

Article

Late Adolescents' Texting Experiences with Family: Mixed-Method Analysis for Understanding Themes and Sentiments

Xiaoran Sun , Jodi Dworkin  and Samantha LeBouef 

Department of Family Social Science, University of Minnesota, Saint Paul, MN 55108, USA; jdworkin@umn.edu (J.D.); lebou006@umn.edu (S.L.)

* Correspondence: sunx0521@umn.edu

Abstract: (1) Background: Texting is a prevalent communication method between late adolescents and their families that has implications for their relationships and well-being. This study used mixed-method analysis to understand what late adolescents, specifically college students, text their families about (i.e., themes), and how they feel about their family texting experiences (i.e., sentiments). (2) Methods: Our analyses used text transcripts of semi-structured individual interviews from 19 college students (aged 18–22 years, 13 female, 10 students of color), with 357 sentences/passages coded in total. (3) Results: Inductive content analysis revealed four themes: emotional support, relationship maintenance, conflict, and difficult conversations. Quantitative sentiment analysis revealed the highest level of positive sentiment attached to emotional support, and the highest level of negative sentiment attached to difficult conversations. The interviews that covered more conflict-based themes tended to have higher positive and negative sentiments. Differences between participants texting with their mothers and fathers were also revealed. (4) Conclusions: This research advances the understanding, in terms of both content and emotions, of the texting interactions with family members among late adolescents, along with providing methodological contributions, by highlighting the utility of the mixed-method analysis of interview data.

Keywords: texting; late adolescents; college students; family; mixed-method; sentiment analysis



Citation: Sun, X.; Dworkin, J.; LeBouef, S. Late Adolescents' Texting Experiences with Family: Mixed-Method Analysis for Understanding Themes and Sentiments. *Adolescents* **2023**, *3*, 581–593. <https://doi.org/10.3390/adolescents3030041>

Academic Editor: Flavia Albarello

Received: 10 August 2023

Revised: 3 September 2023

Accepted: 7 September 2023

Published: 9 September 2023



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1. Introduction

Texting is an important communication method between youth and their family members [1]. Experiences with texting have implications for family relationship quality and late adolescents' well-being [2]. Among late adolescents, specifically, college students are spending significantly less time with family than prior to college, while they have not yet transitioned to their own independent lives [3]; texting may be especially important as it allows them to remain connected with family members [4]. Although prior research on youth's texting with family members has mainly focused on the frequency, duration, or intensity of texting, recent research has been emerging to better understand their subjective experiences with texting, highlighting the importance of this research direction. Accordingly, we designed this study to understand what college students text their families about (i.e., themes), and how they feel about their texting experiences with family (i.e., sentiments). Using text-based transcription data from individual interviews, we used an innovative mixed-method approach to incorporate both qualitative, thematic coding and quantitative, machine-based sentiment analysis.

1.1. Texting with Family Members

Texting is a common method for late adolescents to communicate with their family members. For example, a study found that 85% and 78% of college students reported using text/picture messaging with their mothers and fathers, respectively; this was the second

most frequently used information and communication technology (ICT) to communicate with parents [5]. In a more recent study, text messages collected from college students showed that 96.9% of students identified their mothers and 88.6% identified their fathers as a texting partner, exchanging an average of 87.8 texts with their mothers and 28.4 texts with their fathers over a two-week period [6].

As a common method for family communication, texting plays an important role in youth's relationships with their parents. In a study of high school and early college students, 41.2% and 39.6% of youth reported feeling "somewhat" and "very" close when using text messaging with their mothers and fathers, respectively [7]. Similarly, Crosswhite and colleagues [8] found that 47.4% of late adolescents reported that they "Agree" or "Strongly agree" that "I feel more connected to my family because of text messages". In addition, 42.3% reported that they "Agree" or "Strongly agree" that "Text messaging has improved or strengthened my family relationships". Further, research among adolescents has revealed that the number of text messages that they exchange with their parents and the frequency of family cell phone use (texting and calling) are both positively associated with their relationship quality with their parents [2,9].

Beyond examining the prevalence and frequency of texting between youth and their parents, researchers have also been trying to understand these texting experiences more in-depth, including what family members are texting about. Using a six-item scale, Crosswhite et al. [8] explored the primary reasons that late adolescents and young adults choose to text with family, and found that the most frequent reason was to convey information, followed by to plan activities, for general conversation, to send pictures or jokes, to fill unoccupied time, and to deepen relationships. Given this questionnaire-based method, however, this study confined young adults' reports of reasons for family texting to the six reasons listed. Other studies have openly explored adolescents' texting experiences with their parents: For example, Fletcher and colleagues [10] conducted interviews with adolescents about their cell phone (calling and texting) communication with their mothers and fathers in the past 24 h, including the content and nature of their communication for each text message. Their results showed that adolescents used texting to have both managerial communication and emotional connection communication. Further, Jensen and colleagues [11] collected text messages from college students' mobile phones and coded the content into themes reflecting monitoring, disclosure, and positive connections.

Beyond content, another important aspect for gaining an in-depth understanding of young people's texting with family is the emotions being experienced in this family process. The BlackBerry Project research team [12], for example, collected text messages from adolescents' mobile phones and analyzed sentiments (identified by trained human coders) expressed in the messages exchanged with their parents. They discovered that adolescents had more neutral and positive content exchanged with their parents than negative content. This research highlights the potential for understanding emotions expressed in texting through sentiment analysis, which may have implications for learning how texting may influence family relationships and youth development.

1.2. A Mixed-Method Approach to Understanding Themes and Sentiments in Family Texting

To further explore what happens in family texting and how late adolescents perceive and feel about family texting communication, this study analyzed semi-structured interview data from college students about their texting experiences with family members. Specifically, we took a mixed-method approach, which includes both a standard qualitative approach of coding the interviews into themes, and a quantitative approach using machine-based sentiment analysis on the interview transcriptions to understand the emotions expressed along with those themes. We used thematic coding to reveal what the texting communication was about, and sentiment analysis (positive, negative, and neutral sentiments) to examine how college students perceived their texting experiences with family members.

A novel step taken in this study is our focus on sentiment in the interviews using machine-based text analysis. Sentiment is an important aspect of linguistic characteristics that reflects speakers' own attitudes and emotions [13]. Prior studies have investigated the linguistic characteristics of interview transcriptions, and found them to be associated with attachment styles and relationship closeness [14–16]. In this study, we conducted sentiment analysis using Valence Aware Dictionary and sEntiment Reasoner (VADER), a rule-based, open-source text analysis tool [17]. This tool, based on a large lexicon, classifies sentiment polarity (positive, negative, neutral) and scores the sentiment intensity of text. The results from such sentiment analysis can reflect the valence and intensity of emotions expressed in text. Although VADER has been mostly used for analyzing social media data [18,19], emerging research has used it to analyze interview text data, including those collected from family members, and has found convergence between VADER sentiment scores and human-coded sentiments [20]. Thus, VADER sentiment scores for the interview data in the present study can complement the qualitative coding with quantitative results that reflect the emotions that late adolescents expressed in their interviews regarding texting experiences with their family members.

1.3. Current Study

This study used a mixed-method analytical approach to understand what late adolescents text their family members about (i.e., themes) and how they perceive or feel about these texting experiences (i.e., sentiments). Using semi-structured interview data from college students about their subjective texting experiences with family members, we conducted qualitative analysis to identify themes about family texting experiences that emerged in the interviews. We then used VADER, a text-based quantitative analysis tool, to obtain sentiment scores for the interview text associated with each coded theme to understand how the positive, negative, and neutral sentiments differ across different themes of texting, and how these sentiments are correlated with how much each theme of texting is discussed in the interview.

In addition, informed by prior findings about the differences in adolescents' communication with their mothers and fathers and differences in their prevalence and intensity of texting [6,7], we also obtained themes and sentiment scores related to their texting with their mothers and with fathers to illuminate mother–father differences in our data.

2. Materials and Methods

2.1. Participants and Procedure

College students (age 18–22 years) were recruited from one large public university through email listservs that reach diverse populations of students, including first-generation students, and other students underrepresented in higher education. Data were collected from 19 college students (13 female; 10 students of color; 5 students living on campus) via 30–60 min semi-structured individual interviews; participants received a USD 20 gift card. All participants provided consent to participate and have their interviews recorded. IRB approval was obtained from the researchers' university, study number: [blinded].

Each interview was conducted by a trained interviewer on the research team. First, the interviewer began by walking the student through creating a genogram or a diagram of their relationships with family members who had played significant roles in their life in the past year, using distance to indicate emotional closeness. Next, the interviewer talked with the student, using probes to gather details about how they used texting with these family members, what they talked about via texting, how they handled conflict through texting, what the constellation of texting groups looked like, and how those groups supported family relationships. Participants were also asked: "What do you 'get' from texting with this family member?" and "What do you think you 'give' that person?" Data were collected until we reached saturation, and no participants were excluded from the analysis.

Participants identified 174 family relationships in total. Family size ranged from 3 to 13 across participants. The most frequent roles included brother ($n = 21$), cousin ($n = 21$),

mother ($n = 19$), sister ($n = 19$), aunt ($n = 16$), grandmother ($n = 15$), father ($n = 14$), uncle ($n = 12$), and grandfather ($n = 7$). Based on students' ratings of emotional closeness, mothers were most frequently identified, by 13 participants, as the closest relationship and the most frequent texting partner in the family. Fathers were only listed twice as the closest family member and once as the family member participants texted with most frequently. Five participants identified a sibling as their closest family member and who they texted with most frequently. Seven participants reported not texting most frequently with their closest family member; instead, they reported texting more frequently with a family member with whom they were not emotionally close.

2.2. Qualitative Data Analysis

Data were transcribed verbatim, and the interview transcripts were uploaded into NVivo for qualitative data analysis. For this study's analysis, we removed the first section of the interviews where participants created genograms and quantitatively rated their family relationship closeness. The analyses focused on the subjective texting experiences in the remaining sections.

To minimize bias and to control for coders' influences, data were first coded independently by two trained researchers to identify participants' reasons for texting with family, and to indicate whether they were communicating with their mother or father. Due to limited existing research that has qualitatively explored late adolescents' texting experiences with family, we used a process of inductive content analysis [21] to identify themes in reasons for texting and what they reported getting and giving via texting with family. Interviews were coded line-by-line to identify themes; sentences or passages (more than one sentence) in each interview were labeled in relation to an identified theme. The researchers then met to discuss any disagreement in coding or labeling that emerged between the two coders, and they held discussions to resolve disagreements and potential biases. Discussions were also held to ensure the themes were named in a way that was descriptive of the content. Inter-coder reliability (i.e., the percentage of time the two coders agreed on the sentence or passage being coded as the same theme) was 97.83%. Four themes emerged through this iterative process of independent coding across 357 sentences/passages and discussion: emotional support, relationship maintenance, conflict, and difficult conversations.

Beyond identifying these themes, for each participant's interview document, we also used NVivo to obtain the coverage rate of each coded theme. The coverage rate of each theme indexed the proportion of sentences or passages labeled to the total interview text being analyzed, that is, how much each theme was discussed in each interview.

Next, the interview text that had been coded as one of the original four themes was coded again to identify whether the texting communication was with the participant's mother or father. A similar process of independent coding and conversation to resolve coding disagreements was followed. Inter-coder reliability was 97.87%.

2.3. Quantitative Data Analysis for Sentiment Scores

For the quantitative analyses, we used the VADER Analyzer in Python's Natural Language Toolkit (NLTK) to obtain sentiment scores (including positive, negative, and neutral scores) from the sentences or passages of the interviews that were qualitatively coded for each theme (i.e., theme-level) and from each interview (i.e., document-level).

First, to understand the sentiments expressed for different themes of family texting experiences, we obtained theme-level sentiment scores of sections across interviews that were qualitatively coded for emotional support, relationship maintenance, conflict, and difficult conversations, respectively. For each theme, we extracted the corresponding text sections labeled in the process of qualitative analysis in NVivo across all the interviews and analyzed these sections in Python by computing sentiment scores on these extracted texts. Following the same procedure, we also obtained sentiment scores for sections across interviews labeled as communication with mother and with father.

Second, we obtained document-level sentiment scores to reflect the emotions expressed in each interview, that is, by each participant. Before applying the VADER Analyzer, we preprocessed the text transcript of each interview in the following steps: (1) remove the interviewer's verbatim so that the analysis is focused on the interviewee's expressions; (2) remove paragraphs with fewer than three words (e.g., "Okay" "Sounds good") that could influence the sentiment scores but do not have substantive meaning. To examine how each sentiment expressed in the interviews was correlated to the extent to which each theme of texting was discussed in the interview, we computed Spearman correlation coefficients between the sentiment scores at the document level and the coverage rate of each theme that was determined in the qualitative coding procedure.

3. Results

3.1. Qualitatively Coded Themes about Reasons for Texting with Family

The qualitative analyses of the interview data first revealed four main themes about reasons for texting: emotional support, relationship maintenance, conflict, and difficult conversations. In this section, we describe these themes for college students' texting experiences with their families in general, whereas in the next section (i.e., Section 3.2), we address the differences between texting with their mothers and fathers regarding each theme.

3.1.1. Emotional Support

Across interviews, one of the most common reasons for texting was emotional support (132 sentences or passages across 18 interviews; mean coverage rate = 7.48%, SD = 6.77%). Students described that texting with family was a way to both receive and give emotional support. For example, they stated that a reason for texting is to show that they care about each other:

By them reaching out it makes me know that they care about me, so I guess I get that emotional support from them too . . . I feel like I kind of reciprocate what they're giving me, so like the emotional support. By responding and being interested in what they're talking about and like trying to plan time to be with them. (Female, age 20)

They also described reaching out to family members for advice with school, finances, and other day-to-day responsibilities for the family to provide support and encouragement. For example, one student described reaching out to their father for support on finance:

Me and my dad . . . talk about finances a lot, because he's in charge, he helps me with that for school. (Female, age 20)

Meanwhile, another student described the different types of support (e.g., for school, technology, and finance) that she seeks from each of her parents:

I also get resources from both my mom and dad. My mom more gives me resources for school, 'cause she's in the field that I'm going into, so she'll update me there. And then my dad, computer stuff or finance stuff, or make sure you do this, kind of thing. (Female, age 20)

Students talked about both reassuring family (parents in particular) that they were doing well and seeking validation from family that the family members were doing well. Students mentioned that in addition to receiving support from their families about school and work, they also provided support for family members experiencing hardships through texting. For example, one student explained this experience with their mother:

I think more and more I'm giving her emotional support. Like if she had a hard birth, I'm like oh sorry, like I'm sure you did a great job and like I'm glad the baby is okay, or something like that. Because sometimes her job is really like emotionally hard on her. (Nonbinary, age 20)

3.1.2. Relationship Maintenance

The second theme was relationship maintenance (62 sentences or passages across 15 interviews; mean coverage rate = 4.71%, SD = 4.38%), a way to stay connected and feel like part of the family when not physically together. Maintaining family relationships across distance requires family members to find ways to stay connected. One student described it in this way:

...just like not the necessities but more like ... like more emotional I guess you could say. And like more bonding and stuff. Trying to keep our family close 'cause I'm away at school. (Female, age 20)

Another student described texting, especially through a group chat, as a way to stay connected to her cousins who lived remotely:

It's my cousins all over the country, out of the country, some are in Canada and Europe so ... my aunt made the group chat so that all of us girls could get close. (Female, age 19)

Students described using text messaging to share stories, check in, plan in-person time, and obtain updates as a way to maintain family relationships. This student described maintaining her relationship with her grandmother through fairly mundane text messages:

Grandma would probably be like ... she'll text me about the weather like, what's happening around the house and stuff. And I'll just kind of respond. Um, we just got her an iPhone for Christmas so we text now but it's funny before that we would send emails back and forth that way. (Female, age 20)

They also talked about reaching out via texting just to let other family members know that they were thinking about them. For example,

My sister, what I get from texting her is probably more like bonding and trying to keep our relationship close. (Female, age 20)

These intentional but more mundane acts of communication serve to support relationship maintenance.

3.1.3. Conflict

Students described conflict (144 sentences or passages across 19 interviews; mean coverage rate = 9.01%, SD = 4.33%) resulting from either miscommunication via texting or tensions between family members around simply checking in, logistics, and plans. For instance, one student said:

With my mom I think sometimes we'll end up talking about stuff and then just like some of the tone is lost in texting so it's harder to read what the feel is. It's not that that doesn't happen in person too sometimes but we have fallen into a couple things where I just like couldn't read tone or she couldn't read tone so it was harder to communicate that over text. (Female, age 22)

Another student described conflict arising from planning their family vacation:

We did like plan our whole trip there over that group chat so there was like some conflict there. There is one aunt who has some like psychological problems so sometimes she's hard to communicate with. And it's never, I don't think it's really big drama, but sometimes there's like weird interpersonal stuff. (Female, age 22)

Although students talked about conflict that occurred via text message, they also explained that conflict was generally not resolved via texting. Instead, they would choose to move the conversation off of text message to either a phone call or in-person conversation as one participant described:

Yeah she'll say something and then I'll be like well what do you mean and then we'll get into like full blown caps, like full blown arguments ... then I'll call her and because there's so much distance between us like it's over ... usually like conflicts like big big issues we don't talk about until we're in person. (Female, age 21)

Students frequently described a situation where family members were not living together or close by and would not be seeing each other regularly. This situation created a sense of not wanting to wait for an in-person conversation to let the conflict linger, and so the family would begin to address the conflict via texting.

3.1.4. Difficult Conversations

Difficult conversations were the least frequent theme (19 sentences or passages across 9 interviews; mean coverage rate = 1.07%, SD = 1.47%) but unique from conflict. Difficult conversations were usually based around family updates or abrupt interactions that triggered strong emotions. One student described a text message from his father that said

Would you be mad if I got a divorce? (Male, age 20)

Sometimes they would text back to continue the conversation despite the topic being stressful; for example, another student said

I'll respond back usually try to understand just why, like why. Why are you saying this? Why do you feel like this? Is something else going on that's making you feel stressed? Um . . . I try to be really communicative. (Female, age 21)

Further, one student described how these difficult conversations made others feel and how family decided to handle them in person:

It's hurtful, because that's happened in the past when people have been talking behind other people's backs and the other person gets hurt really bad so like we're trying not to do that . . . like it would happen with my mom so right now definitely most of the conversations that we'll have are during holidays when we're all together and we can talk about stuff. (Female, age 18)

3.2. Qualitatively Coded Texting with Mother and Father

Content analysis for adolescents' texting experiences with their mothers and fathers revealed differences in texting. First, mothers were mentioned more often in the interviews; among all the sentences and passages coded for this study ($n = 357$), 73 of these referenced participants texting with their mothers, and mother-referenced sentences and passages appeared across 17 interviews. In contrast, 41 sentences and passages referenced participants texting with their fathers, and these only appeared in 11 interviews. Second, among the sentences and passages coded for participants texting with their mothers, emotional support was the most common theme (42.5%), followed by conflict (34.2%), relationship maintenance (19.2%), and difficult conversations (4.1%). In contrast, conflict was the most common theme in participants texting with their fathers (48.8%), followed by emotional support (34.1%), relationship maintenance (12.2%), and difficult conversations (4.9%).

Participants texting with their mothers was more likely to be coded as emotional support, compared to texting with their fathers. A student explained that she connected with her mother via texting:

Definitely emotional support. If I tell her I have a big test, she'll like shoot me a text at the beginning of the day. (Female, age 20)

Another student described that they would turn to their mother first for advice and support:

If I need help with something I'll probably text my mom first . . . especially with car troubles 'cause she works in the car industry so she can give me some fast advice and I know that its trustworthy um or sometimes like if something reminds me of her or like the other way around if something if she sees something that reminds her of me we'll send that to each other but that's less frequent. (Transgender, age 20)

Further, a student explained that their mom used text messages to help keep her children connected with their father:

My mom will text group chat with me and brother and just be like hey, make sure you tell dad you love him. He's having a hard time. (Nonbinary, age 20)

In comparison, one student identified how her text messages with her father were not about emotional support:

Like information, like jokes, like things like that. Um, much less to like, not in like emotional supportive resources. (Female, age 19)

Although participants texting with their fathers was relatively infrequent, when it did occur, nearly half of these text messages with their fathers were coded as conflict, which was more frequent compared to conflict in texting with their mothers. In addition, students mentioned that texting with their fathers was often logistical or simply a way to check in, for example,

I think he is more likely to send me photos of like something my brother is up to. (Nonbinary, age 20)

My dad ... computer stuff or finance stuff, or make sure you do this, kind of thing. (Female, age 20)

This stands in contrast to how students described texting communication with their mothers.

3.3. Quantitative Sentiment Analysis

To further understand students' emotions expressed for each theme of family texting, sentiment scores were computed (Table 1). At the descriptive level, students expressed their highest levels of positive sentiment while discussing emotional support, followed by relationship maintenance, conflict, and difficult conversations. In contrast, discussions about difficult conversations revealed the highest level of negative sentiment, followed by conflict, relationship maintenance, and emotional support. Further, difficult conversations were attached to the highest level of neutral sentiment, followed by relationship maintenance, emotional support, and conflict.

Table 1. Mean (SD) VADER sentiment scores for sentences and passages qualitatively coded as emotional support, relationship maintenance, conflict, and difficult conversations and as texting with mother and father.

Qualitatively Coded Sentences and Passages	VADER Scores		
	Positive Sentiment	Negative Sentiment	Neutral Sentiment
Emotional Support	0.26 (0.09)	0.02 (0.02)	0.71 (0.09)
Relationship Maintenance	0.24 (0.07)	0.03 (0.03)	0.74 (0.07)
Conflict	0.21 (0.05)	0.09 (0.04)	0.69 (0.07)
Difficult Conversations	0.09 (0.06)	0.13 (0.09)	0.78 (0.08)
Texting with Mother	0.24 (0.06)	0.05 (0.05)	0.70 (0.05)
Texting with Father	0.22 (0.11)	0.09 (0.08)	0.69 (0.06)

Turning to the sentiment scores for adolescents' texting experiences with their mothers and fathers, the results showed that students expressed more positive and fewer negative emotions with their mothers than with their fathers. This pattern is consistent with the qualitative results described above; participants experienced more emotional support and relationship maintenance in texting with their mothers than with their fathers, and more conflict in texting with their fathers than with their mothers.

The document-level analyses revealed how sentiments for all of the interviews were related to how much each theme was covered in the interviews. The average scores across interviews were 0.25 (SD = 0.05, range = 0.18–0.35), 0.03 (SD = 0.01, range = 0.02–0.04), and 0.72 (SD = 0.05, range = 0.62–0.80) for positive, negative, and neutral sentiments,

respectively; this means that neutral sentiment dominated the whole interview text, and that overall, positive emotions were stronger than negative emotions expressed about family texting experiences. Table 2 shows Spearman correlations between these sentiment scores and the coverage rates of the qualitatively coded themes. Specifically, at the document level, the sentiment scores were not significantly correlated with the coverage rates of emotional support, relationship maintenance, or difficult conversations. However, an interesting pattern emerged for the conflict theme: coverage rate was positively correlated with both the positive and negative sentiment scores, and negatively correlated with the neutral sentiment score. In other words, interviews that contained a larger proportion of the conflict theme tended to be more emotionally expressive overall on both the positive and negative valences.

Table 2. Spearman correlation coefficients between document-level sentiment scores and coverage rates of qualitatively coded themes.

Qualitative Theme Coverage	Sentiment		
	Positive	Negative	Neutral
Emotional Support	−0.32	0.14	0.28
Relationship Maintenance	−0.29	0.06	0.28
Conflict	0.60 **	0.52 *	−0.67 ***
Difficult Conversations	−0.36	0.24	0.31

* $p < 0.05$. ** $p < 0.01$, *** $p < 0.001$.

4. Discussion

To better understand late adolescents' texting experiences with their families—a ubiquitous and prevalent experience among youth nowadays [1,6]—we took a mixed-method approach to the analysis of interview data from college students. We specifically explored themes and sentiments reflected in these interviews to answer the following questions: What do college students text their families about? And how do they perceive or feel about these texting experiences? The results from the qualitative content analyses revealed four main themes in their texting—emotional support, relationship maintenance, conflict, and difficult conversations. We then used sentiment analysis through VADER to obtain quantitative sentiment scores for the emotions expressed in each theme, with the results revealing different extents of positive, negative, and neutral sentiments across different themes, and different correlations between how much each theme was covered in the interview and the overall sentiments expressed in each interview. Further, the qualitative results revealed that participants texted more with their mothers than their fathers, and the quantitative results revealed more positive and fewer negative sentiments in college students' experiences of texting with their mothers than with their fathers.

Our interview-based approach allowed for the open exploration of college students' texting experiences with family, especially their reasons for texting, which resulted in findings about four main themes that align well with fundamental family functions that have been widely examined in the family literature [22–24]. In comparison with prior research on youth's texting with family, emotional support and relationship maintenance align with prior findings about adolescents' texting with their parents [10,11]. However, conflict and difficult conversations—texting themes that tended to be dominated by negative emotions—were uniquely identified in our study. These two themes make a unique contribution to the family texting literature by illuminating the existence of negative exchanges in family texting. An important next step is to investigate whether and how texting communication that is based around conflict and difficult conversations has implications for family relationships and family members' well-being.

Although prior studies have examined sentiment in text messages [12], to our knowledge, the current study is the first to reveal sentiments expressed in interviews about family texting. The sentiment scores revealed the existence of positive, negative, and neutral emotions expressed in college students' subjective perceptions of their texting experiences with family. These results suggest that how students perceive or feel about their texting experiences differed across different themes/reasons for texting: they expressed more positive emotions in experiences with emotional support and relationship maintenance than conflict and difficult conversations, and more negative emotions with difficult conversations and conflict than emotional support and relationship maintenance. This pattern illuminates how different texting experiences may differ in their implications for college students' mood and well-being and family functioning. Moving beyond previous research focused on testing the frequency of texting with family (i.e., how often) as it correlates with family relationship quality [2,9], the themes/content of family texting (i.e., what they text about) merit more attention in future research as experiences potentially influencing college students' and their families' well-being.

At the document level, the relative intensity of neutral, positive, and negative sentiments (from high to low) in interviews about texting with family in this study align with the order of sentiments in text messages between adolescents and parents [12], which suggests potential consistency in perceptions of family texting and the actual texting content between young people and their families. This order of sentiment intensity is inconsistent with some other sentiment analysis results of adolescents' digital environments; for example, a recent study revealed positivity as the dominant sentiment among the gamer community on YouTube [25]. This inconsistency across studies suggests that emotions experienced by adolescents can differ across different digital activities and digital interactions with different groups of people. In contrast to the sentence/passage-level results, however, the document-level results did not reveal significant correlations linking how much the themes of emotional support, relationship maintenance, and difficult conversations were covered in each interview to the intensity of each interview's positive, negative, and neutral sentiments. Moreover, it was surprising that there were significant positive correlations between the proportion of sentences/passages qualitatively labeled as related to conflict and both positive and negative sentiment scores. Together, these results highlight the complication in understanding each participant's subjective perceptions in their entirety. Considering why participants who were recognized through qualitative coding as having more conflicts with family members in texting had stronger emotions in both positive and negative valences, as identified using the sentiment analysis tool, is worth further exploration with larger datasets.

An additional insight from this study's analysis is that college students' experience of texting is different between their mothers and fathers. Our qualitative results revealed that participants more frequently mentioned texting with their mothers than with their fathers, which is consistent with previous findings about differences in the prevalence and intensity of participants texting with their mothers versus their fathers [5,6]. In addition, the sentiment scores contributed to this understanding about between-parent differences; specifically, late adolescents had more positive experiences with their mothers and more negative experiences with their fathers in their texting communication. Together, these findings highlight the importance of interventions targeted at promoting healthier digital communication between young people and their fathers.

The mixed-method analyses in this study make an important methodological contribution to youth and family communication research by modeling the application of this approach with interview data. Researchers have almost exclusively conducted qualitative analyses of interview data; more recently, researchers are moving toward exploring and examining automated tools to reduce the labor of qualitative coding and promote new discoveries using tools such as machine learning and natural language processing [26]. Sentiment analysis is an important part of natural language processing that reflects emotions and attitudes in speech and conversations [13], and can be especially useful for analyzing

interview data in youth and family research given that emotional climate is fundamental to family relationships [27].

Limitations and Future Directions

Despite its many contributions, this study has limitations that need to be addressed in future studies. First, despite the racial/ethnic and gender identity diversity in our sample, we had more female participants, which may have led the findings to be biased towards young women's experiences. Future research should seek a more balanced sample in terms of gender, and compare texting experiences with family among different gender identities. Second, although our sample was adequate for qualitative analyses of interview data, the small sample size did limit our quantitative explorations, and thus, those analyses remained descriptive. By increasing the sample size in future research, we will be able to estimate multivariate models and test associations between sentiment scores and other outcomes, such as relationship closeness and texting frequency. Third, when coding for college students' texting partners (mothers and fathers), we were not always able to discern who they were referencing; it is possible that some mentions of mothers and/or fathers were missed in the coding. While students were asked explicitly to talk about their texting experiences with individual family members, texting is not always dyadic and it was not always possible to identify every part of a group chat. Fourth, the data collection and coding did not allow for the analysis of differences across subgroups of students, such as among those who were living on campus versus those living at home, which is an important future direction for investigations with larger samples.

5. Conclusions

In conclusion, in the current era, where digital technology is an increasingly important part of family communication and of adolescents' lives [28,29], and where texting, in particular, is a common method of family communication [1], this study has shed light on both the 'what' and 'how' of texting interactions with family among late adolescents—who are experiencing a unique developmental period and transitioning to more independence from their families [3]. Similar to face-to-face family dynamics, texting experiences also encompass complexities in content and emotions. Sentiment analysis can be especially useful in understanding emotions associated with digital communication experiences that are undoubtedly multifaceted; using automated, machine-based tools is scalable to large, diverse datasets. An important focus for future research is to figure out how to capture multiple dimensions in texting experiences and consider their implications for supporting families.

Author Contributions: Conceptualization, X.S. and J.D.; Methodology, J.D., X.S. and S.L.; Software, X.S., J.D. and S.L.; Validation, X.S. and J.D.; Formal Analysis, X.S., J.D. and S.L.; Investigation, X.S. and J.D.; Resources, J.D. and X.S.; Data Curation, X.S., J.D. and S.L.; Writing—Original Draft Preparation, X.S., J.D. and S.L.; Writing—Review and Editing, X.S., J.D. and S.L.; Project Administration, J.D.; Funding Acquisition, J.D. and X.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by the Minnesota Agricultural Experiment Station and the Stanford Data Science Scholarship awarded to Xiaoran Sun.

Institutional Review Board Statement: The study was approved by the Institutional Review Board of the University of Minnesota (protocol code: STUDY00005295; date of initial approval: 1 February 2019; date of last update: 12 August 2022).

Informed Consent Statement: Informed consent was obtained from all participants involved in this study.

Data Availability Statement: The materials and analysis code for this study can be made available by emailing the corresponding author.

Acknowledgments: We thank the participants for their contributions to this study. We thank Ting Xu for her assistance with the research.

Conflicts of Interest: The authors declare no conflict of interest.

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