

**Predictors of Loneliness Among University Undergraduates: Personal
Characteristics, Negative Life Events, Childhood Family Experiences, and Social
Media Use**

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Abstract

Recent research suggests that social media has created a new dynamic in loneliness among university undergraduates. Evidence indicates that interactive social media use may be associated with lower loneliness, whereas heavy consumption-based (non-interactive) use may be linked to greater loneliness. The present study examined predictors of loneliness in a sample of 1,923 university undergraduates. In addition to social-media variables, the study addressed personal characteristics (codependence, social anxiety, social skills, decisiveness, emotional regulation, extraversion, and social comparison), situational factors such as recent negative life events, plus the impact of childhood family pattern. Results indicated that higher levels of social skills, extraversion, and emotional regulation were associated with lower loneliness, whereas codependence, social anxiety, and social comparison were associated with higher loneliness. A greater number of negative events in the past year predicted higher loneliness, particularly events such as feeling unwanted, being bullied, feeling like a burden, and feeling rejected. Interactive use of social media was associated with lower levels of loneliness. Structural equation modeling tests a theory of loneliness, childhood experiences → personal qualities → loneliness, that not only receives strong support but explains 62% of the variance in loneliness. Childhood environment was highly correlated with loneliness: Lower levels of loneliness were characterized by childhood patterns of praise, encouragement, parental involvement, outdoor play, visitors in the home, and family discussion; higher levels of loneliness were associated with conflict, criticism, lack of supervision, and frequent moves. Implications of these findings are discussed.

Key words. loneliness, social loneliness, emotional loneliness, childhood family patterns, social media

Predictors of Loneliness Among University Undergraduates: Personal Characteristics, Negative Life Events, Childhood Family Experiences, and Social Media Use

Loneliness among university undergraduates has become an increasingly important area of research in the era of social media. Although loneliness has been extensively studied for decades, the widespread adoption of social media has altered the social contexts in which loneliness is experienced and managed. The present study examines contemporary influences on undergraduate loneliness, drawing on established literature while addressing emerging factors that warrant further theoretical and empirical investigation.

First, we examine seven individual difference factors—personal qualities that have been widely studied in relation to loneliness. Social skills, decisiveness, emotional regulation, and extroversion have consistently been associated with lower levels of loneliness, whereas codependence, emotional reactivity, and tendencies toward social comparison are linked to higher levels. Including these variables allows for both confirmation of prior results and exploration of their interactive effects using structural equation modeling to show the influence of these variables each other and on loneliness.

Then, this study extends prior research by incorporating underexplored and unexplored factors. Specifically, the role of high school size in predicting loneliness during university has not been previously examined. Additionally, while situational negative events have received some attention, this study systematically assesses both the occurrence and cumulative number of such events. The relationship between social media use and loneliness has been addressed, but results remain inconclusive: There does appear to be an emerging pattern that reveals that interactive use is associated with lower loneliness, whereas passive use is linked to higher loneliness. This study

seeks to replicate these patterns. Finally, 46 childhood family patterns are included as potential predictors, offering a more comprehensive understanding of factors that contribute to undergraduate loneliness.

Consistent with other articles, the acronym SMU (social media usage) is employed throughout the paper. Also, the primary dependent variables names “Loneliness”, “Social Loneliness”, and “Emotional Loneliness” are capitalized.

Literature Review

Social versus Emotional Loneliness. Since the days of Robert Weiss (Weiss, 1975), the terms social loneliness (loneliness due to absence of a social network of friends) and emotional loneliness (loneliness due to absence of a close familial, romantic, or confidant relationships) have been part of the language of the loneliness literature. Literature on social loneliness finds this experience to be associated with depression (Weiss, 1975), low self-esteem and a negative orientation toward support networks (Vaux, 1988). Social loneliness is also a common characteristic of minorities or immigrants (Diehl, et al., 2018), those who are physically inactive (Vaux, 1988) and is characterized by discomfort in social settings (Weiss, 1975). Emotional loneliness is a more frequent experience than social loneliness (Diehl, et al., 2018) and is associated with not being in a nurturing relationship (Diehl, et al., 2018), experiencing higher anxiety (Weiss, 1975), particularly social anxiety (Chen & Hu, 2022), and lower levels of life satisfaction (Salimi, 2011). This is only a sampling of an extensive literature.

Personal Qualities Associated with Higher or Lower Levels of Loneliness. Research has found that the following qualities are associated with lower levels of loneliness: decisiveness (e.g., Petriglieri & Shepro, 2025), emotional regulation (e.g., Patrichi et al., 2025), extraversion (e.g., Entringer & Gosling, 2022; Parija & Shukla, 2014; Ayyildiz, 2026), and excellent social skills (e.g., Lodder, et al., 2016; Curran & Arroyo, 2025).

On the reverse side of the coin, greater loneliness is associated with social anxiety (e.g., Segrin & Kenney, 1995; Lodder, et al., 2016), codependence (e.g., Cermak et al., 1989; Bacon, et al., 2020), and with social comparisons (e.g., F Piko, et al, 2024; Cifci, 2023)—although the impact of social comparisons is more nuanced than simply considering the presence or absence of that behavior.

High School Size Impact on Loneliness at the University Level. In general, transition to university from high school, particularly in the first year is associated with greater loneliness (e.g., Park & Bui, 2024). However no published literature links the size of the high school to loneliness at the university level.

The impact of situational negative events. The literature on the effect of negative events on loneliness is spotty. Specifically, research has found that greater loneliness was associated both daily stressors (Kang et al., 2023) and major disruptions, such as the COVID pandemic (Ebhrhimi et al., 2021), as well as more normal life transitions such as the change from high school to university (Buecker et al., 2021; Park & Bui, 2024). Generally, negative events increase loneliness, and poor mental health makes one particularly vulnerable to situational loneliness (Chang et al., 2010). However, no recent research has systematically explored the impact of many outside negative events and their effect both individually and cumulatively.

The impact of social media. Literature has been surprisingly mixed on the general impact of social media on loneliness. There are studies that show greater SMU is associated higher levels of loneliness (e.g., Halston, et al., 2019; Pittman & Reich, 2016; Primack, et al., 2017; Zhang et al., 2022), has no effect on loneliness (e.g., Ranaei, et al., 2015; Hancock et al., 2022), or reduces loneliness (e.g., Gorman et al., 2025; Mackson et al., 2019). In fact, the Hancock and colleagues study was a meta-analysis showing that over time SMU is converging toward no effect on either loneliness or psychological well-being. Whether SMU increases or decreases loneliness is often associated with situational or personal qualities. For example, Fam and colleagues

(2023) found that when social media is associated with greater loneliness, the interaction is often a negative spiral in which each quality exacerbates the other.

Research finds that greater loneliness is associated with replacing real life with social media networking (Rai & Gill, 2016), excessive SMU (Roberts et al., 2024), social media addiction (Bakry et al., 2022), negative personal qualities such as codependence or social anxiety (Smith et al., 2021), passive use of social media (e.g., “doom scrolling”) (Kross, et al., 2013; Bonsaksen, et al., 2023), SMU to avoid difficult feelings (Bonsaksen, et al., 2023), and SMU that encourages superficial engagement (Nowland et al., 2018).

In the context of SMU, lower levels of loneliness are associated with interactive engagement with virtual social networks (Aslan & Polat, 2024; Fam et al., 2025), and meaningful interactions with others (Nowland et al., 2018). SMU among older adults is associated with lower levels of loneliness (Gorman et al., 2025), and in younger age groups, restricting SMU to less than 30 minutes a day contributes to lowering loneliness levels as well (Hunt et al., 2018).

Anticipated outcomes

H1. Personal Characteristics. We anticipate that social skills, decisiveness, emotional regulation, and extraversion will be associated with lower levels of loneliness. By contrast we anticipate that codependence, social anxiety, and social comparison will be associated with higher levels of loneliness.

H2. School Size. We anticipate that students from smaller schools will experience more loneliness than students who come from larger schools.

H3. Negative Events. We anticipate that a greater number of negative events having occurred in the past year will be associated with higher levels of loneliness.

H4. Social Media Use. We anticipate that more time spent on *interactive* social media sites will be associated with lower levels of loneliness and that more time spent on *consumable* social media sites will be associated with higher levels of loneliness.

Method (1095 words)**Participants**

A total of 1923 subjects participated. Gender balance found 26% men, 73% women and 1% nonbinary. The ethnic composition of the sample included 74% Whites, 13% Blacks, 7% Hispanics, 4% Asians, and 1% DTS or other. The mean age was 22.2 years (range 18 - 54); Participants averaged 2.6 years of college education (range HS to BA/BSc); Mean family income was \$118K (range <\$25K to >\$200K); High school size found 1% home schooled, 7% from schools of 1-100, 35% 101-500, 24% 501-1000, and 33% from school larger than 1000. Participants originated from 47 US states and 13 foreign countries.

This study was approved by the university IRB prior to data collection.

[place the link to the supplemental material (including data set) here]

Materials and Procedures

Participants were recruited by undergraduate students in a large public university research-methods class. The students completed CITI ethics training and were certified to collect data in exchange for partial class credit. Initial contacts with potential participants were made in person, by telephone, e-mail, or social media. Questionnaires were administered to all participants through an internet link to a Qualtrics survey. Participants did not receive any compensation other than expression of appreciation for their contribution.

To ensure data quality and integrity, responses were screened prior to analysis. Participants were excluded if there were indications of invalid responding, including insufficient completion time, excessive missing data, idiosyncratic or inconsistent response patterns, or duplicate IP addresses. All cases failing to meet inclusion criteria were removed from the final data set.

Dependent Variables

The dependent variable, Loneliness, was measured with the widely used 20-item version of the UCLA Loneliness Scale (Russell, 1996) supplemented by seven additional items suggested from a pilot study in an undergraduate research methods class. These additional questions were designed to create a more complete and internally consistent measure, and to assist in differentiating between Social and Emotional Loneliness. From these 27, 11 items were selected to measure Social Loneliness and 11 items to measure Emotional Loneliness. All items were measured on 7-point Likert scales; anchors varied based on the nature of the questions; 13 questions were reverse coded to control for response bias. The final loneliness measure was the mean of all questions that measured Loneliness, Social Loneliness, and Emotional Loneliness. Internal consistency for loneliness was .95, for Social Loneliness .88 and for Emotional Loneliness, .91. The complete questionnaire is included in supplemental material.

Predictor Variables

Many factors were included as predictors of loneliness including: situational negative events, family patterns, codependency, social anxiety, social skills, decisiveness, emotional regulation, extraversion and social comparisons. Description of these variables follow.

Personal Construct variables. All personal-construct variables were measured using 7-point Likert scales to assess the presence or absence of each quality measured. These variables included codependency (8 items, $\alpha = .76$, George & George, 2016), social anxiety (10 items, $\alpha = .95$, Wong, et al., 2016), social skills (9 items, $\alpha = .72$, Segrin & Givertz, 2003), decisiveness (8 items, $\alpha = .80$, Snyder et al. under review), emotional regulation (8 items, $\alpha = .81$, Snyder et al. under review), extraversion (8 items, $\alpha = .76$, George & George, 2016) and social comparison (10 items, $\alpha = .87$, Gibbons & Buunk, 1999). For each of the seven characteristics, statements were presented that were scored on 7-point scales, with anchors that

matched the content of each question. For example, a question that measured codependence was worded “I tell myself that things will get better when the people in my life change what they are doing” with anchors or *never* (1), *sometimes* (4), *often* (7). Each trait was the mean of the related indicators. Thus, the final measure for all seven ranged from little of the related quality (1) to a great deal (7). All questions employed in these measures are included in supplemental material.

Negative events. A sense of loneliness can often be situational. In the pilot study mentioned earlier, the research methods class generated events they thought might impact loneliness. From these, 16 were selected for use in the present study. Participants would identify (“yes” or “no”) whether each of the events had occurred in the past year. They divide into two broad categories: Objective events: The 16 included: (1) divorce of parents, (3) extended illness of close friend or family member, (4) moved to a new location (home or university), (6) loss of a close friend or loved one, (7) breakup with significant other, (9) been in a setting where you don’t know anyone, (13) experienced an extended illness, and (14) lived alone (15); and interpersonal/social experiences (2) been bullied or cyber bullied, (5) been excluded by roommate(s), (8) demanded reassurance or validation, (10) felt that you are a burden, (11) felt that no one wants to be your friend, (12) felt fear of rejection, been insulted or criticized by others, (16) you have insulted or criticized others. In analyses these 16 were used both individually and were summed to measure the cumulative impact of the number or negative events on loneliness.

Social Media. Once again, from the pilot study, students indicated which social media sites they used most frequently. Fourteen sites were identified and included in a drop-down menu for students to select. These included: Tik Tok, Facebook, Twitter/X, Instagram, Snapchat, Reddit, Pinterest, YouTube, Discord, GroupMe, Messages, VSCO, LinkedIn, and YikYak.

Participants would select which of the social media sites they used most frequently. Then they would identify the approximate amount of time per day on this site (scale: *less than daily* (1), *1-15 minutes* (2), *16-30 minutes* (3), *31-60 minutes* (4), *1-2 hours* (5), *2-4 hours* (6), *> 4 hours* (7)).

Next, they identified the primary reasons for using this site including (on a check-all-that-apply list) contact with friends/family, relaxation, bored, keeping up with trends, learn new skills, keep contact with interest groups, grow and improve, discuss topics of interest, entertainment, work or hobbies, and online shopping. Following this, participants answered the same questions (amount of time and reason for use) for the 2nd and 3rd most frequently used sites.

Childhood family patterns. The present study employed 46 childhood family patterns taken from the Snyder and colleagues research (under review). These 46 included 35 specific activities (such as play outdoors, family discussions, church attendance, visitors in the home, hobbies, criticism, family conflict, playing video games). These activities were measured on a *never* (1) to *frequent* (7) scale. Then there were 11 general characteristics of the home environment (such as the quality of child-parent relationship, parent-parent relationship, effectiveness of discipline, quality of nutrition). These were measured on a *poor* (1) to *excellent* (7) scale. All 46 family patterns are included in the supplemental material.

Results (1576 words)

Psychometric Soundness and Internal Consistency of Variables. The following Table indicates the internal consistency (alpha), the number of indicators, and the skewness and kurtosis of all primary variables. Psychometrics for all primary variables fell into the excellent category (skewness and kurtosis between ± 1).

Table 1

Descriptive Statistics and Reliability for Study Variables

Variable	α	# of items	Skewness	Kurtosis
Loneliness	.95	27	0.30	-0.37
Social loneliness	.88	11	0.16	-0.45
Emotional loneliness	.91	11	0.36	-0.38
Sum of negative events	.75	16	-0.06	-0.54
Codependency	.76	8	0.28	0.09
Social Anxiety	.94	10	0.86	0.02
Social Skills	.72	9	-0.05	-0.31
Decisiveness	.80	8	0.09	0.05
Emotional Regulation	.81	8	0.02	-0.04
Extraversion	.89	8	-0.08	-0.55
Social Comparison	.87	10	0.17	0.09

The 46 family patterns demonstrated from excellent (between ± 1) to good (between ± 2) skewness or kurtosis values for all patterns. See George and Mallory (2024) for a discussion of psychometric validity.

Social versus emotional loneliness. Although Social and Emotional Loneliness are conceptually different from each other, the two measures are highly correlated ($r = .86, p < .001$) and in most results that follow the impact on the general Loneliness measure will suffice. Therefore, we report results with the global Loneliness measure and introduce Emotional or Social loneliness only when there are notable contrasts.

Impact of Demographics.

Demographics proved to have quite an impact on loneliness in several domains. However, there were no interesting differences based on relationship status (recall that less than 2% were married in this student sample), level of education, or age.

Gender and ethnic differences. A one-way ANOVA revealed significant differences between men, women and non-binary persons, $F(2, 1918) = 14.82, p < .001$. Post hoc analysis using the Bonferroni method with an alpha of .001 found that non-binary persons ($M = 3.96$) experienced far more loneliness than men ($M = 3.25$) and women ($M = 3.06$). Also, men experienced more loneliness than women. A One-

way ANOVA that compared ethnic groups also found significant differences $F(4, 1916) = 10.06$; $p < .001$. Post hoc analysis using the Bonferroni method with an alpha of .01 found that Black ($M = 3.46$) and Asian ($M = 3.36$) respondents experienced greater loneliness than Whites ($M = 3.04$).

Income and denominational preference. Those with higher income experience significantly less loneliness, $r = -.26$, $p < .001$. A one-way ANOVA found that an Atheist/Agnostic group differed significantly from Catholics and Protestants, $F(2, 1534) = 39.64$, $p < .001$, eta squared = .05. Post hoc analyses using the Bonferroni method with an alpha of .001 found that the Atheist/Agnostic group ($M = 3.46$) are lonelier than Catholics ($M = 2.93$) and Protestants ($M = 3.05$).

High school size. The original file separated high school size into five categories: home schooled, <100, 101-500, 501-1000, and >1000. Results suggested that a better categorization would be to combine home schooled with schools less than 100, and to also combine schools between 500 and 1000 with schools greater than 1000. With those three designations there were substantial differences in loneliness based on high school size, $F(2, 1913) = 11.034$, $p < .001$. Post hoc analysis using the Bonferroni method with an alpha of .001 found that students from schools under 100 suffered much more loneliness ($M = 3.44$) than students from schools over 500 ($M = 3.04$). That said, the small number of home-schooled students ($n = 26$, 1.3% of the sample) resulted in low statistical power eliminating significant differences. However, their loneliness level was much higher ($M = 3.69$) than other groups: 1-100 ($M = 3.40$), 101-500 ($M = 3.17$), 501-1000 ($M = 3.05$), >1000 ($M = 3.04$).

Impact of Personal Qualities

Consistent with hypotheses, participants who measured higher on codependence, social anxiety and social comparison experienced greater loneliness; those who scored higher on social skills, decisiveness, emotional regulation and extroversion experienced lower levels of loneliness. In results that follow we include both bivariate correlations and beta weights from regression equations. The regressions, using the *Enter* method, included the seven personal constructs as predictors plus the sum of negative events, and Loneliness as the dependent variable;

this model resulted in robust results: $R(7, 1843) = .763$, $R^2 = .581$, $p < .001$. Hence, 58% of loneliness is predictable from those seven personal qualities and negative events. All differences are significant at the .001 level, unless otherwise noted.

Personal qualities associated with greater loneliness. Codependence was associated with higher levels of Loneliness ($r = .48$, $b = .26$) as was social anxiety ($r = .57$, $b = .21$). Social comparisons was associated with higher levels of Loneliness in bivariate correlations ($r = .15$) but the influence reversed in the regression equation ($b = -.09$).

Personal qualities associated with less loneliness. Social skills was robustly associated with less loneliness for both correlations and regressions ($r = -.57$, $b = -.32$), as was extroversion ($r = -.51$, $b = -.23$). Emotional regulation was strongly associated with less loneliness in correlations ($r = -.41$) but much less so in regressions ($b = -.05$, $p = .01$). Decisiveness was associated with less loneliness in correlations ($r = -.30$) but was not significantly associated in regressions.

Impact of Situational Negative Events. Recall that there were 16 negative events measured, and participants indicated whether that event had occurred in the past year. The impact of the sum of negative events and each individual event were both examined. Paralleling the pattern for personal qualities (above), a larger number of negative events was associated with greater loneliness in both correlations and regressions ($r = .31$, $b = .10$). In the structural model, the Beta jumped to .22.

The greatest impact of individual negative events is as follows. Table 2 displays, bivariate correlations (point-biserial) between each negative event and loneliness. Then, t tests compare those who experienced the event in the past year with those who did not. Both correlations and t tests use Loneliness as the dependent variable.

Table 2

Correlations between Negative Life Events and Loneliness; t-Test Comparison of Those Who Have Experienced a Certain Negative Event in the Past Year and Those Who Have Not.

Negative event	r_{pb} (sig)	Experienced event during the past year?				
		Yes	No	DF	t (sig)	Cohen's d
Feeling no one wants to be your friend	.47 (<.001)	3.74	2.71	1919	-23.07 (<.001)	1.08
Feeling that you are a burden	.38 (<.001)	3.45	2.61	1919	-18.27 (<.001)	.83
Been bullied or cyber bullied	.21 (<.001)	3.56	3.00	1919	-9.31 (<.001)	.53
Fear rejection	.19 (<.001)	3.23	2.74	1919	-8.35 (<.001)	.46
Roommate excludes you	.18 (<.001)	3.43	3.00	1919	-7.97 (<.001)	.41
Living alone	.15 (<.001)	3.39	3.02	1919	-6.70 (<.001)	.35
Been insulted by others	.15 (<.001)	3.23	2.88	1919	-6.81 (<.001)	.33

Impact of Social Media

When all forms of social media were included, social media use was associated with lower levels of Loneliness ($r = -.08$, $p < .001$); this was paralleled with Emotional Loneliness ($r = -.06$, $p = .003$) and Social Loneliness ($r = -.11$, $p < .001$).

The eleven reasons for social media use (relaxation, bored, entertainment etc.) had no impact on loneliness whatsoever, except for interaction with family and friends which was negatively correlated ($r = -.20$, $p < .001$) with Loneliness; similar values occurred for Social and Emotional Loneliness.

Comparison with the type of social media used was also consistent with hypotheses. The amount of time spent on interactive SMU was associated with lower levels of loneliness whereas the amount of time spent on consumable SMU was associated with higher levels of loneliness.

Correlations between loneliness and the top five most frequently used *interactive* social media sites (Snapchat, $n = 1235$, $r = -.14$, $p < .001$; Messages, $n = 326$, $r = -.05ns$; Discord, $n = 81$, $r = -.32$, $p = .002$; GroupMe, $n = 57$, $r = -.14ns$; Yik Yak, $n = 31$, r

= $-.16ns$) were all associated with lower levels of loneliness. The correlation when combining all five sites ($N = 1730$) resulted in $r = -.13$, $p < .001$.

The top six most frequently used non-interactive social media sites (Instagram, $n = 1479$, $r = .001ns$; Tik Tok, $n = 1389$, $r = .02ns$; YouTube, $n = 446$, $r = .04ns$; Facebook, $n = 190$, $r = .04ns$; Twitter/X, $n = 156$, $r = .02ns$; Pinterest, $n = 125$, $r = .05ns$) were all positively but not significantly associated with more loneliness. The correlation when combining all six sites ($N = 3795$) resulted in $r = .02ns$.

Using the Fisher r to Z transformation to compare the two correlation values ($-.13$ and $.02$) results in a robust difference, $z = 5.21$, $p < .00001$, Cohen's $q = .15$.

Impact of Family Patterns

Childhood family patterns and activities most associated with lower levels of loneliness ($p < .001$) include praise and encouragement ($r = -.36$), parents active involvement ($r = -.34$), playing outdoors ($r = -.29$), visitors in the home ($r = -.29$), family discussions ($r = -.28$), vacations together ($r = -.28$), celebrating holidays together ($r = -.25$), movie nights ($r = -.24$), and meals together ($r = -.23$).

Childhood family patterns and activities most associated with higher levels of loneliness include conflict in the home ($r = .26$), criticism ($r = .22$), smoking ($r = .15$), children unsupervised ($r = .15$), and the use of prescription drugs ($r = .14$). The complete family-patterns chart is included in supplemental material.

Regression: Predictors of Loneliness

Multiple regression analysis was used to determine the cumulative effect of demographics, personal qualities, negative events, social media use and family patterns on Loneliness. Using the SPSS “Enter” function we included variables highly correlated with Loneliness to create the first model. We then removed two underperforming predictors to converge to the final model.

The overall model was significant, $F(13, 1896) = 246.1, p < .001$; accounting for 63 percent of the variance in Loneliness ($R^2 = .63$, adj $R^2 = .63$). Thirteen variables were significant predictors of Loneliness including (rank ordered) social skills ($b = -.25, p < .001$), codependence ($b = .24, p < .001$), extraversion ($b = -.20, p < .001$), social anxiety ($b = .19, p < .001$), praise and encouragement during childhood ($b = -.11, p < .001$), the sum of negative events ($b = .09, p < .001$), playing outdoors during childhood ($b = -.09, p < .001$), family income ($b = -.09, p < .001$), total time on interactive social media use ($b = -.07, p < .001$), gender (being male) ($b = -.07, p < .001$), being criticized when a child ($b = .05, p = .002$), social comparisons ($b = -.05, p = .003$), and good emotional regulation skills ($b = -.05, p = .007$). This provided a springboard for the next step.

Structural Equation Modeling

Theoretical Perspective. Structural equation modeling evaluated a theoretically informed model of loneliness and subsequently refined the model to achieve parsimony and adequate fit. The theoretical design was: Childhood patterns → Personal qualities → Loneliness. We knew that it wasn't that simple. Modification #1 was to allow childhood patterns to affect Loneliness directly in addition to links mediated through personal qualities. Modification #2 was to include factors that may influence Loneliness independent of the 3-step sequence, such as demographics, social media use, or negative events.

The Path toward a Final Model. Using the Muthen & Muthen Mplus, Version 8.5 software, early models failed to converge toward a good model fit due to the large number of variables. The main culprit was the childhood family patterns. There are 46 of them but we selected the eight patterns most likely to affect the model. The 46 family patterns have been used in six different studies over the past three years involving a total of more than 13,000 participants. From these studies (and correlations in the present study) we had a strong feel for the "heavy hitters" in terms of the impact of

childhood family pattern and selected eight of them as potential predictors in the structural model.

The next step was to see if we could combine some of the family patterns to yield a smaller number of variables. We used results from past studies and confirmatory factor analysis (using the Mplus program). The first factor involved what we called “Childhood Enhancers” and included praise/encouragement, parental active involvement, emotional health of the family and family discussions ($\chi^2 = 1.46$, $p = .48$, CFI = 1.0, SRMR = .005). The second factor we labeled “Childhood Destroyers” and included criticism and home conflict. CFA doesn’t work well with a 2-item factor; however, the two values correlated $r = .64$. Left out of the analysis was “playing outdoors” one of the most influential childhood factors across the six studies. We included outdoor play as an independent factor in the final model.

Model fit. First the size of the data set is entirely adequate to conduct SEM. Using the Bentler and Chow (1987) criteria of a 5 to 1 ratio of participants to free parameters, our ratio was 1924 to 48 ratio (40 to 1). The downside of the large sample size is that using chi-square as a fit index disappears. It is virtually impossible to generate a p value greater than .05. Using other indices, the model generated an adequate to good fit: RMSEA = .065, CFI = .97, SRMR = .043.

The Final Model. The model accounted for 62% of the variance in loneliness (residual = .38) from the sources described earlier.

Impact of Childhood Family Patterns. The final model worked almost exactly as the proposed theoretical model; we include three non-significant links to make the model complete. Childhood Enhancers influenced the five personal qualities: codependence ($b = -.11$), social anxiety ($b = -.18$), emotional regulation ($b = .17$), social skills ($b = .33$), extraversion ($b = .25$), and had a direct impact on Loneliness ($b = -.15$). The total impact (direct and mediated links) of Enhancers on was $b = -.35$. The impact of Childhood Destroyers was much less robust: Impact on codependence ($b = -.05$),

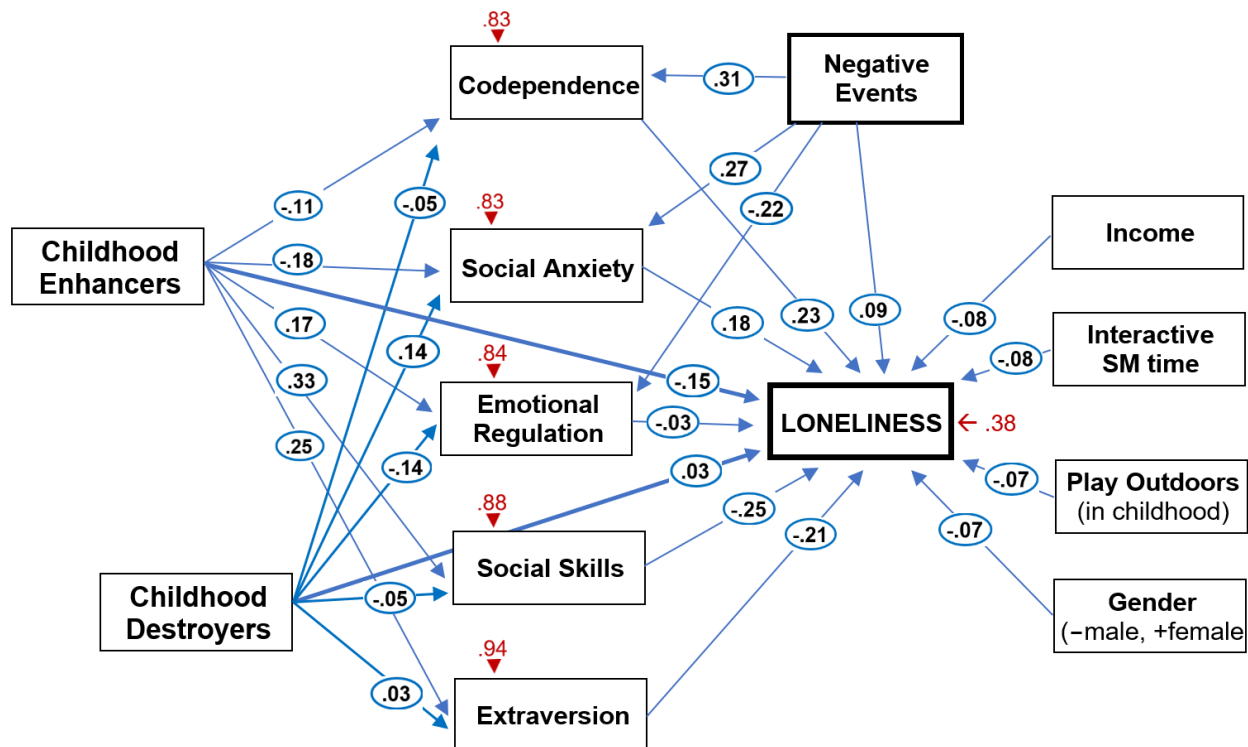
social anxiety ($b = .14$), emotional regulation ($b = -.14$), social skills ($b = -.05$), extraversion ($b = .03ns$), and the direct impact on Loneliness was not statistically significant ($b = .03$). The overall impact of the Childhood Destroyers (direct and mediated) was $b = .09$.

Impact of Personal Qualities. The five personal qualities directly impacted Loneliness as follows: codependence ($b = .23$), social anxiety ($b = .18$), emotional regulation ($b = -.03ns$), social skills ($b = -.25$), and extraversion ($b = -.21$).

Impact of the External Factors. Five external factors impacted loneliness: income ($b = -.08$), time on interactive social media use ($b = -.08$), playing outdoors ($b = -.07$), and gender—being male ($b = -.07$). The interesting external factor was negative events. Not only did this variable have a direct effect on Loneliness ($b = .09$) but was also associated with codependence ($b = .31$), social anxiety ($b = .27$), and emotional regulation ($b = -.22$). In fact, the total impact of negative events on loneliness (direct and mediated) was substantial ($b = .22$). In the model the arrows reflect the directionality in the SEM program; clearly these arrows may be bidirectional. Figure 2 displays the model.

Figure 2

Structural model with Loneliness as the primary dependent variable



Notes: not shown to assist in clarity: All five of the personal constructs are allowed to covary; gender impacts emotional regulation ($b = -.12$). Residuals are in red font.

Discussion (1528 words)

In the discussion that follows we address findings in the following order; 1. Impact of demographics including high school size. 2. Impact of personal qualities. 3. Impact of situational negative events (both individually and cumulatively). 4. Impact of social media. 5. Impact of family patterns 6. Strengths, weaknesses, and directions for future research.

Impact of demographics. Analysis of the impact of gender on loneliness was unusual in that since the sample size was so large we were able to include non-binary respondents in gender comparisons. Results found non-binary participants far lonelier than either men or women. Replicating many studies men were also found to be lonelier than women in both correlations and regressions. Ethnic differences found Whites (the majority ethnic group in this study) to be significantly less lonely than Blacks or Asians.

Both analyses display a similar theme: Consistent with the Visser theory, the majority group tends to be less lonely than minority groups (e.g., Visser & El Fakiri, 2016).

Personal characteristics. Across the seven personal characteristics hypotheses were confirmed in correlational analyses for all seven: codependence, social anxiety and social comparisons were significantly associated with greater loneliness; social skills, decisiveness, emotional regulation and extraversion were all associated with lower levels of loneliness. Regression models and the structural model were largely consistent with the bivariate correlational analyses. The top four, social skills and extraversion were heavily associated with lower levels of loneliness; codependence and social anxiety substantially associated with higher levels of loneliness.

Beyond that, the regressions analysis became more nuanced. The next three predictors included two family patterns (praise and encouragement and playing outdoors) associated with lower levels of loneliness, and the sum of situational negative events associated with more loneliness. The final three predictors included amount of time on interactive social media and emotional regulation, both modestly associated with lower levels of loneliness and criticism in the home during childhood, with higher levels of loneliness.

One of the qualities reversed impact from correlations to regressions: Social comparisons. This variable was modestly associated with higher levels of loneliness in correlations ($r = .15$) but lower levels of loneliness in the regression ($b = -.05$) and did not qualify as a significant predictor in the structural model. The shift of sign from correlation to regression is a common reality of data analysis—suggesting the impact of other variables in this partial correlation. In the media and popular culture, the idea is widely prevalent that social media encourages comparisons with others (number of likes, attractiveness of pictures, magnitude of accomplishments) resulting in compromised well being. One problem of the current measure is that we did not

distinguish between upward and downward social comparisons (Festinger, 1954; Wills, 1981). In this literature, researchers discovered that upward comparisons typically are used for improvement and downward comparisons are used to boost self esteem and to feel good about oneself. The challenge is that in the age of social media these comparisons are so much more frequent than in the past, and the likelihood of comparison with unrealistic images (e.g. photoshopping) is also more likely than in the past. Future studies await to explore the apparently nuanced impact of social comparisons.

School size. Consistent with previous research, the transition from high school to college was associated with increased loneliness. Our findings suggest that high school size also matters, with apparent thresholds at 100 and 500 students. Students from schools with fewer than 100 students reported greater loneliness than those from schools with more than 500 students. Home-schooled students reported the highest loneliness scores of any group (3.69), compared with 3.40 for students from schools with fewer than 100 and 3.04 from schools with more than 1,000 students. This suggests the challenge to students operating in a home environment with 1-3 students and adjusting to a large university with tens of thousands.

Situational negative events. The impact of situational events proved to be important both individually and summed across events. Sixteen types of events were measured. Summed across the 16, the distribution was almost perfectly normal with some individuals experiencing none of the 16 and others experiencing all 16. The sum of negative events was associated with greater levels of loneliness in correlations ($r = .31$) and remained a significant predictor in the regression analysis ($b = .10$). Further, this variable was a major player in the structural model. When both direct and mediated links are considered, the beta between sum of negative events and Loneliness was a substantial .22.

Of perhaps even greater importance was the analysis of each event individually and its impact on loneliness. Using point biserial correlations (between the occurrence of a particular event and loneliness) and t tests (contrasting those who had experienced an event in the past year with those who had not) outcomes revealed events that had the greatest impact on feelings of loneliness in the university undergraduate. The top five events with the most crippling impact on individuals in terms of increasing loneliness included (a) feeling that no one wanted to be your friend, (b) feeling that you are a burden, (c) having been bullied or cyber bullied, (d) the fear of rejection, and (f) being excluded from social events. This and other results provide specifics for counselors working with university students experiencing loneliness. With those specifics in mind, counselors can help guide these students into settings that will provide a greater sense of community.

Family Patterns. Six different studies (the total number of participants from all six studies is greater than 13,000) have been conducted in the previous two years that have included the 46 family patterns used in the present study. Clear patterns across many analyses have begun to identify those patterns associated with a positive profile and those associated with a negative profile. While technically causality is clear (what happens today cannot impact events that took place in the past) we need to remind ourselves that the study is cross sectional, correlational and retrospective. What happens today may impact my perception of the past. This study parallels other studies with revealing that lower levels of loneliness are associated with (in rank order) praise and encouragement, parental active involvement with their children, playing outdoors, family discussions, and visitors in the home. The entire chart is included in supplemental material for a more detailed look.

There is equal clarity on the family patterns associated with greater loneliness including conflict in the home, criticism of the child, smoking, heavy use of prescription drugs, children being unsupervised, and many moves. These findings (particularly when

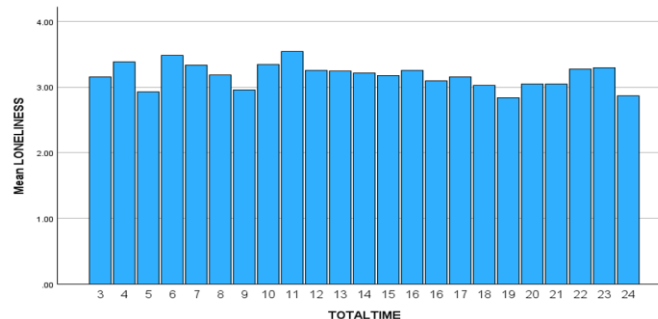
combined with the other five studies) provide psychologists with an extraordinary set of resources to guide parents in raising their children and guide therapists in counseling them.

Social Media Use. Like many studies (and contrasting with many) we found that, overall, more time spent on social media is associated with lower levels of loneliness. While a correlation of $-.08$ ($p < .001$) may not be impressive, total time on SM was also a significant predictor of loneliness in the regressions ($b = -.05$, $p = .002$). This suggests a modest but stable reduction of loneliness through social media use. When time spent on *interactive* social media sites was measured, the beta increased to $-.07$ in regression analyses and increased further to $-.08$ in the structural model. Future studies will further dissect the dynamics of this phenomenon.

Congruent with studies cited earlier, we do find that interactive social media use is associated with lower levels of loneliness whereas consumable social media use is associated with (non-significant) higher loneliness. However, the Fisher r to z transformation finds that interactive use is significantly superior at reducing loneliness than consumable use. This further supports the Nowland and colleagues' research (2018) that finds that SMU that nurtures meaningful interactions is associated with lower levels of loneliness.

Other studies that found excessive use of SM (Roberts et al., 2024) and social media addiction (Bakry et al., 2022) associated with greater loneliness was not supported. Nor does the contention that restricting social media use is associated with lower levels of loneliness (Hunt et al., 2018). In the present study participants reported the amount of cumulative time spent on their three most frequently used sites. Summed across the three sites the values ranged from less than 15 minutes a day use to more than 12 hours a day. Surely > 12 hours a day could be rated as excessive use or SM addiction, yet those at the high end of the scale experienced no more loneliness than those at the low end of the scale. The actual graph is instructive: "3" represents less

than 15 minutes a day, “24” represents greater than 12 hours per day with equal increments for each bar between.



Additional Thoughts from the Structural Model. A good-fitting structural model extends well beyond simple regression in explaining the dynamic of factors associated with a particular phenomenon. Several findings of the structural model have already been included earlier in this discussion. One of the most important findings was how well the structural model estimated the hypothesized model. There was strong evidence for childhood patterns → personal qualities → Loneliness with additional external factors allowed.

Another takeaway was the combination of childhood family factors into the Childhood Enhancers variable (praise/encouragement, parental involvement, emotionally healthy family, family discussion) that represent qualities of a nurturing and high performing family. This single variable not only had a direct impact on reducing loneliness but was also significantly associated with all five of the personal construct variables in the model. Including direct and mediated links the beta weight was a substantial $-.35$.

The Childhood Destroyers (criticism and home conflict), despite a dramatic negative impact on life satisfaction across many studies, was much more modest. Including both direct and mediated influence, the beta of $.09$ suggests increased loneliness but at not nearly the level that Childhood Enhancers reduces loneliness. Insight may come for a Stanley Schacter comment: “Misery doesn’t love any kind of

company, misery loves only miserable company” (Schachter, 1959, p. 24). The comparatively low impact on loneliness (compared to its devastating impact on life satisfaction) may be explained as follows. Those damaged by a negative environment are often attracted to others who share a similar negative background (e.g., Van Zalk et al., 2010; Giletta et al., 2011; Laird et al., 1999). These relationships may provide friendship needs that diminish loneliness.

Finally, it is keenly interesting how much the outside variables contributed to explaining loneliness in the university undergraduate. Negative events ($b = +.22$), income ($b = -.08$), interactive social media use ($b = -.08$), playing outdoors ($b = -.07$), and being male ($b = -.07$) all contributed substantially to 62% of variance in Loneliness being explained.

Strengths and Limitations

The study has several notable strengths. First, it draws on a large ($N = 1923$), and geographically-diverse sample (participants from 47 states and 13 foreign countries) enhancing the generalizability of the findings. Second, the study addresses a more complete set of potentially influencing factors, such as personal qualities, situational negative events, size of the high school, and childhood patterns. Finally, with variables used from the five different categories (demographics, personal qualities, negative events, high school size, and social media use) regressions were able to account for 63% of the variance in regressions, 62% in the structural model—yielding a more complete picture of the dynamic of factors associated with loneliness.

Perhaps the greatest weakness is that the study was unable to dissect many components of social media use that influence the experience of loneliness. Future studies might explore issues such as differences between addiction to SM and using SM a great deal. The issue of social comparisons also suggests a more careful look at upward versus downward social comparisons to see whether Festinger’s and Will’s research still applies in the present context of social-media use.

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