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# Supportive Family Communication During the Transition to College

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# ABSTRACT

Supportive Family Communication During the Transition to College

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When first-year students begin college they are thrown into a new environment where they are expected to simultaneously perform academically, form new relationships, and become independent. Many students struggle with this transition; experiences of stress, anxiety, and depression are common. For the majority of residential college students this is their first time living away from their family homes. The wealth of digital communication technologies available today allows students to stay in touch with their families at a frequency that was not historically possible. I examined the relationship between students' college adjustment and frequent family communication.

I recruited new college students to participate in a longitudinal study during their first year on campus. I built and deployed a custom mobile application to collect communication log data directly from participants' phones during three one-week data collection periods, one during each quarter of the academic year. Participants then completed personalized surveys to provide contextual information to augment the logged data and participated in follow-up interviews.

Results indicated that participants' college adjustment increased at the start of their time on campus then remained relatively stable throughout the remainder of their first year,

while the challenging situations that they faced evolved. Further, participants frequently communicated with their families, often in routine and regular ways, which can be considered as family rituals. The findings did not provide a conclusive answer to the question of how frequent family communication is related to students' college adjustment. Conversation analysis showed that students were receiving social support from their families, suggesting a potential buffering effect.

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# INTRODUCTION

1.5 million students start as first-year students at four-year colleges in the United States each year (Pryor et al., 2012). When they arrive on campus students are thrown into a new environment where they are expected to simultaneously perform academically, form new relationships, and mature emotionally (Baker et al., 1985). This transition can be extremely stressful and many new college students experience homesickness, loneliness, and depression (Dyson & Renk, 2006). While they are adjusting to their new lives on campus, contemporary college students use a variety of communication technologies to keep in touch with family members back home, allowing them to communicate more frequently than was possible for previous generations (Hofer, 2008; M. E. Smith, 2015; M. E. Smith et al., 2012). It is unknown, however, whether this frequent family communication helps or harms students' adjustment to college. I explored the relationship between frequent family communication and first-year students' college adjustment.

One might expect students' communication with family members to help them adjust to college. My previous research in this area has found that students use communication technology to maintain and even improve family relationships after they've moved away for college (M. E. Smith, 2015; M. E. Smith et al., 2012). And other researchers have shown that maintaining supportive family relationships can help students adjust to college (Sarigiani et al., 2013). Family communication can provide social support and buffer the negative effects of stressful life events, including the transition to college (Cohen & Wills, 1985; Hall et al., 2019;

Kahn et al., 2017; Mattanah et al., 2010). Further, social support can benefit new college students by providing them with coping resources and improving their adjustment to college (Baker et al., 1985; DeAndrea et al., 2012; Mikal et al., 2013; Taylor et al., 2013). This prior research provides evidence to support the hypothesis that students' increased communication with family members may help them adjust to college.

Alternatively, there are also reasons to suspect that frequent communication with family members could impede students' adjustment to college. Students who frequently communicate with their parents are less autonomous and less satisfied with their college experience (Dyson & Renk, 2006; Hofer, 2008). Developmentally, college students are in a period of emerging adulthood (Arnett, 2014; Johnson et al., 2010; Scheinfeld & Worley, 2018; Taylor et al., 2013). During this time students are developing independence and must renegotiate roles and family dynamics with their parents, who often have different expectations of authority and autonomy than they do (Padilla-Walker et al., 2014). Frequent family communication may indicate a students' parents are over-involved, which can be detrimental for the students' adjustment to college (Fingerman et al., 2012; Schiffrin et al., 2014). Thus, prior research also provides evidence to support a contrasting hypothesis that students' frequent communication with family members may inhibit their adjustment to college.

While most of the prior research on communication and college adjustment has relied on self-reported data, I used log data to examine participant's communication patterns. I recruited new college students and followed them throughout their first year in college.

Participants installed a custom mobile application on their phones that logged their phone calls, text messages, and Facebook messages for one week during each of the three terms of their first year in college. Following those data collection periods, participants completed personalized surveys and interviews to gain additional insights into their communication behaviors. I analyzed this combination of quantitative and qualitative data to explore research questions related to students' college adjustment, communication with family, and the relationship between those two variables.

Survey results indicated that participants' college adjustment remained relatively stable throughout their first year in college. Interviews provided more insight to the variety of challenging situations students faced during this time, including those directly related to college life and others made more difficult by living away from their families. Log data revealed participants communicated with their families quite frequently, through both calls and messages. Interviews provided additional insights to the patterns and expectations around this family communication. Results comparing college adjustment and frequency of family communication were inconclusive. However, conversation analysis showed that students frequently receive social support from their families during the college transition, suggesting a potential buffering effect. This work contributes to the scholarship by introducing a novel method for collecting accurate communication data and confirming results of prior work in the areas of college adjustment and family communication.

# BACKGROUND

## COLLEGE ADJUSTMENT

New residential college students are dropped off on campus and expected to concurrently find their way around an unfamiliar environment, perform academically, form new friendships, and develop independence. Often this is the first time that students are living away from their family homes. For some, this is an exciting opportunity to explore and enjoy freedom without the watchful eye of parents. Other students struggle with the responsibilities of household chores (such as laundry, cleaning, grocery shopping, and meal preparation) that they perhaps never had to deal with before. Although beginning college can be an exciting opportunity for students, it is also a major life transition.

Major life changes such as marriage, divorce, or starting college can have negative impacts on people's health and well-being. Holmes and Rahe (1967) identified 43 separate life events associated with illness onset, including many associated with the college transition, such as "Changing to a new school," "Major change in living conditions," "Major change in working hours or conditions," "Change in residence," "Major change in financial state," and "Major change in sleeping habits." Haimson et al. (2021) created an updated taxonomy of 121 life events that people face in their lives today, including starting college. First-year college students must adjust to many major life changes at the same time; this transition is viewed as one of the most difficult transitions young adults face and has been extensively studied

(Chandler, 1951; Dyson & Renk, 2006; Fisher & Hood, 1987; Handel, 2007; Larose et al., 2019; Taylor et al., 2013; Terenzini et al., 1994).

Adjusting to college is often stressful for students (Kahn et al., 2017), and there are many known negative impacts of stress, both mental and physical (Rahe et al., 1964). In a study of millennial college students and stress, Bland, Melton, Welle, and Bigham (2012) found that students frequently use avoidance coping measures, such as surfing the internet, when faced with stressful situations. These coping mechanisms, they argue, are ineffective for alleviating stress and put students at risk of being more susceptible to stress than other people. Relatedly, many students suffer psychologically during the adjustment to college, experiencing homesickness, loneliness, and depression (Dyson & Renk, 2006; Fisher & Hood, 1987; Kahn et al., 2017). Students who experience depression are also more likely to have lower GPAs and to drop out (Eisenberg et al., 2009). Thus, first-year college students today are ill-equipped to cope with the difficult adjustment to college and students who have trouble adjusting may suffer serious negative consequences.

Researchers have argued that adjusting to college is multidimensional. Baker & Siryk (1984) identified four aspects of college adjustment: *Academic Adjustment* focuses on how students are adjusting to the academic demands of college; *Social Adjustment* focuses on how well students have integrated into the social structures of the university; *Personal-Emotional Adjustment* focuses on how students are managing stress and anxiety; and *Institutional Attachment* focuses on how attached students have become to the university. It is possible for a

student to be adjusting well in one area while struggling in another, such as if a student is doing well in their classes but struggling to make friends.

My first goal with this study was to further understand this major life transition:

### RQ 1: How do students adjust to college during their first year?

## DIGITAL FAMILY COMMUNICATION

College students today are frequent users of communication technologies (Holte & Ferraro, 2021; Hou et al., 2019; A. Smith et al., 2011) and derive many benefits from using them to communicate with friends and family members. For instance, using the social network site Facebook can provide students with social capital (Ellison et al., 2007) and a valuable means of connecting with classmates as they adjust to college (Gray et al., 2013). Similarly, conversations via instant messaging can improve the well-being of distressed students by providing them with a means of emotional relief (Dolev-Cohen & Barak, 2013). The ways in which college students' use communication technologies with family members are often different than the ways they use technology to communicate with others. For instance, only a small fraction (1-2%) of posts made by college-aged Facebook users were directed at family members and those posts used different language than posts to friends (M. Burke et al., 2013). Although less frequent, digital family communication can be particularly valuable for students. Being connected to family members through Facebook helps students to see their family members in a new light (M. Burke & Kraut, 2014) and provides students with a sense that someone will be there to help if they need it (Vitak et al., 2011).

Much of the research on college students' digital family communication has focused on parent-child relationships (Agliata & Renk, 2007; Gentzler et al., 2011; Golonka, 2013; Ramsey et al., 2013; Sarigiani et al., 2013; Sax & Weintraub, 2016; M. E. Smith et al., 2012). While the U.S. Census Bureau (2012) defines a family to include any "group of two people or more related by birth, marriage, or adoption and residing together," there are many other definitions of family employed by researchers and even family scholar experts have not agreed on a precise definition. Family structures have become increasingly diverse and it is important to move beyond simplistic, static definitions of family. In this study I consider families more broadly, allowing student participants to self-identify who they consider to be family, to account for the diversity of their lived experiences.

The communication technologies that students use to communicate with family members are also becoming increasingly diverse as newer technologies are developed and become popular on college campuses. Students' use of communication technologies are driven by their own preferences and skills (Litt, 2013), but may also be limited by their family members' access to and familiarity with their preferred technologies (M. E. Smith et al., 2012). Gentzler et al. (2011) surveyed college students in 2009 about their use of communication technologies with the parent they considered to be their closest family member. Two years later Ramsey et al. (2013) repeated the survey and found differences in both the frequency of digital family communication and associations with student adjustment. This highlights how rapidly contemporary communication behaviors change and reinforces the need to repeat studies in this area as changing family communication norms evolve

College students use these many communication technologies, and the various affordances they provide, to communicate with different people and in different ways. In a study of communication technologies and relationship maintenance, Yang, Brown, and Braun (2014) found students viewed different technologies to be appropriate for different stages of relationship development, progressing from Facebook, to instant messaging, and cell phones as relationships progressed. Similarly, students may differentiate which digital communication tools they use with their families at different times and for different uses. Prior work indicates that students consider both the richness of the communication technologies as well as the context of their complex family relationships when deciding which channel to use for communicating with their parents (M. E. Smith et al., 2012). Further, these decisions are also shaped by the student's physical environment and the preferences of the family members they are communicating with (M. E. Smith, 2015).

To account for these preferences, I chose to study multiple communication technologies. Specifically, I focused on the use of phone calls, text messages, and Facebook messages, which students reported using with their families frequently in my prior work (M. E. Smith, 2015). To understand how students' family communication has evolved, I asked:

RQ 2: How do first-year college students communicate with their families?

## COLLEGE ADJUSTMENT & DIGITAL FAMILY COMMUNICATION

As discussed above, adjusting to college is a major life change and can be quite difficult for first-year college students. Further, these students are active users of communication technologies and regularly use them to communicate with family members. While previous

research has studied digital family communication during the college transition, the relationship between this frequent family communication and college adjustment is unclear. Scharp et al. (2018) found students coming from families that encourage open communication felt most confident during their adjustment. Yogan at al. (2017) surveyed pairs of first-year students and their parents and found some family communication to be positively associated with students' adjustment to college and a negative association for other communication methods. Burke at al. (2016) surveyed students about their communication with their parents and found that open communication of thoughts and feelings was beneficial for students' well-being during their transition to college. Sax and Weintraub (2016) found a positive relationship between first-year students' perceived quality of communication with their mothers and emotional support from their fathers with their college adjustment.

Building on this prior work, my primary goal with this study was to explore the relationship between college adjustment and digital family communication:

### RQ 3: How does frequent digital family communication affect first-year college students' adjustment to college?

Prior research points to two conflicting hypotheses: frequent family communication may help students' adjustment to college by providing them with social support or it may hurt students' adjustment to college by enabling them to continue relying on family members.

Regular family communication may help by enabling students to receive social support from their family members. Social support can aid people during major life changes and other stressful situations by reducing the perceived importance of the stressful situation (Cohen & McKay, 1984). Social support has been found to help people through many stressful situations

and life changes (Cohen & Hoberman, 1983; Rozzell et al., 2014), and researchers have identified a number of benefits of social support during students' transition to college. For example, social support can positively impact students' adjustment to college (DeAndrea et al., 2012; Friedlander et al., 2007; Mattanah et al., 2010) and students' perceived social support is negatively associated with internalizing depression and anxiety symptoms (Taylor et al., 2013).

While it is clear that social support can be beneficial to students as they adjust to college, students who leave their family homes for residential colleges often become geographically separated from the friends and family members they have come to rely on for social support. Students living on campus have lower perceptions of social support and experience more loneliness and anxiety than commuter students (Larose & Boivin, 1998). Most college students in the United States are residential students, with over 60% of moving more than 50 miles from their family homes to attend college (Pryor et al., 2012). Fortunately for these students, computer-mediated communication technology makes it possible for people to receive the benefits of social support from a distance (Lewandowski et al., 2011; Oh et al., 2014; Rozzell et al., 2014). College students today are frequent social media users (A. Smith et al., 2011) and social media can provide students with social support and improve their adjustment to college (DeAndrea et al., 2012; Gray et al., 2013).

Thus, students' frequent digital communication with family members may enable them to receive social support that helps them adjust to college:

H1: Frequent digital family communication will be associated with higher adjustment.

However, there is an alternative outcome of this frequent communication. Students today use mobile phones and social media to communicate with their parents more frequently

than was possible for previous generations of students, and there is some evidence to suggest that the students who communicate with their parents most frequently are less autonomous and less satisfied with both their college experience and their relationships with their parents (Hofer, 2008). Developmentally, college students are in a period of emerging adulthood; they no longer see themselves as adolescents, but don't consider themselves to be entirely adults yet either (Arnett, 2000). During this time students are developing independence and must renegotiate roles and family dynamics with their parents, who often have different expectations of their own authority and their children's autonomy at this age (Kenyon & Koerner, 2009; Padilla-Walker et al., 2014). It is important for students to develop independence and autonomy during college, which can be made difficult by family involvement.

Many college students are supported financially by their parents, which can complicate expectations and renegotiation of parent-child power structures and roles (Aquilino, 2006). Additionally, parents today are often more involved in their children's college education than parents in previous generations were (Cullaty, 2011; Lowe & Dotterer, 2018). Students may find this additional involvement to be helpful and appreciate their parents' supporting them during college. However, overinvolved parents may hinder students' development. Parents who are highly involved in the lives of their emerging adult children are commonly referred to as "helicopter parents"; these well-meaning parents are more intrusive than is appropriate given the age of their children (Padilla-Walker & Nelson, 2012). There is some evidence that college students with helicopter parents are more depressed and less satisfied with their lives (Schiffrin

et al., 2014) and have higher levels of anxiety and depression (Darlow et al., 2017) than their peers.

Although family support can help students adjust to college, frequent communication with parents may also enable students to continue to rely on their families rather than developing their own independence and autonomy, a crucial part of emerging adulthood. Thus, students' frequent digital family communication may hurt their adjustment to college:

H2: Frequent digital family communication will be associated with lower adjustment.

As discussed above, that there are multiple dimensions of adjustment to college and students can be adjusting well in one area and struggling in another. I predicted that the relationship between digital family communication and adjustment to college would be different for the different types of adjustment: Given that family members may be unfamiliar with students' course requirements, they may be unable to provide informational support for students' academic concerns and could actively distract students from their course responsibilities. I predicted a negative relationship between *Academic Adjustment* and frequency of family communication:

H3: Increased family communication will be associated with lower academic adjustment.

Similarly, family members may be unable to support students in making social connections on campus and frequent family communication may encourage students' to withdraw from their new peers. I predicted a negative relationship between frequency of family communication and *Social Adjustment*:

H4: Increased family communication will be associated with lower social adjustment.

In my prior interview studies students' often described turning to family members for emotional support to help them overcome challenges they faced while adjusting to college (M. E. Smith, 2015; M. E. Smith et al., 2012). Therefore, I predicted a positive relationship between *Personal-Emotional Adjustment* and frequency of family communication:

H5: Increased family communication will be associated with higher emotional adjustment.

Finally, family communication may remind students of their lives before moving to college, reinforcing feelings of homesickness and encourage students' to consider leaving college. I anticipated a negative relationship between frequency of family communication and *Institutional Adjustment*:

H6: Increased family communication will be associated with lower institutional attachment.

# METHODS

To investigate these research questions and hypotheses, I conducted a longitudinal study combining surveys, data logged from a custom mobile app, and interviews during the 2014–2015 academic year. First-year students were recruited to complete a Pre-Study Survey and install a Mobile Application on their phones. The Mobile Application was used to log their phone calls, text messages, and Facebook messages during the fifth week of each quarter of their first year at Northwestern. Following those data collection periods participants completed follow-up Quarterly Surveys and Interviews. See timeline in Appendix A for an overview of the data collection procedure. This study was approved by the Northwestern University Institutional Review Board.

# PARTICIPANTS

Participants were required to be first-year students at Northwestern University, to live on campus, to be at least 18 years old, to use an Android smartphone, to self-identify as having grown up in the United States, and to speak English as a native language. An Android smartphone was required in order to use the Mobile Application. I limited to native English speakers because my conversation analysis would be limited to English messages. The other requirements were used to yield a homogenous sample on key dimensions. For instance, I anticipated that students living at home with family would have different communication patterns with their families than students living away from home.

I advertised the study by posting flyers on bulletin boards and public digital screens around campus. I contacted professors teaching first-year seminars and those teaching large introductory courses likely to be enrolled by first-year students, and asked them to allow me or a research assistant to pitch the study during class, to make a brief announcement about the study themselves during class, or to forward an email announcement to their class lists. I also made an announcement during an event in a first-year dorm.

Even with all of these recruitment efforts, it was much more difficult to recruit participants than I had anticipated. While making recruitment announcements we found that the vast majority of the students used iPhones and were therefore ineligible for the study. In one class where I made an announcement there was only one student of the 18 in the class who used an Android phone, and he was ineligible because he was under 18. Given these recruitment hurdles, I yielded a much smaller cohort of participants than I had planned for. In light of this smaller cohort, I modified the goals and methods of the study. I initially designed the study to use quantitative statistical analyses to answer all of the research questions. However, I feared that a smaller cohort would not provide the statistical power necessary to make strong claims. So I expanded the scope of the study by adding interviews and plans to analyze collected messages, to add qualitative insights that would complement the limited statistical results.

There were 100 potential participants who responded to the Pre-Study Survey. However, 44 were excluded for incomplete responses, four for being iPhone users, and eight for not being Northwestern first-year students, leaving only 44 valid participants. Of those 21 (47.7%)

identified as female and 23 (52.3%) as male. All participants were 18 or 19 years old at the start of the study. Thirty eight (86.4%) were born in the USA with one each being born in China, Croatia, Hong Kong, India, South Korea, and the UK. All those who were born abroad had lived in the US for at least six years before starting at Northwestern. Twenty participants (45.5%) identified as White, eight (18.2%) as Black, 17 (38.6%) as Asian, and nine (20.5%) as Latinx. Students had moved 12–1755 miles from their hometowns to attend Northwestern (*M*=605.98, *SD*=571.6).

All participants had graduated high school in 2014, the spring before the study started. Thirty two (72.7%) graduated from public schools, two (4.5%) from charter schools, four (9.1%) from private religious schools, and six (13.6%) from other private schools. Forty participants (90.9%) lived with caregivers during high school while four (9.1%) lived at boarding schools. Students reported estimated household incomes from less than $10,000 to $200,000 or more, with 62.7% of participants reporting household incomes of $90,000 or more.

All participating students were enrolled at Northwestern full-time with 24 (54.5%) being enrolled in the College of Arts and Sciences, three (6.8%) in the School of Communication, nine (20.5%) in the School of Engineering, and nine (20.5%) in the School of Journalism. All participants lived in on campus residence halls. Five participants (11.4%) reported that their families were not contributing toward their college expenses, eight (18.2%) reported that their families contributing 1–25% of their expenses for the year (including tuition, housing, food, etc.), four (9.1%) reported 26–50%, three (6.8%) reported 51–75%, and 24 (54.5%) reported 76% or more.

# PROCEDURE

This study involved ten points of data collection across the academic year, see timeline in Appendix A for overview.

First, students interested in participating in the study were directed to complete the **Pre-Study Survey**, which was hosted on Qualtrics. The survey started with an online consent form outlining the full study (see Appendix B). After consenting to participate students were asked to respond to questions about their college adjustment, parental and peer attachment, family background, technology literacy and use, and demographics. See the full survey in Appendix C and description of survey items in the Measures section below.

I reviewed all responses and invited eligible participants to complete the remainder of the study. Those participants were directed to the **Study Website** where they created an account that would be used for the remainder of the study.

**Log data** was collected over three seven-day periods, the fifth week of each term (Northwestern follows a quarter system with Fall, Winter, and Spring terms each academic year, see timeline in Appendix A). At the start of the fall data collection period participants were emailed and directed to log in to the study website. There they were instructed to download, install, and set up the **Mobile Application**. This set up involved logging in with the accounts they had previously created on the study website and connecting their Facebook accounts. Once the app was set up they were able to complete the **Fall Data Collection**, which automatically retrieved logs of their text messages, Facebook messages, and phone calls from the one week period and transmitted them to the study server. Phone calls, text messages, and

Facebook messages were chosen to be logged as these were the three most common methods of communication that first-year student participants had reported using with their families during an earlier study (M. E. Smith, 2015). See details about the app implementation and data collected in the Mobile Application section below.

After running the data collection on their phones each quarter participants were directed to the Study Website where they were asked to log in and view the collected data. In an effort to be transparent about and give participants control over their collected data there was a page on the website where participants could view the data collected by the app. When viewing this page participants were presented with the complete list of contacts they had communicated with during that quarterly data collection period. For each contact they could click to expand and view all communication logged with that person. For each message they were able to delete the content of the message if there was something they didn't want us to see. When a student chose to delete a message the metadata associated with that message remained in the database, but the text of the message was replaced with "[message-deleted]". This allowed for an accurate count of the number of messages sent to/from any given contact during analysis while preserving participants' privacy. Eighteen participants deleted a total of 360 messages, 1.5% of all messages collected. Deleted messages were most often sent to/from romantic partners (46.7%), followed by friends at Northwestern (29.7%). Only 1.1% of deleted messages were with family members.

After reviewing their data, participants were asked to complete the **Quarterly Surveys**. These surveys followed the same format during the fall, winter, and spring quarters: The survey started with an overview thanking participants for their time, informing them the survey would take approximately 30 minutes to complete, explaining that it worked best on desktop browsers, and asking them to complete it within one week of the end of the data collection period. Students were asked to provide updated information about their enrollment status and about their adjustment to college, which was measured using the same scale that they had initially completed during the Pre-Study Survey.

The majority of the survey was questions following up on the data logged that quarter. They were asked about up to fifteen contacts, the five with the most SMS messages, the five with the most Facebook messages, and the five with the most phone calls. I chose to focus on the most frequent contacts in an effort to get information about the majority of communication logged without exhausting participants by asking about every individual message and call. Additionally, I anticipated that most social support would be in conversations with frequent contacts. This approach resulted in survey responses covering 79.7% of all logged messages and calls. For each of these contacts participants were shown the decrypted contact name or number as well as the logged messages or calls and asked whether they recognized the contact. If they did recognize the contact, they were asked to provide a name for the person, identify the type of relationship they have with them (e.g., parent or friend), the contact's gender and relative age, the relative distance between them, their satisfaction with the relationship and

closeness to the person, as well as whether they communicated with that person via any other channels during the data collection period. See the full survey questions in Appendix D.

After completing the quarterly survey participants were invited to sign up for an **Quarterly Interview** appointment the following week. The goal of the interviews was to provide additional context around the data logs and survey responses. Specifically they were designed to help in understanding how students were adjusting to college and how their communication (with family and others) was supporting them in their adjustment. I conducted a total of 56 interviews across the three quarters. Interviews averaged 50 minutes each, resulting in a total of 46 hours and 27 minutes of interview recordings.

I conducted these interviews one-on-one and they lasted approximately one hour. All interviews took place in person, on campus in the Social Media Lab. When participants arrived in the lab for their interview I directed them to a private room and asked them to review the consent form. After they provided consent, I asked them to log in to the study web site on the computer in the room and to review the messages and calls logged via the app that quarter. I explained that we would be discussing some of the logged data and reminded them that they could delete any messages they didn't want me to see. Audio, video (to show facial expressions and reactions) and the computer screen (to show which message threads were being referenced during conversations) were all recorded.

Interviews were semi-structured following a guide (see Appendix E). The participant's first interview started with asking them questions about themselves and their choice to attend Northwestern. For example, "Where did you grow up?", "Are you close with your family?",

“How did you make your decision to come here?” Next I asked questions about their college adjustment (e.g., “How is this quarter going?”). Then I asked them to explain a few challenging situations they had faced that quarter (“What about the situation was stressful?” and “Was there anyone who you talked to or who helped you with this?”). I also asked about their general stress management practices and whether they turn to their families for support.

The majority of the interview was spent discussing specific examples from their communication logs. Together we reviewed the logs on the screen and I asked them questions about particular examples. I asked participants to provide more context about the contacts, such as how they know the person and how else they communicate with them. I also asked them to explain what was going on when the messages were sent and whether that is typical of their conversations with those contacts and whether communication with those contacts had changed since they had started college.

After reviewing the log data I shifted the conversation back to general adjustment to college. I asked participants how they were doing overall, how they felt about their decision to come to Northwestern, and what they expected of the next quarter. I concluded the interviews by asking participants if there was anything else they would like to share and if they had any questions.

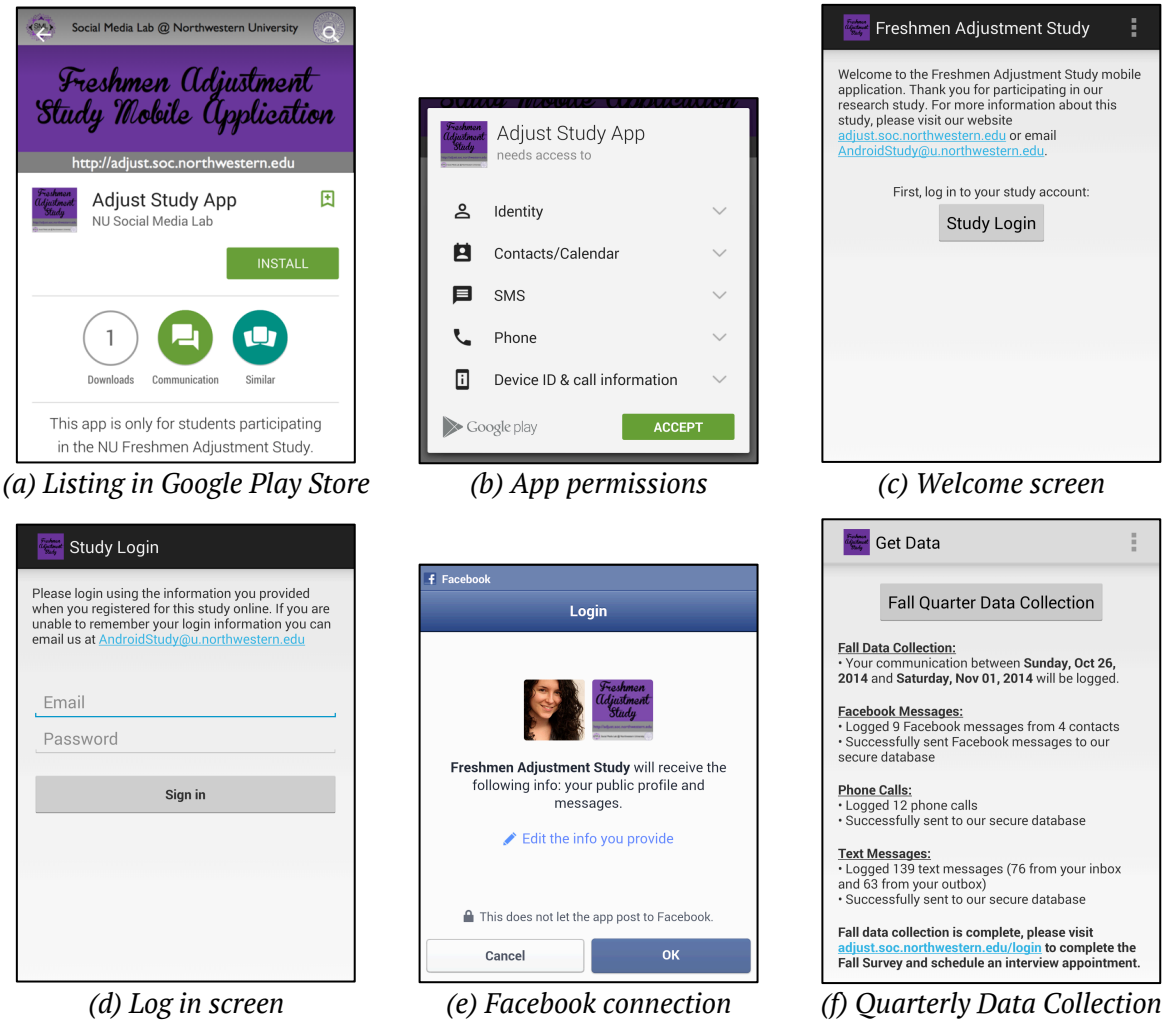
Participants were offered **Incentives** in the form of Amazon gift cards for each part of the study they completed. The amount of the gift cards increased throughout the year in an effort to reduce attrition and amounts were further increased (to the levels indicated below) after the scope of the study was expanded. The amounts of the gift cards they received were: $5

after completing the Pre-Study Survey, $5 after installing the app on their phone, $10 after running the Fall Data Collection on the app and completing the Fall Quarter Survey, $15 after participating in a Fall Quarter Interview, $15 after running the Winter Quarter Data Collection on the app and completing the Winter Quarter Survey, $20 after participating in a Winter Quarter Interview, $20 after running the Spring Quarter Data Collection in the app and completing the Spring Quarter Survey, and $25 after participating in a Spring Quarter Interview. Participants who completed the entire study received a total of $115 in gift cards. Additionally, participants who completed all four surveys were entered into a raffle to win one of three $75 gift cards. Participating in interviews earned them additional raffle entries.

## MOBILE APPLICATION

I developed the mobile app (see Figure 1) specifically to collect data for this study. The app collected digital communication data logs directly from participants' phones and transmitted this data to the study databases. I used a university hosted server, running on a LAMP stack (Linux, Apache, MySQL, and PHP), to host the study website and the databases which stored communication logs and survey data. I developed the Mobile Application for the Android mobile operating system using the Android SDK and coded it in Java. I programmed the Study Website in PHP, HTML, CSS, JavaScript, jQuery, and MySQL.

I built the Mobile Application for Android, rather than iOS or another platform, because the Android operating system allowed for applications with the appropriate permissions to access to user's communications and because Android was the most popular smartphone




*(a) Listing in Google Play Store* *(b) App permissions* *(c) Welcome screen*

*(d) Log in screen* *(e) Facebook connection* *(f) Quarterly Data Collection*

*Figure 1: Screenshots of the Mobile Application.*

operating system in the United States at the time (The Nielsen Company, 2015). The Mobile Application used the Android SDK to access participants' text message (SMS) and phone call logs, and used the Facebook API to access participants' Facebook Messenger logs (this functionality is no longer supported by Facebook). The Mobile App collected all communications of these types for each of the Quarterly Data Collection Periods and transmitted that data to the database on the study server.

The Mobile App was published in the Google Play Store where participants were able to download and install it on their phones (Figure 1a). During the installation process participants were prompted to give the app permissions to access information on their phones needed to access their communication logs, including contacts, text messages, and phone calls (Figure 1b). Participants logged in to the app with the accounts they had created on the study website (Figure 1d) and connected to their Facebook accounts (Figure 1e). Each quarter the app was updated to collect data for the quarter's data collection period. When participants ran the data collection they were shown a summary of the data collected (Figure 1f).

The app logged both **SMS** and **Facebook messages**, including the sender, receiver, message text, and time stamp. In an effort to deidentify messages before storing them in the database each message was run through a script that attempted to automatically remove all names, phone numbers, email addresses, and URLs. This script checked each word in the message against a list of approximately 5,000 common names and automatically replaced them with "[name]". Text strings matching the format of phone numbers and email addresses were identified using regular expressions and replaced. For example, the message "Hey Madeline, call me at 555-867-5309." would have been stored as "Hey [name], call me at [phone number]." The app only logged basic text messages; messages containing images, videos, or gifs were not recorded. Picture and video messages were excluded to preserve the privacy of participants and their contacts, as these images often show identifiable faces, and because the planned analysis did not include analyzing images. Group messages were excluded as the planned analyses

focused on dyadic communication. During analysis, I uncovered that messages containing emoji were not recorded due to my database configuration.

The app also logged phone calls. The metadata associated with the calls were recorded, specifically the phone number; whether the call was incoming, outgoing, or missed; the start time, and the length of the call. No audio recordings were made.

To preserve the privacy of participants and their contacts, phone numbers and contact names were not directly recorded. Instead this data was stored in the database in an encrypted format. This data was decrypted when participants logged in to the study website so that they were able to see the names/numbers associated with each logged message/call when reviewing their data and completing surveys. The encrypted numbers were used during analysis, which allowed for the grouping of messages and calls that were to/from the same person without revealing identifying information. This process was explained to participants in the consent form, see Appendix B.

# MEASURES

## DEPENDENT VARIABLE

**Adjustment to college:** Baker and Siryk introduced the Student Adaptation to College Questionnaire (SACQ; Baker & Siryk, 1984) which has been used by numerous institutions and researchers over the past four decades (Baker, 2002) and is predictive of student retention (Fromme et al., 2008; Gerdes & Mallinckrodt, 1994; Gray et al., 2013; Kerr et al., 2004; Krotseng, 1992; W. Smith & Zhang, 2010) and academic performance (Credé & Niehorster,

2011; Young & Koplow, 1997). The SACQ has four subscales measuring multiple dimensions of students' adjustment to college: the *Academic Adjustment* subscale relates to the educational demands of college coursework; the *Social Adjustment* subscale focuses on interpersonal demands; the *Personal-Emotional Adjustment* subscale aims to determine how students feel psychologically and physically; and the *Institutional Attachment* subscale relates to students' feelings about being in college and the institution they attend. The questionnaire includes 67 statements that participants are asked to rate on a nine-point Likert-type scale from 1 (*Applies very closely to me*) to 9 (*Doesn't apply to me at all*). Statements on the questionnaire include: "I feel that I fit in well as part of the college environment.", "Lately I have been feeling blue and moody a lot.", "Being on my own, taking responsibility for myself, has not been easy.", and "I wish I were at another college or university."

I computed scores for the overall adjustment to college and for each of the four subscales (*Academic Adjustment*, *Social Adjustment*, *Personal-Emotional Adjustment*, and *Institutional Attachment*) for each of the four surveys (Pre-Study Survey and three Quarterly Surveys). After reverse coding items as necessary, I computed the means of the appropriate scale items,. Each score was a value between one and nine where higher values indicate higher adjustment. Initial tests showed low reliability for all five measures. I used correlations to identify related items and reduced from the full set of 67 items to a highly correlated set of 34. With this reduced set of items, Chronbach's alpha scores were high for all scores: Overall Adjustment (34 items, $\alpha$=0.96), Academic Adjustment (11 items, $\alpha$=0.91), Social Adjustment (9 items, $\alpha$=0.886), Personal-Emotional Adjustment (7 items, $\alpha$=0.72), and Institutional

Attachment (10 items, $\alpha$ =0.938). Overall, participants' adjustment scores were moderate, with means between four and six out of nine. See summary of SACQ scores in Table 2.

## INDEPENDENT VARIABLE

**Family Communication:** I computed the number of messages (including both Facebook and SMS) that were exchanged with family members as well as the number of phone calls and cumulative amount of time spent on phone calls with family members from log data. I also computed the percentage of calls/messages with family relative to the all calls/messages during the same time period. I computed each of these values for each Quarterly Data Collection Period (one week each) and totals for the entire study (three weeks). See overview in Table 3.

## EXPLORATORY FACTORS

I collected data on several related factors for potential exploratory analyses:

**Demographics:** I asked participants their birth date (to calculate age), gender, birth country (and when they moved to the US, if not born in the US), native language, ethnicity, zip code, household income, type of high school attended, high school GPA and graduation year, study plans at Northwestern, and how much financial assistance they receive from their families. These demographic factors were summarized using descriptive statistics and described in the Participants section above.

**Attachment:** Armsden and Greenberg (1987) developed the Inventory of Parent and Peer Attachment (IPPA) with subscales measuring individuals security of their relationships

with their parents and peers along three subscales: *trust*, *communication*, and *alienation*. In two surveys of college students they found the security of students' attachment to parents and peers to be highly related to students' well-being. This measure is frequently used in attachment literature (Kenny & Rice, 1995; Laible, 2007; Raja et al., 1992) and has been used alongside the SACQ to study the relationship between attachment and college adjustment (Hiester et al., 2009; Mattanah et al., 2004; Shepard, 2010; Swenson et al., 2008). I used a shortened version (s-IPPA; Raja et al., 1992) including 24 items, 12 for parents and 12 for friends, which has been successfully used in prior work to predict adolescent adjustment (Laible et al., 2000; Raja et al., 1992). For each item participants were asked how often a statement is true for them on a 5-point Likert-type scale from 1 ("Almost Never or Never") to 5 ("Almost Always or Always"). Statements include "I tell my parents about my problems and troubles" and "My friends encourage me to talk about my difficulties".

I computed scores for both *Attachment to Parents* and *Attachment to Peers* by taking the mean response values of the 12 corresponding statements for each relationship type. On average, participants indicated moderate attachment to parents (*M*=2.897, *SD*=0.254, *range*=2.42–3.55, $\alpha$=-0.519), and higher attachment to friends (*M*=3.153, *SD*=0.315, *range*=2.5–3.83, $\alpha$=0.2).

**Family Background:** Participants were asked to think of the two most important parental figures or caregivers in their lives and provide information about each. Questions asked about the type of relationship the participant had with them; whether they lived together during high school; their gender, their age, relative to the participant; their level of education;

their industry of work, whether these two individuals lived together, and how responsibility for caring for the participant was divided between the two of them. Participants were also asked to identify up to five additional family members.

**Digital Skills:** This generation of students, who grew up with digital communication technologies, are often considered to be "digital natives" and viewed as being technologically savvy. However, there are still significant differences among young people in how well they understand and know how to use technology (Hargittai, 2010). Further, young people's digital skills have been shown to explain differences in how they interact with and receive social support from contacts (Micheli et al., 2020). I used the Web-Use skills questionnaire (Hargittai & Hsieh, 2012; Litt, 2013) to evaluate participants' digital skills. Participants were asked to rate their familiarity with six computer and internet-related terms on a Likert-style scale from 1 ("No understanding") and 5 ("Full understanding"). Terms included "PDF" and "Phishing". I computed one score for each participant, by averaging their responses to the six statements. Participants were moderately technologically savvy, with an average score of 3.2 out of five ($SD$=0.887, $range$=1–5, $\alpha$ =0.874).

**Technology Use:** Participants were asked which type of cell phone they have (Android, iPhone, etc.) and which types of services they use (audio calls, video calls, text messaging, etc.). For each communication service selected, they were asked how often they use it with various types of contacts (parents, grandparents, siblings, other family members, friends at Northwestern, friends not at Northwestern, romantic partners, acquaintances, professors/bosses, strangers, and others). See summary of responses in Table 8, Appendix G.

# ANALYSES

## CONVERSATION ANALYSIS

To analyze participants' received social support via digital communication, the content of logged messages (SMS and Facebook messages) were coded. Message logs were coded in three phases: (1) to group messages by topic, (2) to identify the type of social support, and (3) to identify whether support was needed, sought, or received:

- **Topical Groupings**: Each individual message is part of a larger message thread, containing all messages sent between a particular participant and contact. These threads varied in length from a single message to 424 messages across the three weeks of data collection ($M$=21.35, $SD$=43.114). The first phase of coding broke these long threads into groups of messages related to a single topic. For example, Figure 2 shows messages from one thread that were divided into four topical groupings. These topical groupings included 1–71 messages ($M$=6.89, $SD$=7.541).
- **Support Type**: Next topical groupings were coded for the type of social support they included: *No Support*, *Emotional Support*, *Social Companionship*, *Instrumental Support*, or *Informational Support*. This coding scheme was based on the definitions used by Albrecht (1984) and Cohen & McKay (1984) and can be found in Appendix F.
- **Support Action**: Finally, specific messages where participants indicated *needing*, *seeking*, *receiving*, or *giving* social support were identified.

| | | |
|---|---|---|
| Mom: | I just got out of meeting do u need something | Following up on missed call |
| Participant: | No I just wanted to tell you something | |
| Mom: | How are u feeling hunny | Sick |
| Mom: | Call me when u can | |
| Mom: | [name] said she loves u & she misses u,,,hopes u feel better | |
| Mom: | Morning sweetheart how are u feeling? Did u still have fever last nite? | |
| Participant: | Hi momma, im feeling much better. I still have a headache, but I dont feel feverish and I slept through the night | |
| Mom: | Drink lots of water & eat something lite eggs oatmeal no milk | |
| Participant: | Gotcha, thank you momma | |
| Mom: | Can u ask about it in financial aid office? | Financial aid forms |
| Participant: | Ugh okay | |
| Participant: | I'll check online again | |
| Mom: | Not online yet can y email your advisor tomorrow ? Ask if forms were sent out | |
| Participant: | Yeah I can email them | |
| Mom: | Ok nite | Good night |
| Mom: | Time for bed | |
| Participant: | Yes, goodnight momma | |

*Figure 2: Messages coded into topical groupings*

Table 1 shows hypothetical messages demonstrating the different social support types and actions that were coded.

| | Needing | Seeking | Receiving/Giving |
|---|---|---|---|
| **Emotional** | "I'm frustrated." | "I'm frustrated, can we talk." | Sure, what's going on?" |
| **Informational** | "I need to wash my jeans and I don't know how." | "How do I wash my jeans?" | "Use cold water" |
| **Instrumental** | "My tuition is due and I don't have enough money" | "Can you send me money to pay my tuition?" | "I'll transfer money into your account" |
| **Social** | "I have no one to hang out with tonight" | "Will you hang out with me tonight?" | "Sure, let's meet up at 9pm" |

*Table 1: Examples of hypothetical messages demonstrating the social support coding scheme.*

Two research assistants completed the coding. Before coding independently, a subset of threads were randomly selected to be coded by both coders for training. As the research assistants individually coded these threads, we all met to review and resolve discrepancies while iteratively refining the coding scheme. Once the coding scheme was stable and agreement was high, the two research assistants worked independently to code the remaining threads and to re-code those that had been coded with earlier versions of the coding scheme.

## INTERVIEWS

All interviews were recorded and fully transcribed. Interview transcripts were reviewed and summarized by research assistants. I reviewed interview summaries to identify common themes and patterns. Then I reviewed full transcripts to explore these themes and my research

questions, reviewing recordings as necessary. Throughout this process I identified examples of common behaviors and outliers, maintaining a spreadsheet of notes and quotes of each.

## STATISTICAL ANALYSES

For RQ 1, to evaluate whether there were any significant changes in adjustment over time, I conducted five Repeated Measures ANOVAs. These models compared the five adjustment scores across the four surveys. Results indicated that the assumption of sphericity was violated and I used the Greenhouse-Geisser adjustment. While there were 44 valid responses to the pre-study survey, only 17 of those participants went on to complete all three Quarterly Surveys; these analyses were limited to those 17 participants.

For RQ 2, to evaluate whether there were any significant changes in frequency of family communication over time, I conducted three Repeated Measures ANOVAs. The first model tested for differences in percent of time spent on phone calls with family relative to the total time of all phone calls across the three quarters. The second model tested for differences in percent of calls with family members relative to all calls across the three quarters. The third model tested for differences in percent of messages exchanged with family members relative to all messages across the three quarters. Again sphericity was violated and I used Greenhouse-Geisser adjusted results. Only 14 of the 44 participants use the app to log data for all three data collection periods; these analyses were limited to those 14 participants.

For RQ 3, to evaluate the effect of frequent family communication on adjustment to college, I used Pearson product-moment correlations. I tested for correlations between each combination of frequency of family communication measures (number of phone calls, phone

call time (in minutes), number of messages, and relative percentages for each) with each measure of adjustment (Overall Adjustment, Academic Adjustment, Social Adjustment, Personal-Emotional Adjustment, and Institutional Attachment) for each of the three quarters.

# RESULTS

In all there were 44 participants who completed up to four surveys (M=1.75 per participant), used the app to log communication data for up to three weeks (26,443 total messages and calls logged, M=755.51 calls and messages per participant), and participated in up to four interviews (56 total interviews conducted, M=1.3 per participant).

## COLLEGE ADJUSTMENT

With RQ 1, I asked how students' college adjustment changed throughout their first year on campus. Across all four surveys participants' adjustment scores were moderate, with means between four and six. Figure 3 shows the mean adjustment scores (overall and subscales) over time; mean and standard deviation values are listed in Table 2.

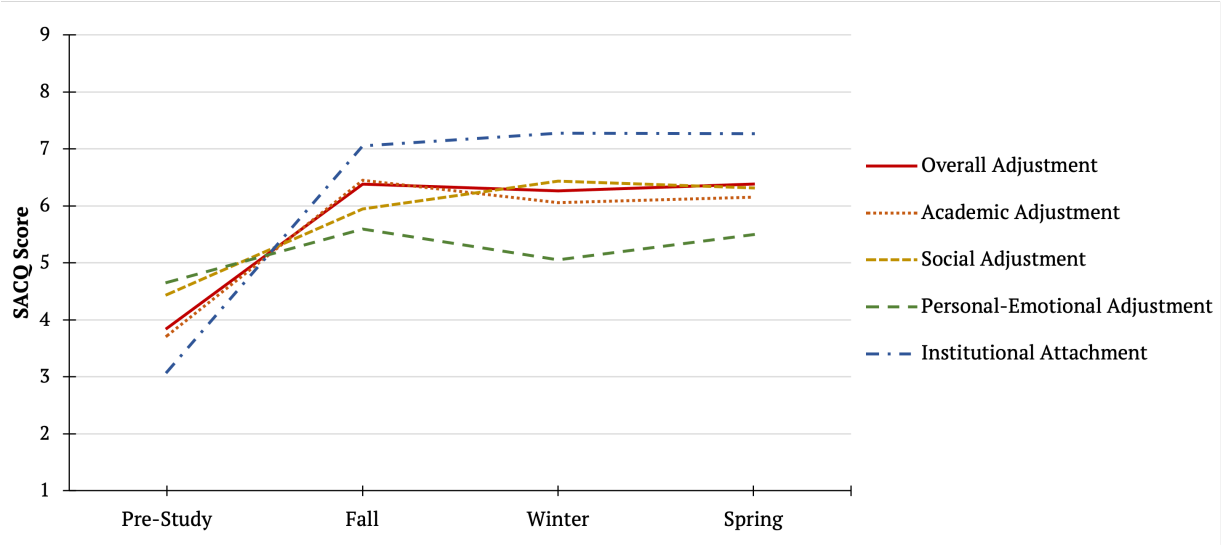



*Figure 3: Line chart of mean SACQ scores over time*

| | Pre-Study | | Fall | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Overall Adjustment | 3.85 | 0.90 | 6.38 | 1.04 | 6.26 | 0.74 | 6.38 | 1.00 |
| Academic Adjustment | 3.72 | 0.96 | 6.45 | 1.11 | 6.05 | 0.93 | 6.15 | 1.25 |
| Social Adjustment | 4.44 | 1.24 | 5.95 | 1.48 | 6.43 | 0.90 | 6.31 | 1.20 |
| Personal-Emotional Adjustment | 4.66 | 1.31 | 5.60 | 1.41 | 5.05 | 1.34 | 5.50 | 1.32 |
| Institutional Attachment | 3.08 | 1.06 | 7.05 | 1.26 | 7.28 | 0.69 | 7.27 | 0.97 |

*Table 2: Mean and standard deviation SACQ scores (overall and four subscales) for each survey*

I was interested in whether students' adjustment increased over the course of the year, as they spent more time on campus. Repeated Measures ANOVAs with Greenhouse-Geisser corrections showed significant differences between the four surveys for four of the five college adjustment measures: Overall Adjustment $F(1.320, 21.126) = 29.549$, $p<0.001$; Academic Adjustment $F(1.498, 23.973) = 23.730$, $p<0.001$; Social Adjustment $F(1.355, 21.686) = 31.618$, $p=0.003$; and Institutional Attachment $F(1.347, 21.553) = 63.812$, $p<0.001$. Pairwise comparisons revealed significant increases ($p<0.001$) in adjustment scores between the Pre-Study Survey and all three quarterly surveys for Overall Adjustment, Academic Adjustment, and Institutional Attachment. Pairwise comparisons also revealed significant increases ($p=0.003$) between the Pre-Study Survey and the Winter and Spring Quarter Surveys for Social Adjustment. There were no significant differences across the four surveys for Personal-Emotional Adjustment, $F(1.312, 20.999) = 1.892$, $p>.05$.

To further understand students' adjustment to college during their first year I turned to the interview data. In analyzing interviews for RQ 1, I looked at the types of challenges participants described facing and they ways that they coped with these situations.

Participants described a wide variety of challenges that they faced while adjusting to college, such as managing their unstructured schedules, struggling with the demands of their

academic programs, navigating social life on campus, and dealing with physical illnesses. Some of these challenges were new to college and some were made harder by being away from family. For example, p176 reflected on how being sick at college was different than being sick when he lived at home with his parents:

> *Well, this past week I was sick. It's been a bit of a struggle not having parents around to take over and take care of you. It's really kind of made me realize what it means to be really, really living on my own and to take care of myself. Because, realizing I don't have a roommate, there's no one to check up on me. Sometimes I sit in my room I'm like "if I died here, no one will know." I'm not that sick, it's not that extreme. But it's been kind of weird kind of having that realization come over you.*

Similarly, p181 described how he had the same general responsibilities as he did before college, but now there was no backup from his parents:

> *I don't have any more responsibilities, it's just a matter of it's all me instead of if I forget to do something my dad might have been like, "Hey, you forgot to do that," and I'd be like, "Oh, thanks." But now there's not anyone who is going to do that.*

The types of challenges they faced evolved over the course of the year. In the fall quarter, the challenges participants discussed were largely related to navigating their new normal, such as learning to live with a roommate or managing difficult courses. By winter quarter, participants had become more involved on campus, such as joining fraternities/sororities and other student organizations or starting work-study jobs. The stressors they discussed often had to do with balancing these competing priorities. Additionally, more students reported feeling homesick during the winter quarter, such as p205:

> *This quarter, something that's different for me, is I actually do miss home a lot. 'Cause fall quarter, I think it was more the excitement of being in a new place and in college, I didn't miss home at all almost. But then going back for winter break was*

> *really nice. And it was to the point where I almost didn't wanna come back. So being here now, I do miss it a lot. And it might be the weather as well.*

Like this participant, many mentioned the cold midwestern winters being a challenge for them winter quarter. In the spring quarter, many of the concerns students discussed had moved from on-campus issues to future plans, such as moving off campus the next year and finding summer internships. Many participants felt like they were better able to handle challenging situations by that point in the year. For example, p204 explained that her cleaning routine helped her to manage her stress:

> *I feel like I'm handling it a lot better than last quarter. Last quarter, I was very stressed, especially at the beginning. I had problems sleeping but that was because of personal issues, not college specifically. But now, I don't know if I've just developed a thicker skin, I don't feel like I've changed my habits that much. I guess I have little de-stress things that I do, like I always clean my room the second after I get back to my dorm room. I clean it top to bottom, except for my roommate's side, 'cause her side is like a disaster zone. But yeah, I clean my side, and that helps de-stress me, I guess.*

Participants coped with these challenges in a variety of ways, such as by cleaning, playing piano, and exercising. Some participants reached out to others for help when they were stressed, such as p160 who turned to her peer advisor and first-year seminar professor for advice when she was feeling overwhelmed and depressed:

> *I was having a rough time so then I went and talked to my PA and he was very happy that I went to talk to him; he was very ecstatic. He was like, "Hey, my freshman actually trusts me!" So that helped. And I talked to my seminar advisor. And they both just really wanted me to get help.*

She felt more comfortable seeking support on campus than from her family, she explained, "My dad just doesn't get it, at all; he just doesn't. And my mom would probably overreact; she's a bit of a hypochondriac."

Some participants reached out to multiple people for different types of support. Such as p200 who talked with her mom, her dorm advisor, and her friends when her roommate's boyfriend overstayed his welcome:

> *I think they were all useful in different ways. With my mom, it was more like processing it and understanding why I was feeling those feelings. With my friends, it was literally just like getting it out there. Then with my RA, it was like figuring out how to deal with it.*

Often participants reached out to various connections for specific types of advice. For example, p201 described how he would turn to his parents for academic advice and his brother when he needs to vent:

> *If I'm really, really stressed out, I would talk to my brother or my parents. My mom is a teacher and my dad has taught some classes as a doctor so they both kind of know a little bit about the teaching process and they're both really encouraging. They're like, "You're learning. It's okay. It's your first quarter of college. You have a long way to go. Don't worry about it. You'll be fine." If I really need to just vent it out, I will talk to my brother.*

I was particularly interested in the ways that participants got support from their families when facing challenges and explored this further with RQ 2 below.

## DIGITAL FAMILY COMMUNICATION

In RQ 2, I asked how first-year college students communicated with their families. Before answering this question I needed to understand who those students consider to be

family: During the Pre-Study Survey, I had asked participants to provide information about two caregivers. Most participants listed parents (90.7%) while a few identified grandparents (4.7%) and several identified a sibling, family friend, or uncle. The participants most often lived with these caregivers full-time (71.4%) or part-time (11.9%) during high school. Caregivers were 56% female and 44% male, and the majority (55.8%) were 26–35 years older than the participant. Caregivers were highly educated, with the majority (71.3%) having earned college degrees. Participants overwhelmingly (96.4%) considered these caregivers to be family. Most often (71.4%) the two identified caregivers lived together. Many participants (40.9%) indicated their caregivers split caring responsibilities 50–50, with others identifying splits from 80–20 to 99–1. I also asked participants to identify up to five additional family members, these included siblings (58.5%), grandparents (11.7%), aunts/uncles (14.9%), cousins (6.4%), step parents (2.1%), and step siblings (2.1%). Of those family members 45.7% were female and 54.3% male. Many of these family members lived together (48.9%).

To understand which methods participants used to communicate with their families and how often they did so I turned first to their Pre-Study Survey responses. Participants self-reported frequent use of many communication technologies with people with whom they had various types of relationships. Phone calls were most frequently used with parents (63.7% reported phone calls with parents weekly or more often) and friends at Northwestern (43.2% weekly or more). Video calls were less commonly used, with only 34.1% of participants reporting using video calls with their parents, most of them less often than monthly. Video calls were used slightly more frequently with friends not at Northwestern (43.2% of

participants). Text messages were used quite frequently: 75% of participants reported texting with friends at Northwestern daily or multiple times per day and 34.1% with their parents that often. Multimedia Messages, Group Messages, and Social Network Sites were also commonly used with friends: Multimedia Messages were used daily or multiple times per day with friends not at Northwestern by 43.1% of participants, Group Messages were used daily or multiple times per day with friends at Northwestern by 52.2% of participants, and Social Network Sites were used daily or multiple times per day with friends not at Northwestern by 40.9% of participants. Several participants reported communicating with other media, including email and games. See Table 8 in Appendix G for a full summary of self-reported technology use.

To further explore the frequency of family communication I examined the data logged by the Mobile Application. This log data showed that students communicated with their families frequently. Over the three one-week study periods, a total of 0–41 calls were recorded between participants and family members (*M*=7.83, *SD*=10.35) making up an average of 39.73% of all participants' calls (*range*=0–100%, *SD*=24.53%). In total, participants spent an average of 68.15 minutes on calls with family members (*range*=0–257.73, *SD*=85.48), which was an average of 43.75% of all the time they spent on the phone (*range*=0–100%, *SD*=36.67%). Most often students initiated the calls with family members, with an average of 4.51 outgoing calls (*range*=0–22, *SD*=5.99), compared to 2.23 answered incoming calls (*range*=0–10, *SD*=2.23) and 1.09 missed incoming calls (*range*=011, *SD*=2.63).

Similarly, participants frequently messaged with their families. On average, there was a total of 72.91 messages with family members logged per participant across the three weeks

(*range*=0–410, *SD*=104.54). Most often these were SMS messages, however six participants exchanged Facebook messages with family members. Participants received more messages from family members than they sent to those contacts (received: *range*=0–362, *M*=49.2, *SD*=83.06; sent: *range*=0–134, *M*=23.71, *SD*=31.1). While there were a significant number of messages exchanged with family members, they made up only a small percentage of the total messages participants exchanged (*range*=0–67.51%, *M*=8.19%, *SD*=12.64%). See Table 3 for frequencies and relative percentages of family communication across the three data collection periods (three weeks).

I was interested in whether students' communication with their families would change over the course of the academic year. In interviews, multiple participants described less frequent contact with their families later in the year. For example, p186 felt that he talked with his parents less often during the winter quarter than he had previously:

| | **Number of Calls/Messages** | | | **Percent of All Calls/Messages** | | |
|---|---|---|---|---|---|---|
| | *Range* | *Mean* | *SD* | *Range* | *Mean* | *SD* |
| **Phone Calls** | | | | | | |
| Call Time (minutes) | 0–258 | 68.15 | 85.48 | 0–100% | 39.73% | 36.67% |
| Number of Calls | 0–41 | 7.83 | 10.35 | 0–100% | 19.73% | 24.53% |
| Outgoing Calls | 0–22 | 4.51 | 5.99 | 0–100% | 21.91% | 26.56% |
| Incoming Calls | 0–10 | 2.23 | 3.04 | 0–100% | 18.82% | 26.33% |
| Missed Calls | 0–11 | 1.09 | 2.63 | 0–100% | 15.16% | 30.20% |
| **Messages** | | | | | | |
| All Messages | 0–410 | 72.91 | 104.54 | 0–67.51% | 8.19% | 12.64% |
| Facebook Messages | 0–34 | 2.06 | 6.28 | 0–54.84% | 4.05% | 11.44% |
| Text Messages | 0–410 | 70.86 | 103.85 | 0–69.87% | 8.71% | 13.21% |
| Sent Messages | 0–134 | 23.71 | 31.21 | 0–63.46% | 8.05% | 12.37% |
| Received Messages | 0–362 | 49.20 | 83.06 | 0–70.68% | 8.31% | 13.08% |

*Table 3: Frequency and relative percent of family communication by type of communication*

> *It's kind of just been downward sloping through the whole year, which may be... That also may be related to the fact that my school work has gotten increasingly harder, so I've had to spend more time doing school work, more time studying, and have less free time, but also maybe just like... I don't know. I'm adjusted and I think they've realized as well that I don't need to be... I'm sure they miss talking to me a lot, but I just don't have... I'm busy, and I'm all adjusted to school and stuff.*

To triangulate this, I explored the log data, looking to see whether students communicated less often with family members, relative to all of their communication, later in the year. The percentage of time participants spent on calls with family members, relative to total call time, decreased from the fall to winter and spring quarters. Conversely, the percentage of messages exchanged with family members, relative to all messages exchanged, increased during the same periods. See chart in Figure 4 depicting these relative frequencies over the three quarters.

To test whether these observed differences were statistically significant I used Repeated Measures ANOVAs with Greenhouse-Geisser corrections. These tests did not reveal any significant differences in the percent of communication exchanged with family members

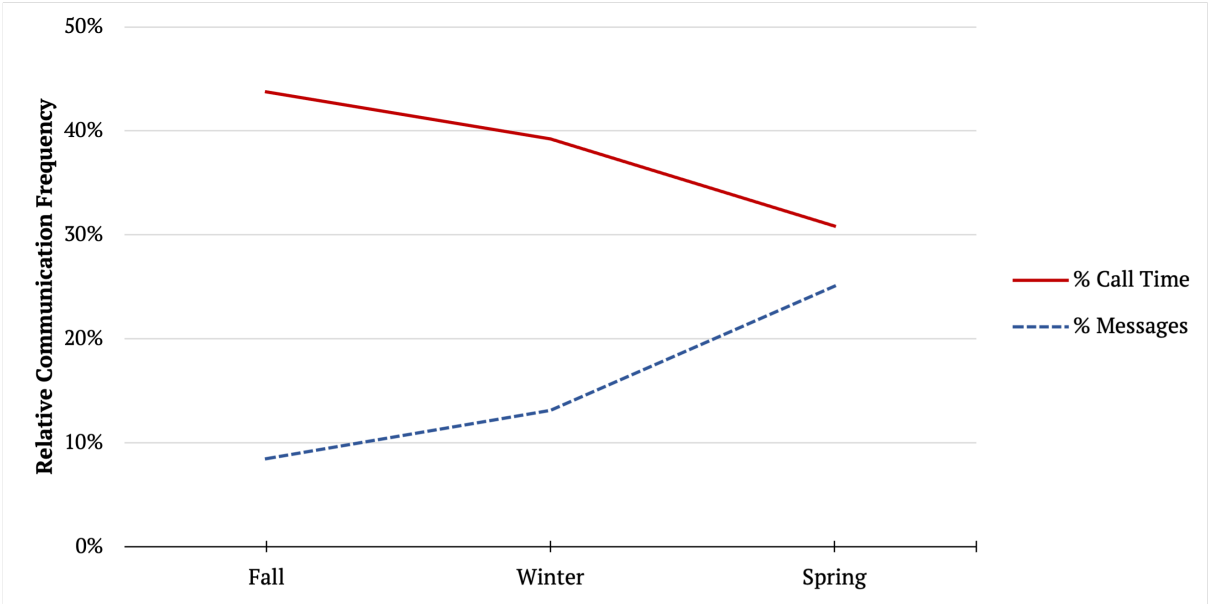



*Figure 4: Line chart of relative family call time and message percentages over time*

relative to all communication across the three data collection periods: number of calls ($F(1.53, 29.282) = 0.054$, $p=0.948$), call time ($F(1.986, 349.159) = 0.392$, $p=0.679$), and number of messages ($F(1.752, 51.583) = 0.493$, $p=0.591$). See Table 4 and Table 5 for numbers and relative percentages of calls and messages for each of the three quarters and communication types.

I turned to the interview data to understand the patterns of communication I observed in the log data. Was this one week sample representative of their broader communication across the semester? How were these communication patterns established? Were they (and their families) satisfied with their communication? What communication was missing from the logs?

Most participants indicated that the logged data was typical for them and their families. Some participants had scheduled times to talk with their families while others communicated only when the need arose, or for some it was a mix of routine and ad hoc contact. Several participants described texting short exchanges whenever there was something to discuss throughout the week while also having regular in-depth phone calls. Often families hadn't established explicit schedules but fell into routines of talking around the same time each week, such as p176 who often called his mom Monday evenings while folding laundry. Some participants had explicitly discussed communication expectations with their family members before starting college. For example, p200 and her mom planned not to call each other for her first six weeks on campus. However, their plans changed once the realities of living apart set in:

> *We were actually going to try not to call until I've been here for a month and a half and then that first week goes like, that's not going to work for me. As long as it's not a scheduled thing, as long as it's something we both want to do every week, I think it's good to do.*

| | Fall Quarter (1 week) | | | Winter Quarter (1 week) | | | Spring Quarter (1 week) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Range* | *Mean* | *SD* | *Range* | *Mean* | *SD* | *Range* | *Mean* | *SD* |
| **Phone Calls** | | | | | | | | | |
| Call Time (minutes) | 0–118.45 | 24.18 | 29.93 | 0–205.95 | 40.84 | 53.05 | 0–105.4 | 20.76 | 33.25 |
| Number of Calls | 0–25 | 3.64 | 5.57 | 0–22 | 3.83 | 5.49 | 0–20 | 2.25 | 4.42 |
| Outgoing Calls | 0–19 | 2.18 | 3.71 | 0–12 | 2.21 | 3.24 | 0–9 | 1.17 | 2.06 |
| Incoming Calls | 0–9 | 1.00 | 1.97 | 0–5 | 1.00 | 1.35 | 0–5 | 0.75 | 1.48 |
| Missed Calls | 0–6 | 0.45 | 1.25 | 0–5 | 0.63 | 1.28 | 0–6 | 0.33 | 1.27 |
| **Messages** | | | | | | | | | |
| All Messages | 0–211 | 30.73 | 44.57 | 0–162 | 35.13 | 49.41 | 0–163 | 25.38 | 42.77 |
| Facebook Messages | 0–34 | 1.61 | 6.23 | 0–0 | 0.00 | 0.00 | 0–9 | 0.79 | 2.27 |
| Text Messages | 0–207 | 29.12 | 42.53 | 0–162 | 35.13 | 49.41 | 0–163 | 24.58 | 42.52 |
| Sent Messages | 0–102 | 11.36 | 21.34 | 0–50 | 10.54 | 15.06 | 0–34 | 6.96 | 11.78 |
| Received Messages | 0–109 | 19.36 | 26.98 | 0–162 | 24.58 | 41.54 | 0–163 | 18.42 | 37.87 |

*Table 4: Frequency of family communication per quarter and communication method*

| | Fall Quarter (1 week) | | | Winter Quarter (1 week) | | | Spring Quarter (1 week) | | |
|---|---|---|---|---|---|---|---|---|---|
| | *Range* | *Mean* | *SD* | *Range* | *Mean* | *SD* | *Range* | *Mean* | *SD* |
| **Phone Calls** | | | | | | | | | |
| Call Time (minutes) | 0–100% | 43.75% | 38.29% | 0–100% | 39.21% | 38.61% | 0–98.53% | 30.84% | 38.87% |
| Number of Calls | 0–100% | 22.42% | 29.20% | 0–80% | 20.55% | 22.87% | 0–83.33% | 14.75% | 24.35% |
| Outgoing Calls | 0–100% | 22.56% | 29.85% | 0–66.67% | 23.02% | 25.82% | 0–100% | 18.81% | 29.35% |
| Incoming Calls | 0–100% | 17.09% | 29.56% | 0–100% | 20.18% | 27.89% | 0–100% | 21.19% | 35.21% |
| Missed Calls | 0–100% | 21.26% | 40.15% | 0–100% | 14.00% | 25.73% | 0–60% | 5.54% | 16.18% |
| **Messages** | | | | | | | | | |
| All Messages | 0–56.14% | 8.46% | 13.65% | 0–78.05% | 13.12% | 18.40% | 0–25.05% | 25.05% | 7.60% |
| Facebook Messages | 0–54.84% | 3.62% | 11.41% | 0–0% | 0.00% | 0.00% | 0–25.71% | 25.71% | 3.28% |
| Text Messages | 0–57.98% | 9.12% | 14.40% | 0–83.48% | 15.60% | 21.39% | 0–25.05% | 25.05% | 8.33% |
| Sent Messages | 0–52.04% | 7.82% | 13.50% | 0–78.43% | 11.74% | 18.92% | 0–28.4% | 28.40% | 7.03% |
| Received Messages | 0–62.3% | 8.76% | 14.63% | 0–77.78% | 13.92% | 18.67% | 0–24.4% | 24.40% | 7.48% |

*Table 5: Relative percent of family communication per quarter and communication method*

Other students also discussed their patterns of family communication continuing to evolve throughout the year, as they established routines on campus and adjusted to living away from their families. For example, p204 reflected during her spring quarter interview on how the topics she discussed with her mom had changed over the year:

> *The beginning of the school year, I'd call my mom every day, or at least every other day, and we'd just talk about what happened during the day, and I'd tell her everything that happened. And now it's like I pick and choose what I choose to tell her. Not because I don't want her to know, but it's just quicker and easier more convenient, not convenient... But it's more time-saving if I just tell her important tidbits.*

Some participants described discrepancies between how often they wanted to communicate and how often their families did. For example, p186 explained that his parents expected him to call every night, the way his older brother did, but that he didn't feel the need to communicate that often. When they felt he wasn't in touch as often as they wanted, his dad would reach out and ask him to call:

> *Occasionally my dad would send a text like, "Call your mom." [...] He'll send it to me individually, just one on one, because I don't think that he wants my mom to know that he's the reason I'm calling her, because she probably wants to feel missed. Well she is, I miss them. But it's not like I am in California and haven't seen them in months, I saw them this weekend for parents weekend.*

In some instances participants were the ones initiating contact, in other it was family members, often it was a mix of both. For example, p178 was usually the one to call her mom because her mom worried about bothering her if she was busy.

While the communication data I logged included only direct phone calls, text messages, and Facebook messages, participants told me about other methods of communication during

interviews. Several participants described group video calls with their families, such as p185 who described Skype calls with her parents and her sister who was away at another college: "*Usually my mom initiates just because she really likes to Skype. And it will be mostly just saying hi to everybody so everyone can talk at once.*" It was also common for participants to have group chats with family members over text messaging, or email. For example, p155 described family emails: "*I do a lot of email chains between my entire side of the family. About things we find on the internet that are funny or if there's an interesting article.*"

Calls with multiple family members joining were common. For example, p208 has nightly FaceTime calls with her parents and brother for bible study. Multiple participants described talking to a single family member that served as a conduit, passing information between the participant and the rest of the family. For example, p196 only talked to his mom but knew that the information was being passed on to his dad and siblings.

## COLLEGE ADJUSTMENT & DIGITAL FAMILY COMMUNICATION

In RQ 3, I asked how students' digital family communication relates to their college adjustment. I used Pearson's correlations to determine relationships between these variables for the six frequency of family communication measures and the five college adjustment measures, for each of the three quarters. See Table 6 for results of all correlations.

I proposed two competing hypotheses: I predicted a positive relationship between communication and adjustment in H1, while I predicted a negative relationship in H2. I found no significant correlations between the amount/percent of calls/messages with family and any of the adjustment measures. Therefore, I did not find evidence to support either hypothesis.

I had further predicted that the different aspects of college adjustment would be related to family communication in different ways. In H3, I predicted a negative relationship between frequency of family communication and Academic Adjustment. In H4, I predicted a negative

| | Overall Adjustment | Academic Adjustment | Social Adjustment | Personal-Emotional Adjustment | Institutional Attachment |
|---|---|---|---|---|---|
| | | | Fall Quarter | | |
| Call Count | -0.045 | -0.073 | -0.164 | 0.067 | -0.034 |
| Call Time | 0.041 | 0.057 | -0.034 | 0.129 | -0.099 |
| Message Count | 0.114 | 0.24 | -0.147 | 0.115 | 0.089 |
| % Call Count | -0.021 | 0.038 | -0.129 | 0.01 | -0.081 |
| % Call Time | 0.14 | 0.143 | 0.033 | 0.076 | 0.09 |
| % Message Count | 0.12 | 0.194 | -0.015 | 0.044 | 0.089 |
| | | | Winter Quarter | | |
| Call Count | -0.04 | -0.072 | -0.061 | -0.076 | 0.166 |
| Call Time | 0.119 | 0.123 | -0.035 | 0.151 | 0.181 |
| Message Count | -0.022 | -0.127 | -0.246 | 0.217 | 0.093 |
| % Call Count | -0.04 | -0.099 | 0.081 | -0.01 | -0.004 |
| % Call Time | -0.107 | -0.184 | -0.277 | 0.225 | -0.102 |
| % Message Count | 0.19 | 0.069 | 0.136 | 0.216 | 0.208 |
| | | | Spring Quarter | | |
| Call Count | 0.099 | 0.197 | 0.09 | -0.007 | -0.007 |
| Call Time | 0.269 | 0.242 | 0.331 | 0.142 | 0.19 |
| Message Count | -0.319 | -0.263 | -0.186 | -0.379 | -0.264 |
| % Call Count | 0.359 | 0.32 | 0.377 | 0.281 | 0.237 |
| % Call Time | 0.341 | 0.246 | 0.41 | 0.198 | 0.324 |
| % Message Count | -0.175 | -0.294 | 0.005 | -0.125 | -0.125 |

*Table 6: Correlations between College Adjustment and Frequency of Family Communication*

relationship between frequency of family communication and Social Adjustment. In H5, I predicted a positive relationship between frequency of family communication and Personal-Emotional Adjustment. Finally, in H6, I predicted a negative relationship between frequency of family communication and Institutional Attachment. I found no evidence to support any of these hypotheses.

I had collected data on several related factors to explore and potentially further explain the relationship between college adjustment and frequent family communication, including demographics, attachment to parents, and digital skills. However, as I did not find any significant relationships between college adjustment and family communication, I did not run any exploratory analyses of these potential factors.

As I was not able to get a clear answer to RQ 3 through statistical analysis of the log data, I turned to qualitative analyses to get a clearer picture of how family communication was or was not useful for students during their transitions to college. Specifically, I focused on whether participants received support from their families during their adjustment, which would provide evidence to support H1.

To explore whether students were receiving social support, I used conversation analysis to identify instances of social support in their text and Facebook Messenger conversations. I saw that students did frequently receive social support via messaging; 70.8% of topical groupings were coded as containing some support. Most commonly this was Informational Support (44.6% of all topical groupings), followed by Social Companionship (19.2%), Instrumental Support (10.4%), and Emotional Support (7.2%). The majority of topical groupings included at least one message where participants were the recipient of support

| | All | Family | Others |
|---|---|---|---|
| **All Support** | 70.9% | 49.9% | 73.7% |
| Needing | 4.1% | 5.8% | 4.5% |
| Seeking | 25.9% | 18.1% | 27.9% |
| Receiving | 59.3% | 40.9% | 62.5% |
| Giving | 43.9% | 37.5% | 48.4% |
| **Emotional** | 7.2% | 7.6% | 7.5% |
| Needing | 1.3% | 2.9% | 1.6% |
| Seeking | 0.4% | 0.8% | 0.3% |
| Receiving | 5.6% | 6.6% | 5.6% |
| Giving | 3.6% | 3.4% | 4.1% |
| **Informational** | 44.6% | 34.4% | 46.7% |
| Needing | 0.8% | 0.5% | 0.9% |
| Seeking | 17.2% | 11.5% | 19.7% |
| Receiving | 36.7% | 26.0% | 39.3% |
| Giving | 28.2% | 28.9% | 30.2% |
| **Instrumental** | 10.4% | 9.2% | 10.2% |
| Needing | 1.1% | 1.3% | 1.0% |
| Seeking | 3.6% | 4.7% | 3.3% |
| Receiving | 5.6% | 7.1% | 5.1% |
| Giving | 5.3% | 3.7% | 5.8% |
| **Social** | 19.2% | 8.1% | 21.4% |
| Needing | 0.9% | 0.8% | 1.2% |
| Seeking | 5.8% | 3.1% | 6.0% |
| Receiving | 17.7% | 6.3% | 20.0% |
| Giving | 11.2% | 5.2% | 13.5% |

*Table 7: Percentages of topical groupings coded for social support by support type and action*

(59.3%), followed by giving support (43.9%), seeking support (25.9), and rarely indicating that they needed support (4.1%). Social support was less common in topical groupings in threads with family members (49.4%) than with other contacts (73.7%). See Table 7 for percentages of topical groupings that included each type of support and support action, for all topical groupings, those exchanged with family members, and those exchanged with other contacts.

I reviewed the topical groupings that were coded as including social support to further understand how students were receiving support from their families. I found that participants received support while discussing a variety of topics, including grades, romantic relationships, health issues, financial aid, travel plans, procuring needed items, coordinating social calls and visits, and general check ins.

Although participants received support from multiple sources, they seemed to especially appreciate support from their families. For example, p163 sent this heartfelt text message to his parents, following a phone call earlier in the evening:

> *Hey Dad and Mom,*
>
> *I wanted to thank you guys for the call tonight. I really needed to talk to someone, and didn't really know how. Your advice, especially Dad about your experience in college and that of your friends, helped me put things back in perspective.*
>
> *I deleted all of those apps and everything on my phone, and made a promise to myself that I wouldn't allow it to get out of hand again (aka - moderation is key). I feel much better now, ready to tackle the rest of the quarter head-on.*
>
> *Socially, I realize I haven't "put myself out there" and that's been hard for me to initiate here (idk why). It really discourages me that, when it seems as though everyone here (and my friends from high school) have their own group of friends, I couldn't call a single person here my friend yet. I'm still hesitant to reach out to anyone, and it frustrates me to no end. Once I get going, I know things will get better.*

> *Thank you for all your love and support so far!*
>
> *Love,*
> *[name]*

Most text messages were not this long, but it was common for participants to thank their family members after receiving support. I saw "*thank you*" messages for all types of support, including the Emotional Support of listening after a hard day and the Instrumental Support of proof reading a paper.

I turned to interview data to further explore when students did and did not receive support from their families while adjusting to college. I found that participants described instances when they had reached out to family members explicitly for support, as well as times when they received support during other routine contact. For example, p174 didn't call his parents when he was sick, but they happened to call and ask how he was doing so he brought his illness then and they gave him advice.

Participants also discussed a number of challenging situations when they sought support from others, but explicitly not from their family members. In choosing whether to seek support, participants often were careful not to burden their family members. For example, when p205 was contemplating transferring to another school, she chose not to discuss it with her parents, so they wouldn't worry about the costs:

> *I think [I didn't talk to my parents about it] because they would worry. My dad would be really understanding about it, he would completely understand if I changed my mind about Northwestern. But I think my mom would be like, "We already paid so much money. It'd be a waste of money for you to come back now." So I didn't want to worry them because even though I did think about transferring, I believe that in the*

> *end it would all work out, because I mean I'm sure not everyone on this campus is excelling, yet they're here. [chuckle] So yeah, I thought they would worry.*

Taken together these results indicate that participants did receive helpful support via communication with their family members. While the participants appreciated this support and sometimes turned to their families explicitly seeking support, there were also times families were not able to support participants in navigating the college transition. It is unclear whether frequent communication with families afforded participants more opportunities to receive support and whether that affected their college adjustment.

# DISCUSSION

Moving away from home to begin college is a major life change and is a difficult transition for many first-year college students (Dyson & Renk, 2006; Kahn et al., 2017). As emerging adults, new students are developing independence while they learn to live independently and their relationships with their families are evolving (Arnett, 2014; Lowe & Dotterer, 2018). In decades past, students were largely cut off from their families after arriving on campus. But the ubiquity of cell phones makes it easy for students today to communicate with their families long distance (Hofer, 2008; Ramsey et al., 2013). My primary goal with this research was explore the relationship between college adjustment and frequent digital family communication. I proposed two competing hypotheses: frequent family communication would help students adjust by allowing them to receive social support from their families, or frequent family communication would hurt students' adjustment by holding them back from developing independence. I first explored college adjustment and family communication independently before examining the relationship between them.

## COLLEGE ADJUSTMENT

To address the question of how students' frequent communication with family affects their adjustment to college, we first need to understand their adjustment to college. I therefore posed RQ 1, which asked how students adjust to college during their first year. Prior research has shown that adjusting to college is a major life event and can be challenging for students

(Dyson & Renk, 2006; Haimson et al., 2021). Most of the literature in this space uses a cross-sectional approach, measuring students' adjustment at one point during their first year (e.g., Sarigiani et al., 2013). A few studies have explored students' college adjustment over time, such as Rice (1992) who found students' adjustment scores increased between their first and third years in college. My work expands on this prior research by examining students' college adjustment longitudinally, at four times during their first year on campus.

My results identified statistically significant changes in participants' *Adjustment to College* scores as the academic year progressed. Specifically, *Overall Adjustment*, *Academic Adjustment*, and *Institutional Attachment* increased between the Pre-Study Survey, administered in the first weeks participants were on campus, and later Quarterly Surveys, administered during the fifth weeks of each quarter. There were no significant changes between quarters. Academic Adjustment refers to a students' motivation for being in college, success in effort expended, and satisfaction with the academic environment. Institutional Attachment includes students' attachment to the college they are attending. In prior research, students who score highly on these measures earn higher GPAs and are less likely to drop out (Baker, 2002). The increase found in these measures adjustment could indicate that students struggle to adjust to college in their first few weeks on campus, but soon settle in to a steady state of adjustment for the remainder of their first year on campus.

Similarly, participants' *Social Adjustment* scores increased from the first measurement in the Pre-Study Survey to the Winter and Spring Quarter measurements. The fall quarter mean was between the Pre-Study and later quarters, but not statistically significant from either.

Social Adjustment includes success in social activities, involvement with other persons on campus, relocation away from home, and satisfaction with the campus social environment (Baker, 2002). The slower increase in this measure may indicate that it took longer for students to settle in socially than it did for them to adjust in other areas.

There were no significant changes in *Personal-Emotional Adjustment* scores across the academic year. This measure refers to students' psychological and physical well-being during their college adjustment, including whether the student has been feeling anxious and if they have been sleeping well (Baker, 2002; Baker & Siryk, 1984). The lack of change with this variable indicates that participants' well-being was relatively stable from when they first arrived on campus through the remainder of the year.

Taken together, these findings suggest that students' adjustment to college initially increases as they learn to navigate their new campuses, before stabilizing and remaining relatively steady for the remainder of their first year. This complements prior work that has identified increases in students' adjustment over longer periods of time (Baker, 2002) and suggests that the increases may be occurring at the start of students' first year on campus.

Much of the prior work on the college transition has focused on quantitative measures of adjustment. My findings build on this work by providing qualitative examples of the challenges students face during this transition. In interviews, participants described a variety of stressful situations they faced while adjusting to college, including those directly related to college and others made harder by being on their own for the first time. These situations exemplified the six stress categories identified by Hall et al. (2019): academic, time

management, interpersonal (friends and roommates), growing up, and finances. Further, the types of issues that participants discussed evolved over the course of the year. In the fall, many of the issues were related to adjusting to life on campus, such as learning to live with a roommate. As winter came, students more often talked of being homesick and struggling with the winter. Near the end of the year, students were looking ahead and making plans for the following summer and sophomore year. This progression indicates that students' stresses evolve even while their adjustment to college remains steady throughout their first year.

Participants also described a variety of coping methods that they used to deal with these challenging situations. Some participants took action themselves, such as by distracting themselves with playing instruments or video games, or by focusing on tidying their personal spaces. These actions are similar to the coping mechanisms identified by Bland et al. (2012). Some participants reached out to other contacts for support, including professors, resident assistants, friends, and family members. This is in line with prior research that has found students to receive support from a variety of sources during the transition to college (Gray et al., 2013; Hirsch & Barton, 2011; Taylor et al., 2013). The additional qualitative detail from my interview results provides insights into the ways students cope with stress during this transition, and may prove useful to researchers and college administrators proposing programs to help support college students.

# DIGITAL FAMILY COMMUNICATION

In RQ 2, I asked how first-year college students communicate with their families using digital communication technologies. While much of the prior work in this space has relied on self-reported data (Abar et al., 2013; Hall et al., 2019; Romo & Jacobo, 2020; Scharp et al., 2018; M. E. Smith, 2015; M. E. Smith et al., 2012), I collected log data directly from students' phones. This log data showed that participants communicated with their families frequently. In self-reported data from the Pre-Study Survey, 63.7% of participants indicated having phone calls with their parents at least once per week, and 77.3% for text messages. Log data showed an average of 2.61 calls and 24.3 messages with family members per week of data collection. This indicates that students may actually communicate with their families more frequently than they self-report and that the methods I used can provide a more accurate picture of students' communication behaviors.

Another contribution of this work is situating students' family communication behaviors within their overall communication practices. My log data results showed that participants were not only frequently communicating with their family, but that family communication made up a significant portion of their overall digital communications. Nearly 40% of the time participants' spent on phone calls was in conversation with family members. Text and Facebook messages exchanged with family members made up a smaller percent of all messages, only 8.9%. Prior work has established that college students are frequent users of communication and social media, these results contribute to that literature by showing a

significant portion of the time students spend communicating may be in communication with family members.

My longitudinal approach also contributes to the understanding of how communication patterns emerge and evolve over the course of students' first year on campus. When comparing communication logs collected from the three quarters of the academic year, I found no significant differences in the relative frequency of family communication. This may indicate that students and their families establish and communication routines that continue throughout their first year in college.

My interview results confirmed that participants' family communication often followed set patterns, with many describing regular rhythms of communication. Some participants reported particular times that they would call their families, such as when walking between classes or folding laundry. Such routine communication may be viewed as ritualistic. Family rituals are repetitive family experiences acted out in systematic fashions over time, including celebrations, traditions, and interactions (Wolin & Bennett, 1984). Participating in family rituals has been shown to be beneficial for both individual family members and families as a group, including by helping families to establish protective mechanisms and become resilient (Patterson, 2002). These findings contribute to the family communication literature by establishing first-year college students' communication with their families as a type of family ritual.

Family rituals are shaped by family rules, which either explicitly or implicitly define acceptable interactions (Galvin et al., 2015). As families evolve and change, so to can these

family rules and ritualistic communication patterns. While my log data did not show significant differences in communication frequency over time, some participants self-reported perceived changes in their family communication patterns during their interviews. Some found themselves communicating with their families more frequently than they had anticipated, once the reality of living apart set in. Others described communicating less frequently as the year went on and they became more independent. These findings indicate that families' communication rituals may change as their emerging adult children begin college and adjust to living away from home.

Further, much of the research on student-family communication has focused on specific types of family relationships, often parents (Kolkhorst et al., 2010; Lowe & Dotterer, 2018; Sax & Weintraub, 2014; Scheinfeld & Worley, 2018; M. E. Smith et al., 2012), but some work has examined sibling (Lindell et al., 2013, 2015) and grandparent (Mansson, 2013) relationships as well. I used a broad definition of family in this study, allowing participants to identify whom they considered to be family. Through my log data and follow-up surveys I saw that participants communicated with family members of a variety of relationships. This suggests that students are in regular communication with a variety of family members and contributes to the literature on family communication.

## COLLEGE ADJUSTMENT & DIGITAL FAMILY COMMUNICATION

With that understanding of first-year students' adjustment to college and family communication practices in mind, I turned to exploring the relationship between those two

variables. In RQ 3, I asked how frequent family communication affects first-year students' adjustment to college. I proposed two competing hypotheses: a positive relationship with family communication providing opportunities for students to receive helpful social support (H1) and a negative relationship with frequent communication holding students back from developing autonomy and independence (H2). My quantitative results did not provide evidence to support of either hypothesis. I had further predicted relationships between frequent family communication and aspects of academic adjustment measured through the SACQ sub-scales: a negative relationship with academic adjustment (H3), a negative relationship with social adjustment (H4), a positive relationship with personal-emotional adjustment (H5), and a negative relationship with institutional attachment (H6). My results did not support any of these hypotheses.

While my log data was not able to answer my overarching research question, my qualitative results provided some insights. Through conversation analysis of logged Facebook and Text Messages, I found that participants frequently received social support from their families through these channels. The social support literature identifies four primary types of support: Emotional Support helps individuals feel valued; Informational Support helps individuals understand and cope with problematic events, Social Companionship helps individuals feel less isolated, and Instrumental Support provides needed resources or services (Wills, 1985). My results include instances of all of these types of support, showing that students are able to use digital communication technologies with their families to receive crucial social support resources.

Scholars have theorized that social support can act as a buffer and reduce the potential negative impacts an individual experiences during a major life event, such as the transition to college (Cohen & McKay, 1984). Given that my results indicated participants received social support from their families, it is possible this support buffered some of the stress participants experienced during the transition, aiding in their college adjustment. This is in line with prior research which has suggested social support from families can provide such a buffer during the transition to college (T. J. Burke et al., 2016; Kahn et al., 2017; Moreira & Telzer, 2015).

It is also possible that these effects may vary for different types of communication methods. While my log data included phone calls, text messages, and Facebook messages, participants reported using other methods to communicate with their families as well, such as WhatsApp messages and video calls. Prior work provides some evidence that family communication via these different methods can have different effects on students' college adjustment. In a study that paired college students and their parents, Yogan et al. (2017) found a positive association between asynchronous communication and students' college adjustment but a negative association with synchronous communication. Similarly, Gentzler at al. (2011) found students who had frequent phone contact with their parents received more support than those who communicated via social networking sites. Further, Lindell et al. (2015) studied first-year students' relationships with their siblings during the college transition and found those relationships to be strongest when they frequently communicated via synchronous methods. Taken together these studies suggest that the effect of family communication on students' college adjustment may vary by both type of communication and type of family relationship.

Further research in this area would benefit from a broad view of both communication behaviors and family relationships.

## LIMITATIONS

There are several important limitations to consider when interpreting the results of this study. First, the measurements for the key variables are imperfect and threaten the internal validity of these findings. *Frequency of Family Communication* was measured using log data collected from participants' phones. While this method may have provided a more accurate picture of participants' communication behaviors than self-reported measures would have, this data was still limited in significant ways. Only direct text messages, Facebook messages, and phone calls were logged, excluding messages sent to groups and those containing pictures, videos, or emoji. This also excluded any communication on other platforms, such as video calls, emails, and WhatsApp messages, which were commonly discussed by participants in interviews. Data was only collected for three one-week periods, providing only brief snapshots of students' communication and potentially missing larger patterns of communication and change over the year.

*Adjustment to College* was measured using the SACQ, which has been used by many studies and shown to have high reliability and validity (Baker, 2002). However, My initial findings showed low reliability with the full scale and I discarded half of the items. While the resulting set of items had high Chronbach's alpha scores, they may not fully capture the construct.

In addition, the population of this study poses a threat to the external validity of these results. The number of participants in this study was relatively small, especially for the longitudinal analyses. The population was also biased, including only Northwestern University students who used Android phones, had grown up in the United States, and spoke English as a native language. Students at Northwestern University are much more likely to graduate from college compared to the national average; 94% of Northwestern students graduated within six years (Northwestern University, n.d.) compared to 62% nationally (National Center for Education Statistics, 2020). This may indicate that adjusting to college is less of a concern for Northwestern students than for students at other institutions.

Further, this data was collected in 2014 and 2015. Technology and communication behaviors rapidly evolve as new technologies are developed and fade in and out of fashion. While the data presented here may have been representative of students' behaviors at that time, it is unlikely that students' family communication today is the same.

# CONCLUSION

I set out to answer whether frequent college communication has a positive or negative effect on first-year students' college adjustment. My results were not able to provide a conclusive answer to this question. Despite that lack of conclusive finding, and in spite of the limitations presented above, my work makes several contributions to the literature on family communication and college adjustment. First, I presented a method for collecting more accurate communication frequency data through the use of a custom mobile app that directly

logged communication from students' phones and personalized follow-up surveys. My results confirm the results of prior work relying on self-reported data, indicating that first-year college students communicate with their families quite frequently. Second, my interview results show students experience a variety of challenges and stressful situations during their transition to college, confirming and adding qualitative insights to prior work in this area. Third, my conversation analysis revealed that students received social support from family members during this time, which suggests an opportunity for the buffering effect to reduce the impact of the stress students experience.

# REFERENCES

Abar, C. C., Abar, B., Turrisi, R., & Belden, C. (2013). Communication Technology Used Among Parents and Their College Teens. *Journal of The First-Year Experience & Students in Transition*, *25*(1), 61–76. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2013/00000025/00000001/art00004

Agliata, A. K., & Renk, K. (2007). College Students' Adjustment: The Role of Parent–College Student Expectation Discrepancies and Communication Reciprocity. *Journal of Youth and Adolescence*, *37*(8), 967–982. https://doi.org/10.1007/s10964-007-9200-8

Albrecht, T. L., & Adelman, M. B. (1984). Social Support and Life Stress: New Directions for Communication Research. *Human Communication Research*, *11*(1), 3–32. https://doi.org/10.1111/j.1468-2958.1984.tb00036.x

Aquilino, W. S. (2006). Family Relationships and Support Systems in Emerging Adulthood. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of age in the 21st century* (pp. 193–217). American Psychological Association. https://doi.org/10.1037/11381-008

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

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469–480. https://doi.org/10.1037/0003-066x.55.5.469

Arnett, J. J. (2014). *Emerging Adulthood: The Winding Road from the Late Teens Through the Twenties* (4th ed.). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199929382.001.0001

Baker, R. W. (2002). *Research With The Student Adaptation To College Questionnaire (SACQ)*. https://www.mtholyoke.edu/courses/shilkret/baker/

Baker, R. W., McNeil, O. V., & Siryk, B. (1985). Expectation and reality in freshman adjustment to college. *Journal of Counseling Psychology*, *32*(1), 94–103. https://doi.org/10.1037/0022-0167.32.1.94

Baker, R. W., & Siryk, B. (1984). Measuring adjustment to college. *Journal of Counseling Psychology*, *31*(2), 179–189. https://doi.org/10.1037/0022-0167.31.2.179

Baker, R. W., & Siryk, B. (1987). *(SACQ) Student Adaptation to College Questionnaire Manual*. https://www.wpspublish.com/sacq-student-adaptation-to-college-questionnaire

Bland, H. W., Melton, B. F., Welle, P., & Bigham, L. (2012). Stress Tolerance: New Challenges for Millennial College Students. *College Student Journal*, *46*(2), 362–375.

Burke, M., Adamic, L., & Marciniak, K. (2013). Families on Facebook. *Proceedings of the International AAAI Conference on Web and Social Media*, *7*(1). https://ojs.aaai.org/index.php/ICWSM/article/view/14386

Burke, M., & Kraut, R. E. (2014). Growing Closer on Facebook: Changes in Tie Strength Through Social Network Site Use. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 4187–4196. https://doi.org/10.1145/2556288.2557094

Burke, T. J., Ruppel, E. K., & Dinsmore, D. R. (2016). Moving Away and Reaching Out: Young Adults' Relational Maintenance and Psychosocial Well-Being During the Transition to College. *Journal of Family Communication*, *16*(2), 180–187. https://doi.org/10.1080/15267431.2016.1146724

Chandler, J. R. (1951). *Successful adjustment in college* (University of Michigan). Prentice-Hall.

Cohen, S. E., & Hoberman, H. M. (1983). Positive Events and Social Supports as Buffers of Life Change Stress. *Journal of Applied Social Psychology*, *13*(2), 99–125. https://doi.org/10.1111/j.1559-1816.1983.tb02325.x

Cohen, S. E., & McKay, G. (1984). Social Support, Stress and the Buffering Hypothesis: A Theoretical Analysis. In A. Baum, S. E. Taylor, & J. E. Singer (Eds.), *Social Psychological Aspects of Health* (Vol. 4, pp. 253–267). Erlbaum Associates.

Cohen, S. E., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Credé, M., & Niehorster, S. (2011). Adjustment to College as Measured by the Student Adaptation to College Questionnaire: A Quantitative Review of its Structure and Relationships with Correlates and Consequences. *Educational Psychology Review*, *24*(1), 133–165. https://doi.org/10.1007/s10648-011-9184-5

Cullaty, B. (2011). The Role of Parental Involvement in the Autonomy Development of Traditional-Age College Students. *Journal of College Student Development*, *52*(4), 425–439. https://doi.org/10.1353/csd.2011.0048

Darlow, V., Norvilitis, J. M., & Schuetze, P. (2017). The Relationship between Helicopter Parenting and Adjustment to College. *Journal of Child and Family Studies*, *26*(8), 2291–2298. https://doi.org/10.1007/s10826-017-0751-3

DeAndrea, D. C., Ellison, N. B., LaRose, R., Steinfield, C., & Fiore, A. (2012). Serious social media: On the use of social media for improving students' adjustment to college. *The Internet and Higher Education*, *15*(1), 15–23. https://doi.org/10.1016/j.iheduc.2011.05.009

Dolev-Cohen, M., & Barak, A. (2013). Adolescents' use of Instant Messaging as a means of emotional relief. *Computers in Human Behavior*, *29*(1), 58–63. https://doi.org/10.1016/j.chb.2012.07.016

Dyson, R., & Renk, K. (2006). Freshmen adaptation to university life: Depressive symptoms, stress, and coping. *Journal of Clinical Psychology*, *62*(10), 1231–1244. https://doi.org/10.1002/jclp.20295

Eisenberg, D., Golberstein, E., & Hunt, J. B. (2009). Mental Health and Academic Success in College. *The B.E. Journal of Economic Analysis & Policy*, *9*(1). https://doi.org/10.2202/1935-1682.2191

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The Benefits of Facebook "Friends:" Social Capital and College Students' Use of Online Social Network Sites. *Journal of Computer-Mediated Communication*, *12*(4), 1143–1168. https://doi.org/10.1111/j.1083-6101.2007.00367.x

Fingerman, K. L., Cheng, Y.-P., Wesselmann, E. D., Zarit, S., Furstenberg, F., & Birditt, K. S. (2012). Helicopter Parents and Landing Pad Kids: Intense Parental Support of Grown Children. *Journal of Marriage and Family*, *74*(4), 880–896. https://doi.org/10.1111/j.1741-3737.2012.00987.x

Fisher, S., & Hood, B. (1987). The stress of the transition to university: A longitudinal study of psychological disturbance, absent-mindedness and vulnerability to homesickness. *British Journal of Psychology*, *78*(4), 425–441. https://doi.org/10.1111/j.2044-8295.1987.tb02260.x

Friedlander, L. J., Reid, G. J., Shupak, N., & Cribbie, R. (2007). Social Support, Self-Esteem, and Stress as Predictors of Adjustment to University Among First-Year Undergraduates. *Journal of College Student Development*, *48*(3), 259–274. https://doi.org/10.1353/csd.2007.0024

Fromme, K., Corbin, W. R., & Kruse, M. I. (2008). Behavioral risks during the transition from high school to college. *Developmental Psychology*, *44*(5), 1497–1504. https://doi.org/10.1037/a0012614

Galvin, K. M., Bylund, C. L., & Brommel, B. J. (2015). *Family Communication: Cohesion and Change* (8th ed., Vol. 399). Pearson Allyn and Bacon.

Gentzler, A. L., Oberhauser, A. M., Westerman, D., & Nadorff, D. K. (2011). College Students' Use of Electronic Communication with Parents: Links to Loneliness, Attachment, and Relationship Quality. *Cyberpsychology, Behavior, and Social Networking*, *14*(1–2), 71–74. https://doi.org/10.1089/cyber.2009.0409

Gerdes, H., & Mallinckrodt, B. (1994). Emotional, Social, and Academic Adjustment of College Students: A Longitudinal Study of Retention. *Journal of Counseling & Development*, *72*(3), 281–288. https://doi.org/10.1002/j.1556-6676.1994.tb00935.x

Golonka, M. M. (2013). *Keeping in Touch: Relationships between Parenting Style, Parent-Child Electronic Communication, and the Developing Autonomy and Adjustment of College Students*. Duke University. http://dukespace.lib.duke.edu/dspace/handle/10161/7242

Gray, R., Vitak, J., Easton, E. W., & Ellison, N. B. (2013). Examining social adjustment to college in the age of social media: Factors influencing successful transitions and persistence. *Computers & Education*, *67*, 193–207. https://doi.org/10.1016/j.compedu.2013.02.021

Haimson, O. L., Carter, A. J., Corvite, S., Wheeler, B., Wang, L., Liu, T., & Lige, A. (2021). The major life events taxonomy: Social readjustment, social media information sharing, and online network separation during times of life transition. *Journal of the Association for Information Science and Technology*, 1–15. https://doi.org/10.1002/asi.24455

Hall, E. D., Scharp, K. M., Sanders, M., & Beaty, L. (2019). Family Communication Patterns and the Mediating Effects of Support and Resilience on Students' Concerns About College. *Family Relations*, *69*(2), 276–291. https://doi.org/10.1111/fare.12386

Handel, M. J. (2007). *Communication technologies and the freshman transition: Staying close with friends.* ProQuest Dissertations Publishing. http://hdl.handle.net/2027.42/126708

Hargittai, E. (2010). Digital Na(t)ives? Variation in Internet Skills and Uses among Members of the "Net Generation." *Sociological Inquiry*, *80*(1), 92–113. https://doi.org/10.1111/j.1475-682x.2009.00317.x

Hargittai, E., & Hsieh, Y. P. (2012). Succinct Survey Measures of Web-Use Skills. *Social Science Computer Review*, *30*(1), 95–107. https://doi.org/10.1177%2F0894439310397146

Hiester, M., Nordstrom, A., & Swenson, L. M. (2009). Stability and Change in Parental Attachment and Adjustment Outcomes During the First Semester Transition to College Life. *Journal of College Student Development*, *50*(5), 521–538. https://doi.org/10.1353/csd.0.0089

Hirsch, J. K., & Barton, A. L. (2011). Positive Social Support, Negative Social Exchanges, and Suicidal Behavior in College Students. *Journal of American College Health*, *59*(5), 393–398. https://doi.org/10.1080/07448481.2010.515635

Hofer, B. K. (2008). The Electronic Tether: Parental Regulation, Self-Regulation, and the Role of Technology in College Transitions. *Journal of The First-Year Experience & Students in Transition*, *20*(2), 9–24. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2008/00000020/00000002/art00001

Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research*, *11*(2), 213–218. https://doi.org/10.1016/0022-3999(67)90010-4

Holte, A. J., & Ferraro, F. R. (2021). Tethered to texting: Reliance on texting and emotional attachment to cell phones. *Current Psychology*, *40*, 1–8. https://doi.org/10.1007/s12144-018-0037-y

Hou, Y., Xiong, D., Jiang, T., Song, L., & Wang, Q. (2019). Social media addiction: Its impact, mediation, and intervention. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *13*(1), Article 4. https://doi.org/10.5817/cp2019-1-4

Johnson, V. K., Gans, S. E., Kerr, S., & LaValle, W. (2010). Managing the Transition to College: Family Functioning, Emotion Coping, and Adjustment in Emerging Adulthood. *Journal of College Student Development*, *51*(6), 607–621. https://doi.org/10.1353/csd.2010.0022

Kahn, J. H., Kasky-Hernández, L. M., Ambrose, P., & French, S. (2017). Stress, Depression, and Anxiety Among Transitioning College Students: The Family as a Protective Factor. *Journal of The First-Year Experience & Students in Transition*, *29*(2), 11–25. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2017/00000029/00000002/art00001

Kenny, M. E., & Rice, K. G. (1995). Attachment to Parents and Adjustment in Late Adolescent College Students: Current Status, Applications, and Future Considerations. *The Counseling Psychologist*, *23*(3), 433–456. https://doi.org/10.1177/0011000095233003

Kenyon, D. B., & Koerner, S. S. (2009). Examining Emerging-Adults' and Parents' Expectations about Autonomy During the Transition to College. *Journal of Adolescent Research*, *24*(3), 293–320. https://doi.org/10.1177/0743558409333021

Kerr, S., Johnson, V. K., Gans, S. E., & Krumrine, J. (2004). Predicting Adjustment During the Transition to College: Alexithymia, Perceived Stress, and Psychological Symptoms. *Journal of College Student Development*, *45*(6), 593–611. https://doi.org/10.1353/csd.2004.0068

Kolkhorst, B., Yazedjian, A., & Toews, M. (2010). A Longitudinal Examination of Parental Attachment, College Adjustment, and Academic Achievement. *Journal of The First-Year Experience & Students in Transition*, *22*(1), 9–25. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2010/00000022/00000001/art00001

Krotseng, M. V. (1992). Predicting persistence from the student adaptation to college questionnaire: Early warning or siren song? *Research in Higher Education*, *33*, 99–111. https://doi.org/10.1007/bf00991974

Laible, D. J. (2007). Attachment with parents and peers in late adolescence: Links with emotional competence and social behavior. *Personality and Individual Differences*, *43*(5), 1185–1197. https://doi.org/10.1016/j.paid.2007.03.010

Laible, D. J., Carlo, G., & Raffaelli, M. (2000). The Differential Relations of Parent and Peer Attachment to Adolescent Adjustment - Springer. *Journal of Youth and Adolescence*, *29*, 45–59. https://doi.org/10.1023/a:1005169004882

Larose, S., & Boivin, M. (1998). Attachment to Parents, Social Support Expectations, and Socioemotional Adjustment During the High School--College Transition. *Journal of Research on Adolescence*, *8*(1), 1–27. https://doi.org/10.1207/s15327795jra0801_1

Larose, S., Duchesne, S., Litalien, D., Denault, A.-S., & Boivin, M. (2019). Adjustment Trajectories During the College Transition: Types, Personal and Family Antecedents, and Academic Outcomes. *Research in Higher Education*, *60*(5), 684–710. https://doi.org/10.1007/s11162-018-9538-7

Lewandowski, J., Rosenberg, B. D., Parks, M. J., & Siegel, J. T. (2011). The effect of informal social support: Face-to-face versus computer-mediated communication. *Computers in Human Behavior*, *27*(5), 1806–1814. https://doi.org/10.1016/j.chb.2011.03.008

Lindell, A. K., Barr, N. C., & Killoren, S. E. (2015). Technology-Mediated Communication with Siblings During the Transition to College: Associations with Relationship Positivity and Self-Disclosure. *Family Relations*, *64*(4), 563–578. https://doi.org/10.1111/fare.12133

Lindell, A. K., Campione-Barr, N., & Greer, K. B. (2013). Associations Between Adolescent Sibling Conflict and Relationship Quality During the Transition to College. *Emerging Adulthood*, *2*(2), 79–91. https://doi.org/10.1177/2167696813502778

Litt, E. (2013). Measuring users' internet skills: A review of past assessments and a look toward the future. *New Media & Society*, *15*(4), 612–630. https://doi.org/10.1177/1461444813475424

Lowe, K., & Dotterer, A. M. (2018). Parental Involvement During the College Transition: A Review and Suggestion for its Conceptual Definition. *Adolescent Research Review*, *3*, 29–42. https://doi.org/10.1007/s40894-017-0058-z

Mansson, D. H. (2013). College Students' Mental Health and Their Received Affection From Their Grandparents. *Communication Research Reports*, *30*(2), 157–168. https://doi.org/10.1080/08824096.2012.763028

Mattanah, J. F., Ayers, J. F., Brand, B. L., Brooks, L. J., Quimby, J. L., & McNary, S. W. (2010). A Social Support Intervention to Ease the College Transition: Exploring Main Effects and Moderators. *Journal of College Student Development*, *51*(1), 93–108. https://doi.org/10.1353/csd.0.0116

Mattanah, J. F., Hancock, G. R., & Brand, B. L. (2004). Parental Attachment, Separation-Individuation, and College Student Adjustment: A Structural Equation Analysis of Mediational Effects. *Journal of Counseling Psychology*, *51*(2), 213–225. https://doi.org/10.1037/0022-0167.51.2.213

Micheli, M., Redmiles, E. M., & Hargittai, E. (2020). Help wanted: young adults' sources of support for questions about digital media. *Information, Communication & Society*, *23*(11), 1655–1672. https://doi.org/10.1080/1369118x.2019.1602666

Mikal, J. P., Rice, R. E., Abeyta, A., & DeVilbiss, J. (2013). Transition, stress and computer-mediated social support. *Computers in Human Behavior*, *29*(5), A40–A53. https://doi.org/10.1016/j.chb.2012.12.012

Moreira, J. F. G., & Telzer, E. H. (2015). Changes in family cohesion and links to depression during the college transition. *Journal of Adolescence*, *43*, 72–82. https://doi.org/10.1016/j.adolescence.2015.05.012

National Center for Education Statistics. (2020, April). *Undergraduate Retention and Graduation Rates*. Fast Facts. https://nces.ed.gov/programs/coe/indicator_ctr.asp

Northwestern University. (n.d.). *Undergraduate Retention & Graduation Rates: Student Finance*. https://www.northwestern.edu/sfs/about/undergraduate-retention--graduation-rates.html

Oh, H. J., Ozkaya, E., & LaRose, R. (2014). How does online social networking enhance life satisfaction? The relationships among online supportive interaction, affect, perceived social support, sense of community, and life satisfaction. *Computers in Human Behavior*, *30*, 69–78. https://doi.org/10.1016/j.chb.2013.07.053

Padilla-Walker, L. M., & Nelson, L. J. (2012). Black hawk down?: Establishing helicopter parenting as a distinct construct from other forms of parental control during emerging adulthood. *Journal of Adolescence*, *35*(5), 1177–1190. https://doi.org/10.1016/j.adolescence.2012.03.007

Padilla-Walker, L. M., Nelson, L. J., & Knapp, D. J. (2014). "Because I'm still the parent, that's why!" Parental legitimate authority during emerging adulthood. *Journal of Social and Personal Relationships*, *31*(3), 293–313. https://doi.org/10.1177/0265407513494949

Patterson, J. M. (2002). Understanding family resilience. *Journal of Clinical Psychology*, *58*(3), 233–246. https://doi.org/10.1002/jclp.10019

Pryor, J. H., Eagan, K., Blake, L. P., Hurtado, S., Berdan, J., & Case, M. H. (2012). *The American Freshman: National Norms Fall 2012*. Higher Education Research Institute, UCLA. https://www.heri.ucla.edu/monographs/TheAmericanFreshman2012-Expanded.pdf

Rahe, R. H., Meyer, M., Smith, M., Kjaer, G., & Holmes, T. H. (1964). Social stress and illness onset. *Journal of Psychosomatic Research*, *8*(1), 35–44. https://doi.org/10.1016/0022-3999(64)90020-0

Raja, S. N., McGee, R., & Stanton, W. R. (1992). Perceived attachments to parents and peers and psychological well-being in adolescence. *Journal of Youth and Adolescence*, *21*(4), 471–485. https://doi.org/10.1007/bf01537898

Ramsey, M. A., Gentzler, A. L., Morey, J. N., Oberhauser, A. M., & Westerman, D. (2013). College Students' Use of Communication Technology with Parents: Comparisons Between Two Cohorts in 2009 and 2011. *Cyberpsychology, Behavior, and Social Networking*, *16*(10), 747–752. https://doi.org/10.1089/cyber.2012.0534

Rice, K. G. (1992). Separationndividuation and adjustment to college: A longitudinal study. *Journal of Counseling Psychology*, *39*(2), 203–213. https://doi.org/10.1037/0022-0167.39.2.203

Romo, E., & Jacobo, S. (2020). *2019 Your First College Year Survey* (pp. 1–4) [Techreport]. Higher Education Research Institute, UCLA. https://heri.ucla.edu/briefs/YFCY/YFCY-2019-Brief.pdf

Rozzell, B., Piercy, C. W., Carr, C. T., King, S., Lane, B. L., Tornes, M., Johnson, A. J., & Wright, K. B. (2014). Notification pending: Online social support from close and nonclose relational ties via Facebook. *Computers in Human Behavior*, *38*, 272–280. https://doi.org/10.1016/j.chb.2014.06.006

Sarigiani, P., Trumbell, J., & Camarena, P. (2013). Electronic Communications Technologies and the Transition to College: Links to Parent-Child Attachment and Adjustment. *Journal of The First-*

*Year Experience & Students in Transition*, *25*(1), 35–60. https://www.ingentaconnect.com/content/fyesit/fyesit/2013/00000025/00000001/art00003

Sax, L. J., & Weintraub, D. S. (2014). Exploring the Parental Role in First-Year Students' Emotional Well-Being: Considerations by Gender. *Journal of Student Affairs Research and Practice*, *51*(2), 113–127. https://doi.org/10.1515/jsarp-2014-0013

Sax, L. J., & Weintraub, D. S. (2016). Hold on Tight or Let Go: Exploring the Parental Role in First-Year Students' College Adjustment. *Journal of The First-Year Experience & Students in Transition*, *28*(2), 73–92. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2016/00000028/00000002/art00004

Scharp, K. M., Hall, E. D., Sanders, M., & Colver, M. (2018). The Relationship Between Students' Family Communication, Transition Efficacy, and Communication Skill. *Journal of College Orientation, Transition, and Retention*, *25*(1). https://doi.org/10.24926/jcotr.v25i1.2917

Scheinfeld, E., & Worley, T. (2018). Understanding the Parent-Child Relationship during the Transition into College and Emerging Adulthood Using the Relational Turbulence Theory. *Communication Quarterly*, *66*(4), 444–462. https://doi.org/10.1080/01463373.2018.1443954

Schiffrin, H., Liss, M., Miles-McLean, H., Geary, K., Erchull, M., & Tashner, T. (2014). Helping or Hovering? The Effects of Helicopter Parenting on College Students' Well-Being. *Journal of Child and Family Studies*, *23*(3), 548–557. https://doi.org/10.1007/s10826-013-9716-3

Shepard, A. R. (2010). *Psychological separateness and parental attachment as predictors of Black students' psychological resilience and adjustment to college: Vol. DAI/B 71-04*. http://search.proquest.com/docview/230892522

Smith, A., Rainie, L., & Zickuhr, K. (2011). *College students and technology* (Internet & Technology). Pew Research Center. https://www.pewresearch.org/internet/2011/07/19/college-students-and-technology/

Smith, M. E. (2015). Staying Connected: Supportive Communication During the College Transition. In C. J. Bruess (Ed.), *Family Communication in an Age of Digital and Social Media* (pp. 184–204). Peter Lang Publishing. https://www.peterlang.com/view/9781454194019/22_chapter9.html

Smith, M. E., Nguyen, D. T., Lai, C., Leshed, G., & Baumer, E. P. S. (2012). Going to College and Staying Connected: Communication Between College Freshmen and Their Parents. *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work*, 789–798. https://doi.org/10.1145/2145204.2145322

Smith, W., & Zhang, P. (2010). The Impact of Key Factors on the Transition From High School to College Among First- and Second-Generation Students. *Journal of The First-Year Experience & Students in Transition*, *22*(2), 49–70. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2010/00000022/00000002/art00003

Swenson, L. M., Nordstrom, A., & Hiester, M. (2008). The Role of Peer Relationships in Adjustment to College. *Journal of College Student Development*, *49*(6), 551–567. https://doi.org/10.1353/csd.0.0038

Taylor, Z. E., Doane, L. D., & Eisenberg, N. (2013). Transitioning From High School to College: Relations of Social Support, Ego-Resiliency, and Maladjustment During Emerging Adulthood. *Emerging Adulthood*, *2*(2), 105–115. https://doi.org/10.1177/2167696813506885

Terenzini, P. T., Rendon, L. I., Upcraft, M. L., Millar, S. B., Allison, K. W., Gregg, P. L., & Jalomo, R. (1994). The Transition to College: Diverse Students, Diverse Stories. *Research in Higher Education*, *35*(1), 57–73. https://doi.org/10.1007/bf02496662

The Nielsen Company. (2015, March 5). *Smartphone Owners Are as Diverse as Their Devices*. Insights. https://www.nielsen.com/us/en/insights/article/2015/smartphone-owners-are-as-diverse-as-their-devices/

United States Census Bureau. (2012). *Subject Definitions*. Current Population Survey. https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html#family

Vitak, J., Ellison, N. B., & Steinfield, C. (2011). The Ties That Bond: Re-Examining the Relationship between Facebook Use and Bonding Social Capital. *2011 44th Hawaii International Conference on System Sciences*, 1–10. https://doi.org/10.1109/hicss.2011.435

Wills, T. A. (1985). Supportive Functions of Interpersonal Relationships. In S. E. Cohen & S. L. Syme (Eds.), *Social Support and Health* (pp. 61–82). Academic Press. https://psycnet.apa.org/record/1985-97489-004

Wolin, S. J., & Bennett, L. A. (1984). Family Rituals. *Family Process*, *23*(3), 401–420. https://doi.org/10.1111/j.1545-5300.1984.00401.x

Yang, C., Brown, B. B., & Braun, M. T. (2014). From Facebook to cell calls: Layers of electronic intimacy in college students' interpersonal relationships: *New Media & Society*, *16*(1), 5–23. https://doi.org/10.1177/1461444812472486

Yogan, L., Freedle, A., & Ringenberg, M. (2017). Impact of Communication on Parents' and First-Year College Students' Ratings of Student Academic, Emotional, and Social Adjustment. *Journal of The First-Year Experience & Students in Transition*, *29*(2), 26–42. https://www.ingentaconnect.com/contentone/fyesit/fyesit/2017/00000029/00000002/art00002

Young, J. W., & Koplow, S. L. (1997). The Validity of Two Questionnaires for Predicting Minority Students' College Grades. *The Journal of General Education*, *46*(1), 45–55. http://www.jstor.org/stable/27797326

# APPENDIX A: STUDY TIMELINE

| | |
|---|---|
| 23-Sep | Fall Quarter Begins |
| 29-Sep | Pre-Study Survey |
| 27-Oct | Fall Quarter Data Collection |
| 3-Nov | Fall Quarter Survey |
| 10-Nov | Fall Quarter Interviews |
| 12-Dec | Fall Quarter Ends |
| 5-Jan | Winter Quarter Begins |
| 2-Feb | Winter Quarter Data Collection |
| 9-Feb | Winter Quarter Survey |
| 16-Feb | Winter Quarter Interviews |
| 20-Mar | Winter Quarter Ends |
| 30-Mar | Spring Quarter Begins |
| 27-Apr | Spring Quarter Data Collection |
| 4-May | Spring Quarter Survey |
| 11-May | Spring Quarter Interviews |
| 12-Jun | Spring Quarter Ends |

# APPENDIX B: CONSENT FORM

***Note:*** *This is the original consent form from the Pre-Study Survey. Interviews were added later and compensation amounts were also increased.*

I am Madeline Smith, a doctoral student in the Technology & Social Behavior program at Northwestern University. I am conducting this research study to better understand how students adjust and communicate during their first year of college.

## STUDY PARTICIPATION

If you agree to participate, you will be asked to complete five parts of this study:

**Pre-Study Survey:** Immediately after agreeing to participate you will be asked to complete this Pre-Study Survey. The survey includes questions about yourself, your family, your use of communication technology, and your adjustment to college. It will take you approximately 30 minutes to complete.

**Android App:** Next, I will email you with instructions to install and log into the study Android App on your phone. Installing and logging into the app will take you approximately 15 minutes. And once you have logged into the app, it will run in the background and you can continue to use your phone as normal.

When the app is activated (only during the study periods detailed below), it will anonymously log your phone calls, text messages, and Facebook messages. These logs will include when you communicated, whom you communicated with, and what you communicated (text only, no audio will be recorded). Phone numbers, names, and email addresses will be automatically removed or encrypted to keep your data anonymous. These communication logs will be sent to our protected database.

**Fall Study Period + Survey:** The app will be activated and will log your communication during one week in the Fall Quarter (12:00am on October 19, 2014 – 11:59pm on October 25, 2014). At the end of the week (on October 26th) I will ask you to complete the online Fall Survey. The survey will include questions about your adjustment to college and your relationships with some of the people you communicated with during the study period. The survey will take you approximately 30 minutes to complete.

**Winter Study Period + Survey:** The app will again be activated and will log your communication during one week in the Winter Quarter (12:00am on February 15, 2015 – 11:59pm on February 21, 2015). At the end of the week (on February 22, 2015) I will ask you to complete the Winter Survey, which is very similar to the Fall Survey and will take you approximately 30 minutes.

**Spring Study Period + Survey:** The app will be activated and will log your communication for the last time during one week of the Spring Quarter (12:00am on April 26, 2015 – 11:59pm on May 2, 2015). At the end of the week (on May 3, 2015) I will ask you to complete the Spring Survey and uninstall the app, which will take you approximately 45 minutes.

Completing all five parts of the study will take you approximately 2.5 hours, between now and the end of the Spring 2015 quarter.

## RISKS & BENEFITS

We do not anticipate any risks to you for participating in this study beyond those encountered in your everyday life. Although unlikely, there is a slight risk that a third party could intercept the data we collect from your phone. The likelihood of this happening is very slim and is no more likely than the possibility of your communication being intercepted whenever you use the Internet. To minimize this risk, we will de-identify and encrypt your communication logs before transmitting them and will store that data separately from your survey responses.

There are no direct benefits to you for participating. However, your participation in this study will help us to better understand the role of the communication technologies and adjustment to college. This knowledge will contribute to the social science research and may be helpful for future college freshmen.

## COSTS & PAYMENTS

Participation in this study will involve no cost to you, beyond the normal costs of using your cell phone.

You will receive an Amazon.com gift certificate for each part of the study you complete:

- $5.00 after you complete this pre-study survey.
- $5.00 after you install the app on your phone.
- $10.00 after you complete the fall quarter survey.
- $12.50 after you complete the winter quarter survey.
- $15.00 after you complete the spring quarter survey.

If you complete the entire study, you will receive five gift certificates worth a total of $42.50. Each gift certificate will be emailed to the email address you provide at the end of this pre-study survey and will be sent within one week of when you finish that part of the study.

If you complete the entire study, you will also be entered into a raffle for the chance to win an extra $75 gift certificate. At least three gift certificates worth $75 each will be raffled on May 20, 2015.

Your chances of winning will be approximately one in twenty-five, depending on the exact number of participants who complete the study.

## PRIVACY & SECURITY

When you start the Pre-Study Survey you will be automatically assigned a Participant ID number that will be used to anonymously identify all data collected from you during your participation in this study. Further, names, email addresses, and phone numbers will be automatically removed or encrypted before being stored in our database, to protect your privacy and the privacy of those you communicate with.

For example, if you receive a message with the text “sure thing, email it to me at joesmith@example.com.” from the phone number 867-5309, it will be stored in our database as “sure thing, email it to me at [email-address]” from “SJd4r7UtDKk=”. The encrypted phone number is meaningless unless it is unlocked with a special key, and the key to your data will be deleted at the end of the study so that your data cannot be connected to you or the people you communicate with during the study.

At the end of the Pre-Study Survey you will be directed to another website and asked to register for the study by entering your name, email address, phone number, and a password for the study. This information will not be shared with anyone else and will be stored in a separate database from the rest of the data collected during this study. Your name and email address will only be used to contact you with information about the study and to send you gift certificates. Your phone number will be encrypted before it is stored and will only be used to verify that the app has been installed on your phone.

All study data will be securely stored in a private database that can only be accessed by the researchers. The results of this research may be published, but your name or any other identifying information will not be used in any publications or presentations.

## VOLUNTARY PARTICIPATION

Your participation in this research study is completely voluntary. You can skip questions in the survey and you can withdraw at any time by exiting the survey, uninstalling the app from your phone, or emailing AndroidStudy@u.northwestern.edu.

## RESEARCH CONTACTS

If you have any questions about this study you may email us at AndroidStudy@u.northwestern.edu. You can also contact me directly at madsesmith@u.northwestern.edu or the principle investigator for this research study, Jeremy Birnholtz, at jeremyb@northwestern.edu.

Any questions about your rights as a research subject may be directed to the Institutional Review Board (IRB) Office of Northwestern University at (312) 503-9338.

## CONSENT

If you want a copy of this consent form for your records, you can print it from this screen. If you would you like documentation linking you to this research study, please email your request to us at AndroidStudy@u.northwestern.edu.

Please select the appropriate option below to indicate whether you wish to participate in this study. If you wish to participate, select the Accept to participate option and continue on to the Pre-Study Survey. If you do not wish to participate in this study, please select the Do not agree option, and your session will end.

Sincerely,

Madeline Smith & Jeremy Birnholtz

# APPENDIX C: PRE-STUDY SURVEY

This Pre-Study Survey is part of the Freshmen Adjustment Study at Northwestern University. Please visit the study website at adjust.soc.northwestern.edu for more information and email AndroidStudy@u.northwestern.edu if you have any questions.

1. Please indicate whether you meet each of the following requirements for this study:
    a. I am currently a freshman at Northwestern University.
    b. I am 18 years of age or older.
    c. I grew up in the United States of America.
    d. I currently live on campus.
    e. I have and use an Android smartphone.
    f. English is my native language.

## SACQ

The statements in this section describe college experiences. Read each one and decide how well it applies to you at the present time (within the past few days). For each statement select the point in the continuum that best represents how closely the statement applies to you.

*See (Baker & Siryk, 1987)*

## S-IPPA

Indicate how true the following items are:

*See (Raja et al., 1992)*

## CAREGIVERS

Think of the two most important parental figures or caregivers in your life. Provide a name (first name or nick name) for each person. These names will be used in the following questions.

1. Do you consider _____ to be part of your family?
    a. Yes
    b. No

2. _____ is your:
    a. Adoptive parent

   b. Biological parent
   c. Foster parent
   d. Grandparent
   e. Step-parent
   f. Other relative, please describe:
   g. Other non-relative, please describe:

3. Did you live with _____ in high school?
   a. Yes, full time
   b. Yes, part time
   c. No

4. What is _____'s gender?
   a. Male
   b. Female
   c. Other, please specify:

5. What is _____'s approximate age?
   a. Younger than me
   b. Approximately the same age as me
   c. Older than me by 1-2 years
   d. Older than me by 3-5 years
   e. Older than me by 6-10 years
   f. Older than me by 11-15 years
   g. Older than me by 16-25 years
   h. Older than me by 26-35 years
   i. Older than me by 36-50 years
   j. Older than me by more than 50 years

6. What is the highest level of school _____ has completed?
   a. No high school diploma
   b. High school graduate or equivalent (ex: GED)
   c. Some college, no degree
   d. Vocation / technical certificate
   e. Two-year college degree (such as: AA, AS)
   f. Four-year college degree (such as: BA, BS)
   g. Some graduate or professional school, no degree

h. Graduate or professional degree (such as: MA, MBA, PhD, MD, JD)

7. Which industry does _____ work in?
    a. Forestry, fishing, hunting or agriculture support
    b. Mining
    c. Utilities
    d. Construction
    e. Manufacturing
    f. Wholesale trade
    g. Retail trade
    h. Transportation or warehousing
    i. Information
    j. Finance or insurance
    k. Real estate or rental and leasing
    l. Professional, scientific or technical services
    m. Management of companies or enterprises
    n. Admin, support, waste management or remediation services
    o. Educational services
    p. Health care or social assistance
    q. Arts, entertainment or recreation
    r. Accommodation or food services
    s. Other
    t. Unemployed

8. Do you consider _____ to be part of your family?
    a. Yes
    b. No

9. Do _____ and _____ reside in the same household?
    a. Yes
    b. No

10. How did your caregivers split the responsibility of caring for you?
    a. _____: %
    b. _____: %

## FAMILY

Think of the people you consider to be part of your immediate family. Please provide names (first names or nick names) for up to five family members. Do not include the caregivers you already told us about.

1. _____ is your:
    a. Parent
    b. Step-parent
    c. Grandparent
    d. Step-grandparent
    e. Aunt/Uncle
    f. Step-aunt/uncle
    g. Sibling
    h. Step-sibling
    i. Cousin
    j. Step-cousin
    k. Other relative, please describe:
    l. Other non-relative, please describe:

2. What is _____'s gender?
    a. Male
    b. Female
    c. Other, please specify

3. Does _____ reside in the same household as _____?
    a. Yes
    b. No

## DIGITAL SKILLS

How familiar are you with the following computer- and Internet-related items? Please indicate your understanding of the following items.

*See (Hargittai & Hsieh, 2012)*

## TECHNOLOGY USE

1. What type of cell phone do you have?

a. iPhone smartphone
b. Android smartphone
c. Windows smartphone
d. Other smartphone, please specify:
e. Basic phone
f. I do not have a cell phone

2. Please provide more details about your Android phone.
    a. Brand (e.g., Samsung):
    b. Model (e.g., Galaxy S5):
    c. Android Version (e.g., 4.4.2):

3. Please indicate the communication services and apps that you have used in the last month. Include any apps/services you have used to communicate with others using your cell phone, computer, or other devices.

    *Have NOT used*

    *Have used*

    a. Phone Calls (audio only): Phone calls, Skype, Google Voice, etc.
    b. Video Calls: Skype, Facetime, Google Hangouts, etc.
    c. Text Messages: SMS (regular cell phone texting), iMessage, Google Hangouts, WhatsApp, Facebook Messenger, Kik, etc.
    d. Multimedia Messages (picture, gif, video, etc.): MMS (cell phone pic messages), SnapChat, iMessage, Google Hangouts, WhatsApp, Facebook Messenger, Kik, etc.
    e. Group Messages (sent to two or more people): MMS (cell phone pic messages), GroupMe, iMessage, Google Hangouts, WhatsApp, Facebook Messenger, Kik, etc.
    f. Social Network Sites: Facebook, Twitter, Instagram, Tumblr, Pinterest, Google+, Vine, LinkedIn, etc.
    g. Other, please specify:

For each selected above:

4. How often do you use _____ with each type of contact?

    *Never*

    *Less than monthly*

    *Monthly*

    *Multiple times per month*

    *Weekly*

    *Multiple days per week*

*Daily*

*Multiple times per day*

a. Parents
b. Grandparents
c. Siblings
d. Other family members, please specify
e. Friends at Northwestern
f. Friends not at Northwestern
g. Romantic (boyfriend, girlfriend, etc.)
h. Acquaintances
i. Professors/Bosses
j. Strangers
k. Others, please specify:

## DEMOGRAPHICS

1. When were you born?
2. What is your gender?
    a. Male
    b. Female
    c. Other, please specify
3. In which country were you born?
4. If not USA, when did you move to the USA?
5. Is English your native language?
    a. Yes
    b. No, please specify:
6. What is your ethnic background? (Please select all that apply.)
    a. White / Caucasian
    b. Black / African-American
    c. Asian / Asian-American
    d. Native Hawaiian / Pacific Islander
    e. Hispanic / Latino / Mexican-American / Puerto Rican / Cuban / Etc.
    f. Other, please specify:

7. What zip code did you reside in during high school?

8. What is your best estimate of your household income?
    a. Less than $10,000
    b. $10,000 - $19,999
    c. $20,000 - $29,999
    d. $30,000 - $39,999
    e. $40,000 - $49,999
    f. $50,000 - $59,999
    g. $60,000 - $69,999
    h. $70,000 - $79,999
    i. $80,000 - $89,999
    j. $90,000 - $99,999
    k. $100,000 - $149,999
    l. $150,000 - $199,999
    m. $200,000 - $249,999
    n. $250,000 or more

9. From which type of high school did you graduate?
    a. Public school (not charter or magnet)
    b. Public charter school
    c. Public magnet school
    d. Private religious / parochial school
    e. Private independent college-prep school
    f. Home school
    g. Other, please specify:

10. Where did you live during high school?
    a. With a caregiver (parents, family member, etc.)
    b. At school (dorm)
    c. On my own
    d. Other, please specify:

11. What was your average GPA in high school?
    a. A or A+ (4.0 or higher)
    b. A- (3.7 – 3.99)
    c. B+ (3.3 – 3.69)

d. B (3.0 - 3.29)
e. B- (2.7 - 2.99)
f. C+ (2.3 - 2.69)
g. C (2.0 - 2.29)
h. C- (1.7 - 1.99)
i. D (1.0 - 1.69)
j. F (below 1.0)

12. In what year did you graduate high school?

13. If not 2014, briefly describe what you did between high school and college:

14. Are you enrolled as a:
    a. Full-time student
    b. Part-time student

15. Which college are you enrolled in at Northwestern? (Please select all that apply.)
    a. Weinberg College of Arts and Sciences
    b. School of Communication
    c. School of Education and Social Policy
    d. McCormick School of Engineering
    e. Medill School of Journalism, Media, Integrated Marketing Communications
    f. Bienen School of Music

16. What is your current major? (Please select all that apply.)
    *Full list of majors at Northwestern*

17. Where do you live this quarter?
    a. On campus residence hall
    b. Fraternity or sorority house
    c. Off campus, with family
    d. Off campus, other
    e. Other, please specify:

18. How much financial assistance for the current year's educational expenses (including tuition, housing, food, etc.) do you receive from family resources such as your parents?
    a. None
    b. 1 – 25%
    c. 26 – 50%

d. 51 – 75%
e. 76% or more

# APPENDIX D: QUARTERLY SURVEYS

## WELCOME & INSTRUCTIONS

Hello _____, welcome to the _____ Quarter Survey for the Freshmen Adjustment Study. Thank you so much for participating in our research study!

This survey will take you 30–45 minutes to complete and you will receive $10 for your time. After you complete the survey you will be able to sign up to participate in an interview and earn $15 more.

If you have any questions about this survey or the research study, please email AndroidStudy@u.northwestern.edu.

Note: This survey works best on a desktop browser. If you are currently on a mobile device, please come back to the survey from a computer. You must complete the survey by _____. to continue with the Freshmen Adjustment Study.

## NORTHWESTERN STATUS

1. Are you enrolled as a:
    a. Full-time student
    b. Part-time student

2. Which college are you enrolled in at Northwestern? (Please select all that apply.)
    a. Weinberg College of Arts and Sciences
    b. School of Communication
    c. School of Education and Social Policy
    d. McCormick School of Engineering
    e. Medill School of Journalism, Media, Integrated Marketing Communications
    f. Bienen School of Music

3. What is your current major? (Please select all that apply.)
    *Full list of majors at Northwestern*

4. What do you expect your GPA to be this quarter?
    a. A or A+ (4.0 or higher)
    b. A- (3.7 – 3.99)

c. B+ (3.3 – 3.69)
d. B (3.0 - 3.29)
e. B- (2.7 - 2.99)
f. C+ (2.3 - 2.69)
g. C (2.0 - 2.29)
h. C- (1.7 - 1.99)
i. D (1.0 - 1.69)
j. F (below 1.0)

## SACQ

The statements in this section describe college experiences. Read each one and decide how well it applies to you at the present time (within the past few days). For each statement select the point in the continuum that best represents how closely the statement applies to you.

*See (Baker & Siryk, 1987)*

## CONTACTS

The following pages will ask about some of the people that you communicated with during the fall data collection period.

For each contact:

1. Our records indicate that you communicated with someone using the name "_____" during the fall data collection period. Do you recognize this contact?
    a. Yes
    b. No

2. Please provide a unique name (first name or nickname) for this contact. We will use the name you provide to refer to this contact in future surveys.

3. What type of relationship do you have with this contact?
    a. Family
    b. Romantic (boyfriend, girlfriend, etc.)
    c. Friend at Northwestern
    d. Friend NOT at Northwestern
    e. Acquaintance at Northwestern
    f. Acquaintance NOT at Northwestern
    g. Manager, supervisor, professor, etc. at Northwestern

   h. Manager, supervisor, teacher, etc. NOT at Northwestern
   i. Other, please specify:

4. What is this contact's gender?
   a. Female
   b. Male
   c. Other

5. What is this contact's approximate age?
   a. Younger than me by more than 15 years
   b. Younger than me by 11–15 years
   c. Younger than be my 6–10 years
   d. Younger than be my 3–5 years
   e. Younger than me by 1–2 years
   f. Approximately the same age as me
   g. Older than me by 1–2 years
   h. Older than me by 3–5 years
   i. Older than me by 6–10 years
   j. Older than me by 11–15 years
   k. Older than me by more than 15 years

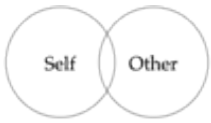
6. How far away does this contact live from your on-campus residence?
   a. Same building
   b. Same part of campus
   c. Same campus
   d. Same metropolitan area
   e. Same state
   f. Same time zone
   g. 1 time zone away
   h. 2 time zones away
   i. Further away

7. How satisfied are you with your relationship with this contact?
   a. Very dissatisfied
   b. Somewhat dissatisfied
   c. Neutral
   d. Somewhat satisfied

e. Very satisfied

8. Please select the image that best describes your relationship with this contact. No answer is better or worse than another.

a. 


b. 


c. 


d. 


e. 


f. 


g. 


9. The app logged __ direct Facebook messages / text messages / phone calls between you and "_____" during the week. Did you communicate with this contact in any other ways during that time?

*Not during that week*

*Once during that week*

*More than once during that week*

*Daily*

*More than once per day*

a. Face-to-face

b. Phone calls or text messages logged by the app with the Phone # or Contact Name:

*Drop-down list of contacts from database*

c. Phone (audio) calls not logged by the app: (Skype, Google Voice, etc.)

d. Text messages not logged by the app: (Google Hangouts, WhatsApp, GroupMe, etc.)

e. Group Messages (Sent to two or more people; MMS, GroupMe, Hangouts, etc.)
f. Multimedia messages: (Pictures or videos; MMS, Snapchat, Kik, etc.)
g. Video Calls: (Skype, Google Hangouts, etc.)
h. Social Networking Sites: (Facebook posts, Twitter, Instagram, etc.)
i. Other communication

# APPENDIX E: QUARTERLY INTERVIEW GUIDE

## INTRODUCTION & CONSENT

Thank you so much for participating our Freshmen Adjustment Study! My name is Madeline E. Smith, I'm the person who has been emailing you about the study and I will be conducting your interview today.

Before we get started, please take a moment to read over and sign the consent form. I'll be right outside, just open the door when you're done or if you have any questions.

Do you have any questions about the interview or the consent form?

To get things started, please log in the study website *(on the computer in the interview room)*. We'll be looking talking about some of you communication that was logged by the app during this interview. Before we do that why don't you take a few minutes to look through the logs, that way you can remind yourself what is there and you can also delete any messages you don't want us to see. I'll be outside the room, just open the door when you're ready to get started.

As a reminder, you can skip any question(s) you are uncomfortable answering or ask to stop the interview or the recording at any time. Do you have any questions before we begin?

## BACKGROUND (FALL QUARTER ONLY)

- To get this started, tell me a bit about yourself.
    - Where did you grow up?
    - Had you ever lived away from home before coming here?
    - Did you ever move to a new place (before moving here for college)?
    - What was your high school like? (Public, private, big, small, etc.)
- Tell me about how you use communication technology.
    - Laptop, tablet, cell phone, smart phone, software, skype, websites, Facebook, etc.
    - Which is the most important to you? Why?
- Tell me about your family.
    - Do you have any siblings? How old are they? Where do they live?
    - Are your parents married? Where do they live?
    - Are there other people you consider family?
    - Do you have any family who live closer to Northwestern than where you lived?

    - What kinds of communication technology do your family members use?
    - What kinds of relationships do you have with these family members?
    - Are you close with them? Distant? Are there people you are closer to than others?
    - What kinds of things do you talk about with them?
    - Are there things you tend not to talk about?

- Tell me a little bit about your college application and decision process.
    - How did you decide where to apply? Which schools did you apply to?
    - How did you make your decision to come here?
    - Were your family members involved in these decisions?
    - Had other people in your family gone to college before? How, if at all, did that impact your process?

- How did you feel about college before you started here?
    - What parts of college were you excited about?
    - What were you worried or concerned about?
    - Had other people in your family gone to college before? Did their experiences influence your expectations?

## COLLEGE ADJUSTMENT

- How is this quarter going?
    - How are your classes?
    - How is your dorm?
    - Making friends?
    - Are you involved in anything on campus? (clubs, sports, jobs, etc.)
    - Which things were easiest to adjust to? And which were hardest?
    - Have you through about transferring?

- Think of a few examples challenges or challenging situations you've faced this quarter.
    - Academic challenges: exams, course registration, declaring a major or minor, etc.
    - Social challenges: making friends, romance, family, parties, etc.
    - Financial challenges: paying tuition, finding a job, taking out loans, etc.
    - Health: physical, mental, emotional, fitness, nutrition, drugs, alcohol, etc.
    - Others?

- Tell me more about <*example situation*>. (For one or two of the situations from the last question.)

    - What about the situation was stressful?
        - How was it different from (or similar to) challenges you faced in high school or while you were living at home?
        - How often do you experience stressful situations such as these? More or less often than before you moved to college?
        - Were there other things going on at the same time that made it more difficult?
    - Was there a point when you felt better about this?
        - What do you think happened that made you feel better?
        - What did you do?
        - What did others do?
        - In which ways did you feel better
    - Was there anyone who you talked to or who helped you with this?
    - Did you get help from anyone on campus? Anyone from home? Elsewhere?
    - What did they do? And how did that help you?
    - How did you communicate with them? (Face-to-face, on the phone, online, etc.)
        - Why did you choose that communication method?
        - What about the method was useful in this situation?
        - What about the method was not useful in this situation?
    - How did you feel about the situation after communicating with them?

- In general, how have you been dealing with stress this quarter?
    - Are there any things you do to relieve stress? (talking to others, going to the gym, eating ice cream, watching movies, cleaning your house, etc.)
    - Has that been working for you?
    - Are there things you would like to do to better manage your stress?

- Who, if anyone, do you turn to for help during these stressful times?
    - Are there people on campus who help you? People you know from home or other places?
    - In what ways do these people support you? Advice? Distractions? Financially?
    - Are there other people you know you could ask if you needed them?
    - How do you decide whom to turn to for support when you need it?
    - How do you communicate with these people? Face-to-face? Phone calls? Skype? Etc.

- When would you turn to family members for help?
    - Are there certain family members who you are more comfortable turning to? Why?

- Are there certain situations when you would be more comfortable turning to family than other people you know? Why?
- Are there certain situations when you would be uncomfortable turning to family members for support? Why? Who would you rather turn to?

## COMMUNICATION LOG

For the rest of the interview we're going to be talking about some specific examples from your communication logs.

Tell me about this contact. (*For a few contacts, starting with the most frequently contacted*):

- How do you know them?
- How long have you known them?
- Are you close to them?
- How often do you see them?
- How (else) do you communicate with them?
- Tell me about your conversations with them that are shown here.
  - What were these messages/calls about?
    - What was going on when you sent this message?
    - Explain this abbreviation, etc.
  - Was there anything going on that week that you were asking this person for help with? Or helping them with?
  - Is this typical of the kinds of things you talk about with this person?
    - What message here best sums up your relationship?
  - This log gives a partial picture of your relationship with this person, what is it missing?
  - How else did you talk to this person that week (such as in person conversations or other digital communication not in this log)
  - What other kinds of things do you talk about with this person that isn't shown here?
- How (if at all) has the way you communicate with this person changed since you started college? *(or since we spoke last quarter?)*
- Do you communicate more or less frequently?
- Do you see each other more or less frequently?

- Have you changed the tools/apps you use to communicate?
- Have the topics you communicate about changed?
- Has your relationship changed?

## REFLECT ON CHANGES & MAKE FUTURE PREDICTIONS

- Tell me about how things have been going since we spoke last quarter. *(Or since you started college.)*
    - Have your relationships with people you knew before coming here changed?
    - Have your relationships with people you met here changed?
    - Have you gotten involved in anything new here?
- How do you feel about Northwestern and your decision to come here?
    - Have you considered transferring?
    - Do you feel like you belong here?
    - Have you changed (or considered changing) your major?
    - Has that changed since last quarter?
- How do you expect next quarter *(or next year)* to go?
    - What, if anything, do you expect to be different than this quarter?
    - Are there any challenges you anticipate?
    - Are there anything things you want to do differently?
- Do you have any advice for future freshmen?
    - Are there any tips or tricks you've learned that you wish you knew when you first got here?
    - Are there any things you would do differently if you were starting over?

## WRAP-UP

- Is there anything else you would like to add to this conversation?
- Do you have any questions for me?
- Thank you again for your participation in this study! I'll send you an email with your amazon gift certificate soon. Feel free to email me if any questions come up after you leave.

# APPENDIX F: MESSAGE CODING SCHEME

## KEY DEFINITIONS

- **Participant:** A first-year student who participated in the study
- **Contact:** A person the participant is talking to
- **Thread:** A stream of communication between a participant and a contact
- **Message:** An individual message within a thread (SMS or FB)
- **Topical Grouping:** A subset of message(s) from a thread focused on an identifiable subject and can be read as a coherent conversation between two individuals. Note that this subject may be a wide area and multiple sub-subjects may be discussed in the same topic (example: "making plans" topical grouping could also include "food to order", "time to meet", "what to wear", etc.)
- **Social Support**: Communication that enables an individual to positively relate to his or her social environment, provides solutions and/or reduces the perceived importance of a stressful situation.

## SOCIAL SUPPORT TYPES

- **No Support:** Topical grouping does not include any messages conveying support actions or discussing a stressful situation.
- **Emotional Support**: Topical grouping includes messages about feelings, emotions, and moods. Commonly messages include emotion words such as "love" "mad" "happy" "upset", etc. Emotions do not need to be related to the contact ("I'm mad at him" counts, as does "I'm mad at you").
- **Social Companionship**: Topical grouping includes messages concerning plans to spend time together socially, either in person or mediated. Support must be between the participant and the contact ("I have no one to hang out, want to do something tonight?" counts, but "I have no one to hang out with" on its own does not). Making plans to hang out together is social, but coordinating the details of those plans is not.
- **Instrumental Support**: Topical grouping includes messages describing provision or promise of actionable support. When someone is literally doing something for another person. Such as sending money, booking a flight, providing a ride, etc. Support must be between the participant and contact ("I'll give you $5" counts, but "My mom gave me $5" doesn't).

- **Informational Support**: Topical grouping includes messages about general, applicable facts and advice. When someone is telling another person relevant facts or advice pertaining to the topic, what they are doing, or what they should do ("The store closes at 6pm" counts, but "You should declare your major", and "From my experience, I would go with this class" doesn't).
- **Unknown:** Any Topical groupings where we can't tell what is happening because the messages are all sent or all received.

## SOCIAL SUPPORT ACTIONS

- **Giving:** The message shows the participant as the sender, giving a type of support to the other person. This could be giving emotional support ("I love you", "Everything will be alright"), social support ("Let's hang out this weekend"), instrumental support ("I had my transcript mailed home") or informational support ("I did really well on my midterm")
- **Needing:** The message shows the participant indicating that they need support, not necessarily specifically from the person they are talking to.
- **Seeking:** The message shows the participant directly and specifically asking support, again, not necessarily specifically from the person they are talking to.
- **Receiving:** The message shows the participant as the receiver, getting a type of support from the other person.

## TOPIC CODING INSTRUCTIONS

1. Read through the messages/calls in a thread.
2. Identify one or more message(s) that form a topical grouping
    - Each topical grouping can be read independently as a conversation
        - Contextual/background information may help readers understand the topic messages, but should not necessarily be coded as part of the topical grouping. For example, you might have a topic that refers to information from a previous topic ("plans for this weekend" might refer to "recap of last weekend", but those are still separate topics.)
    - Messages do not need to be sequential to be in the same topical grouping
    - Note that topical groupings will be coded for social support later, but do not focus on those categories now
    - Each message should belong to a topical grouping, even if it's the only message in that topical grouping
3. Assign a unique number to each topical grouping

- Start at 1 (for the first topical grouping in a thread) and increase sequentially, but do not worry about missing numbers or additions later on
- Each message should be labeled with this number

4. Provide a short description for each topical grouping
    - One word to one sentence in length
    - Provide description only for first message in topical grouping
    - Use "?" if you are unsure about the topical grouping description

## SOCIAL SUPPORT CODING INSTRUCTIONS

1. Read all of the messages in a single topical grouping to determine the primary social support type for that grouping.
    - Many topical groupings will have a social support type
    - Not all topical groupings will contain social support actions. Label these topical groupings with "No Support".
    - Consider the support types in the order listed within the context of the relationship between the participant and contact.
    - Indicate the support type by typing in the category name, for the first message in a topical grouping only.
2. Read messages individually to determine the relevant social support actions
    - Messages may be coded as zero or more support actions.
    - Indicate the support action(s) by marking the appropriate column(s) for each row.
    - Each topical grouping that is coded for a social type should have at least one message containing a social support action.
3. When necessary, identify a secondary social support type for the topical grouping, and repeat step 2 to identify support actions for that type.

# APPENDIX G: REPORTED COMMUNICATION TECHNOLOGY USAGE

*Table 8: Self-reported frequency of communication technology usage by relationship type*

| | Never | Less than Monthly | Monthly | Multiple Times per Month | Weekly | Multiple Days per Week | Daily | Multiple Times per Day |
|---|---|---|---|---|---|---|---|---|
| **Phone Calls** | | | | | | | | |
| Parents | 6.8% | 4.5% | 4.5% | 20.5% | 20.5% | 34.1% | 2.3% | 6.8% |
| Grandparents | 47.7% | 20.5% | 6.8% | 13.6% | 9.1% | 2.3% | | |
| Siblings | 36.3% | 11.4% | 11.4% | 13.6% | 13.6% | 11.4% | | 2.3% |
| Other Family | 81.7% | 2.3% | 2.3% | 9.1% | 2.3% | | | 2.3% |
| Friends at NU | 9.1% | 15.9% | 6.8% | 25.0% | 9.1% | 13.6% | 9.1% | 11.4% |
| Other Friends | 20.5% | 9.1% | 13.6% | 25.0% | 13.6% | 11.4% | 4.5% | 2.3% |
| Romantic | 61.4% | 2.3% | | 4.5% | 4.5% | 11.4% | 6.8% | 9.1% |
| Acquaintances | 43.1% | 27.3% | 9.1% | 9.1% | 4.5% | 2.3% | 2.3% | 2.3% |
| Supervisor | 70.4% | 11.4% | 2.3% | 11.4% | | 4.5% | | |
| Stranger | 75.0% | 13.6% | 2.3% | 9.1% | | | | |
| Other | 93.2% | 2.3% | | 4.5% | | | | |
| **Video Calls** | | | | | | | | |
| Parents | 65.9% | 11.4% | 4.5% | 2.3% | 13.6% | 2.3% | | |
| Grandparents | 84.1% | 15.9% | | | | | | |
| Siblings | 75.1% | 13.6% | | 4.5% | 4.5% | 2.3% | | |
| Other Family | 97.7% | 2.3% | | | | | | |
| Friends at NU | 90.9% | 4.5% | | 2.3% | 2.3% | | | |
| Other Friends | 56.8% | 11.4% | 6.8% | 9.1% | 9.1% | 6.8% | | |
| Romantic | 77.3% | 6.8% | 2.3% | 2.3% | 6.8% | 4.5% | | |
| Acquaintances | 95.5% | 4.5% | | | | | | |
| Supervisor | 97.7% | 2.3% | | | | | | |
| Stranger | 97.7% | 2.3% | | | | | | |
| Other | 100.0% | | | | | | | |

| | Never | Less than Monthly | Monthly | Multiple Times per Month | Weekly | Multiple Days per Week | Daily | Multiple Times per Day |
|---|---|---|---|---|---|---|---|---|
| **Text Messages** | | | | | | | | |
| Parents | | 6.8% | 2.3% | 13.6% | 18.2% | 25.0% | 13.6% | 20.5% |
| Grandparents | 75.0% | 4.5% | | 9.1% | 2.3% | 9.1% | | |
| Siblings | 20.4% | 6.8% | 11.4% | 11.4% | 11.4% | 25.0% | 4.5% | 9.1% |
| Other Family | 75.1% | 6.8% | 2.3% | 4.5% | 4.5% | 4.5% | | 2.3% |
| Friends at NU | | 2.3% | | 6.8% | 6.8% | 9.1% | 34.1% | 40.9% |
| Other Friends | 4.5% | 2.3% | 9.1% | 15.9% | | 20.5% | 22.7% | 25.0% |
| Romantic | 54.6% | 2.3% | | 4.5% | 2.3% | | 6.8% | 29.5% |
| Acquaintances | 24.9% | 20.5% | 11.4% | 13.6% | 4.5% | 20.5% | 2.3% | 2.3% |
| Supervisor | 74.9% | 9.1% | 2.3% | 11.4% | | 2.3% | | |
| Stranger | 72.7% | 18.2% | | 6.8% | | 2.3% | | |
| Other | 93.2% | 2.3% | | 4.5% | | | | |
| **Multimedia Messages** | | | | | | | | |
| Parents | 33.9% | 6.8% | 11.6% | 18.2% | 13.6% | 15.9% | | |
| Grandparents | 81.8% | 6.8% | 2.3% | 6.8% | | 2.3% | | |
| Siblings | 36.4% | 9.1% | 9.1% | 13.6% | 11.4% | 6.8% | 4.5% | 9.1% |
| Other Family | 86.3% | 4.5% | | 2.3% | | 2.3% | 2.3% | 2.3% |
| Friends at NU | 9.1% | 9.1% | 6.8% | 11.4% | 4.5% | 18.2% | 18.2% | 22.7% |
| Other Friends | 13.8% | 6.8% | 4.5% | 18.2% | 4.5% | 9.1% | 13.6% | 29.5% |
| Romantic | 54.6% | 2.3% | 4.5% | 9.1% | 6.8% | 4.5% | 6.8% | 11.4% |
| Acquaintances | 63.8% | 13.6% | 4.5% | 6.8% | 4.5% | 4.5% | 2.3% | |
| Supervisor | 86.4% | 6.8% | 2.3% | 4.5% | | | | |
| Stranger | 86.4% | 6.8% | 2.3% | 4.5% | | | | |
| Other | 95.4% | 2.3% | | 2.3% | | | | |
| **Group Messages** | | | | | | | | |
| Parents | 72.8% | 6.8% | 4.5% | 4.5% | 2.3% | 6.8% | 2.3% | |
| Grandparents | 86.5% | 4.5% | | 4.5% | | 4.5% | | |
| Siblings | 68.3% | 6.8% | 4.5% | 4.5% | 4.5% | 6.8% | 2.3% | 2.3% |
| Other Family | 88.6% | 4.5% | | 2.3% | | 2.3% | | 2.3% |
| Friends at NU | 9.1% | 2.3% | 2.3% | 6.8% | 9.1% | 18.2% | 29.5% | 22.7% |
| Other Friends | 31.8% | 15.9% | 4.5% | 11.4% | 2.3% | 11.4% | 9.1% | 13.6% |
| Romantic | 86.3% | 2.3% | 2.3% | 2.3% | | | 2.3% | 4.5% |
| Acquaintances | 65.9% | 11.4% | 2.3% | 4.5% | 4.5% | 6.8% | 2.3% | 2.3% |
| Supervisor | 91.0% | 4.5% | | 4.5% | | | | |
| Stranger | 86.3% | 6.8% | | 2.3% | 2.3% | | 2.3% | |
| Other | 93.1% | 2.3% | | 2.3% | | | | 2.3% |

| | Never | Less than Monthly | Monthly | Multiple Times per Month | Weekly | Multiple Days per Week | Daily | Multiple Times per Day |
|---|---|---|---|---|---|---|---|---|
| **Social Network Sites** | | | | | | | | |
| Parents | 65.9% | 2.3% | 2.3% | 11.4% | 4.5% | 6.8% | 6.8% | |
| Grandparents | 81.8% | 4.5% | | 6.8% | 2.3% | 2.3% | 2.3% | |
| Siblings | 38.7% | 4.5% | 2.3% | 25.0% | 4.5% | 15.9% | 9.1% | |
| Other Family | 81.9% | 4.5% | 2.3% | 4.5% | | 6.8% | | |
| Friends at NU | 4.5% | 2.3% | 2.3% | 15.9% | 15.9% | 22.7% | 20.5% | 15.9% |
| Other Friends | 6.8% | 2.3% | 2.3% | 15.9% | 13.6% | 18.2% | 25.0% | 15.9% |
| Romantic | 63.7% | 2.3% | 2.3% | 6.8% | 6.8% | 6.8% | 4.5% | 6.8% |
| Acquaintances | 43.4% | 4.5% | 13.6% | 4.5% | 6.8% | 9.1% | 13.6% | 4.5% |
| Supervisor | 79.5% | 6.8% | 4.5% | 2.3% | 2.3% | | 2.3% | 2.3% |
| Stranger | 74.9% | 11.4% | 6.8% | 2.3% | 2.3% | 2.3% | | |
| Other | 90.9% | 4.5% | 2.3% | | 2.3% | | | |
| **Other** | | | | | | | | |
| Parents | 93.2% | 4.5% | | | 2.3% | | | |
| Grandparents | 93.1% | 2.3% | | | 2.3% | 2.3% | | |
| Siblings | 91.0% | 4.5% | | | 4.5% | | | |
| Other Family | 97.7% | | | | 2.3% | | | |
| Friends at NU | 88.6% | 2.3% | 2.3% | | 2.3% | 4.5% | | |
| Other Friends | 88.5% | 2.3% | 2.3% | | 2.3% | 2.3% | | 2.3% |
| Romantic | 95.4% | | | | 2.3% | 2.3% | | |
| Acquaintances | 86.4% | 2.3% | 4.5% | | 4.5% | 2.3% | | |
| Supervisor | 90.9% | 2.3% | | | 4.5% | 2.3% | | |
| Stranger | 90.9% | | 4.5% | | 2.3% | 2.3% | | |
| Other | 97.7% | | | | 2.3% | | | |