Research article

College students and cyberbullying: how social media use affects social anxiety and social comparison

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A B S T R A C T

Cyberbullying is defined as aggression intending to inflict harm on others by electronic communication technologies. Cyberbullying has become more common as social media has grown and is accompanied by negative mental health consequences. Research on cyberbullying and mental health in adolescents suggests cyberbullying victimization moderates the relationship between social comparison and social anxiety, but little is known about this phenomenon in college students. Therefore, the objective of this study was to explore the relationship between cyberbullying, social anxiety, and social comparison amongst college students. A convenience sample of 486 undergraduate students from southern Texas and northern Ohio completed a PyschData survey that assessed social anxiety, social comparison, experiences with be a cyberbullying victim, perpetrator, or both. We found that social anxiety was associated with cyberbullying victimization and perpetration; however, social comparison was not. Cyberbullying victimization was not a moderator between social comparison and anxiety, suggesting that unlike adolescence, college students' experiences with these constructs may be unique to their developmental level.

1. Introduction

Bullying is defined as the intent to harm another person physically, emotionally, or psychologically through one's actions or behavior. In the bullying perpetrator-victim relationship, the perpetrator is the one seeking to harm the victim through their actions and it often involves some type of social power imbalance (Waseem and Nickerson, 2021). The traditional forms of bullying (verbal, physical) and their relationship to social anxiety and other mental health problems have been well studied (Campbell, 2013). Cyberbullying is defined as aggression sent by electronic communication technologies that is used to inflict harm on others (Mehari et al., 2014; Tokunaga, 2010). Cyberbullying has become prevalent partly with the rise of social media (Craig et al., 2020; Zhu et al., 2021). Studies have shown that in college students, cyberbullying perpetrators had more issues with problematic social media use, which is defined as an "unmanageable urge to use social media and spending too much time on it in which real life relationships and areas are negatively affected" (Kircaburun et al., 2018). As for cyberbullying victims, there was a positive association with victimization and time spent on a computer. Despite these associations, little is known about social media usage

in the context of cyberbullying. Cyberbullying can be carried out directly by way of threats or verbal assaults, or indirectly through methods such as posting an inappropriate picture of the victim online without their consent. Many factors contribute to the relative ease of cyberbullying perpetration, such as anonymity and not having to face the victim directly (Kircaburun et al., 2018).

Both cyberbullying perpetrators and victims have been shown to experience associated mental health symptoms. Amongst victims, cyberbullying has been associated with increases in generalized anxiety, social anxiety, and suicidal ideation (Sampasa-Kanyinga et al., 2014; Hatchel et al., 2018; Lee, 2020; Coelho et al., 2022; Gong et al., 2022; Wright et al., 2022). Perpetrators have also been shown to have significant associations with increased aggression and suicidal thoughts (Schenk et al., 2013) as well as increased depressive symptoms (Lee, 2020). Similar to traditional bullying, cyberbullying and its effects on mental health have been better studied in adolescents compared to college students (Cassidy et al., 2013).

Research suggests that social comparison and social anxiety are associated (Ojha et al., 2021). Social anxiety and social comparison are associated with negative mental health outcomes. Social anxiety alone is

associated with increased suicidal ideation, even when depression and other psychological factors are controlled for (Buckner et al., 2017). Social comparison occurring on social media creates a dissonance between the self being presented and the real self, leading to depression and worsening mental health (Lee, 2020). In contrast, a study performed in India concerning graduate students showed that increased social media use did not correlate with increased levels of anxiety or depression (Ojha et al., 2021). We wanted to investigate the associations between cyberbullying, social anxiety, and social comparison amongst college students. According to Pew Research Center (2022), young adults(18–29) continually report the highest active engagement in social media, putting them at the highest risk of experiencing cyberbullying.

Previous studies evaluating social anxiety and cyberbullying victimization have shown a variety of results, one study of 2128 adolescent students in Belgium found positive association amongst adolescents (Pabian and Vandebosch, 2015), while no association amongst a sample of 86 Illinois college students (Mager, 2015). In the only other samples of college students exploring these topics which used unvalidated measures of cyberbullying, there was a significant association between social anxiety and cyberbullying victimization (Na et al., 2015; Giumetti et al., 2022). Social comparison has also been evaluated in the context of "trolling", which can be considered a form of cyberbullying. In that study, trolling was associated with a greater engagement in downward social comparison (Howard et al., 2019). Additionally, another study amongst 941 Chinese adolescents showed cyberbullying perpetration and victimization were significantly correlated with social comparison (Geng et al., 2021).

College students' social anxiety and social comparison may differ by race and ethnicity. In one study consisting of 2554 Latino college students and 4047 non-Latino white college students, Latinos showed a lower prevalence of social anxiety and later age of onset relative to non-Latino whites (Polo et al., 2011). However, the negative impacts that this social anxiety had on several aspects of a Latino person's life was more severe. As for social comparison in Latino adolescents, one study showed that Latino girls reported greater social comparison than Latino boys. This study was partly focused on how Western media and its portrayal of what is "ideal" affected social comparison (Warren et al., 2010). In another study looking at adolescents in 8th, 10th, and 12th grade across the United States, it was found that Latinos had lower self-esteem scores relative to white students (Bachman et al., 2010). This observation does support the theory proposed by Gerth and Mills that minority groups tend to have lower self-esteem relative to nonminority groups because social comparisons were made based on status in society. Regarding Caucasians, one study found that Caucasian Americans, with the average age of 46.48 years, were more likely to be diagnosed with social anxiety disorder compared to African Americans, Asian Americans, and Hispanic Americans (Asnaani et al., 2010). In another study examining social media and social comparison, where the majority of the sample was comprised of Caucasian and African American college freshmen, social comparison was associated with identity distress dependent on the type of social comparisons being made (Yang et al., 2018). However, much research historically has failed to consider race/ethnicity (Roberts et al., 2020). Based on the limited previous findings, Latino college students may experience increased social comparison and decreased social anxiety relative to Caucasian college students.

The present study uses cross-sectional data of college students at two universities (one in the Midwest US, where the majority of students matriculating are Caucasian, and another in the Southwest US, where the majority of students are Latino) to examine the relationships between social anxiety and social comparison amongst cyberbullying perpetrators and victims. Considering the lack of research on this topic in general and especially among diverse samples, our study may assist with future research that attempts to examine the specific effects of ethnicity on social comparison, social anxiety, and cyberbullying. Cyberbullying perpetration and victimization were measured through texting, email, Facebook, Twitter, Tumblr, Instagram, and online gaming. Both direct and indirect cyberbullying were considered. We hypothesized both social anxiety and social comparison would be positively associated with cyberbullying victimization and perpetration. Additionally, we hypothesized that cyberbullying victimization would serve as a moderator between social comparison and social anxiety. Finally, we hypothesized that self-reporting both cyberbullying perpetration and victimization would moderate the relationship between social comparison and social anxiety.

2. Methods

2.1. Procedures

Data was collected through the PsychData online survey program. Potential participants signed up on PsychData, and then were directed to a new browser where they were first provided informed consent. If they agreed to participate, they then clicked to proceed to the study. Following survey completion, students were either awarded extra credit for participating or credit toward their introductory psychology course.

2.2. Participants

This study was approved by two separate institutional review boards (one in Texas and one in Ohio, IRB number was 108575). Each site was approved to recruit up to 400 participants. Data was collected over a period of four semesters in 2014–2016. Of the 486 participants who completed the survey, 42.6% were Hispanic/Latino (n = 207), 38.7% were Caucasian/White (n = 188), 14.0% were African American/Black (n = 68), 1.2% were Asian (n = 6), 0.2% was American Indian (n = 1), and 1.9% were biracial/multiracial (n = 9), and 1.4% identified as "other" (n = 7). 67% were female (n = 326), 32% were male (n = 155), and 1% were transgender (n = 5). Of the students, 23% were freshmen (n = 112), 25% sophomores (n = 122), 13% juniors (n = 63), and 9% seniors (n = 44). Regarding ethnicity, 43% were Latino/a (n = 209), 39% White (n = 190), 14% African American (n = 68), and 4% other (n = 19). The mean age of the participants was 20.10 years old (sd = 3.60, range 17–47 years old).

2.3. Measures

2.3.1. Social media cyberbullying questionnaire

To measure cyberbullying, a 66-item measure of frequency (over a period of 6 months) of cyberbullying perpetration and victimization through text, email, Facebook, Twitter, Tumblr, Instagram, and online gaming was used (Hovey et al., 2014). This measure was developed for this study since no validated measure existed to assess this construct at the time of research design. The present study utilized the victimization scale, which yielded an excellent Chronbach's alpha = .91 and the perpetration scale, which also yielded an excellent Chronbach's alpha = .93. Examples of questions used in the questionnaire include: Have you ever deliberately excluded someone from a message thread on Facebook? Have you ever received a threatening message on Facebook? Have you ever written an embarrassing message about someone on Tumblr? It is worth noting that this was an unvalidated instrument developed specifically to measure cyberbullying perpetration and victimization through social media.

2.3.2. Social interaction anxiety scale (SIAS)

Social anxiety was measured using the SIAS, a 20-item one-factor survey that assesses generalized social interaction anxieties and asks the participant to rate characteristics as "not at all true of me" to "extremely true of me." (0–4) (Mattick and Clarke, 1998). This measure was selected for inclusion in the current study because it had previously been validated as a measure of social anxiety in adults. Scores on the SIAS have evidenced good internal consistency (Cronbach's alpha ranging from .88 to .94) as well as three-month test-retest reliability (r = .92 and

Table 1. Means, standard deviations, and correlations between social comparison, social anxiety, cyberbullying victimization and perpetration.

Variable	*M*	*SD*	1	2	3	4
1. Social Comparison	37.89	6.92	-			
2. Social Anxiety	25.36	16.32	217**	-		
3. Cyberbullying Victimization	3.97	7.02	-.055	.136**	-	
4. Cyberbullying Perpetration	3.64	6.47	-.043	.126**	.899**	-

Note. Values given represent the Pearson Correlation coefficient *r*. **indicates a $p < .01$.

.93) (Mattick and Clarke, 1998). The present study's Chronbach's alpha was excellent ($\alpha = .89$).

2.3.3. Scale for social comparison orientation

Social comparison was measured using the Iowa-Netherlands Comparison Orientation Measure (INCOM), an 11-statement survey which asks questions like "I often compare how I am doing socially (e.g., social skills, popularity) with other people." Responses range from 1 (strongly disagree) to 5 (strongly agree) (Gibbons and Buunk, 1999). This measure was selected for inclusion in the present study because it was previously validated as a measure of social comparison. The INCOM has shown Cronbach's alpha ranging from .78 to .85 in 10 American samples and .78 to .84 in 12 Dutch samples. Its two-factor structure is supported by confirmatory factor analysis with Goodness-of-Fit (GFI) index >.95 and Adjusted Goodness-of-Fit index (AGFI) > .95 (Gibbons and Buunk, 1999). The present study's Chronbach's alpha INCOM was good ($\alpha = .704$).

2.4. Statistical procedures

We utilized IBM SPSS v. 26 to run all analyses. We first examined descriptive statistics and correlations among our variables. We then ran two multiple linear regressions to examine our two hypotheses: whether cyberbullying victimization moderated the relationship between social comparison and social anxiety, then whether being both a cyberbully victim and cyberbully perpetrator moderated the relationship between social anxiety and social comparison.

3. Results

Correlations and descriptive statistics for each measure (i.e., between social comparison, social anxiety, cyberbullying victimization, and cyberbullying perpetration) are reported in Table 1. As can be observed in the means, standard deviations, and correlations table, we have no issues of multicollinearity aside from the strong correlation between cyberbullying perpetration and victimization. Correlations between social comparison and social anxiety as well as between cyberbullying victimization and perpetration and social anxiety are in the expected direction and are small.

As observed in Figure 1, assumption of normality is met. The standardized residual ranged from $-.2999$ to 2.969, and Cook's distance ranged from .000 to .057. The analysis found that social comparison was significantly and positively associated with social anxiety ($r = .217$, $p < .001$), social anxiety was significantly and positively associated with cyberbullying victimization ($r = .136$, $p = .003$), and social anxiety was significantly and positively associated with cyberbullying perpetration ($r = .126$, $p = .006$).
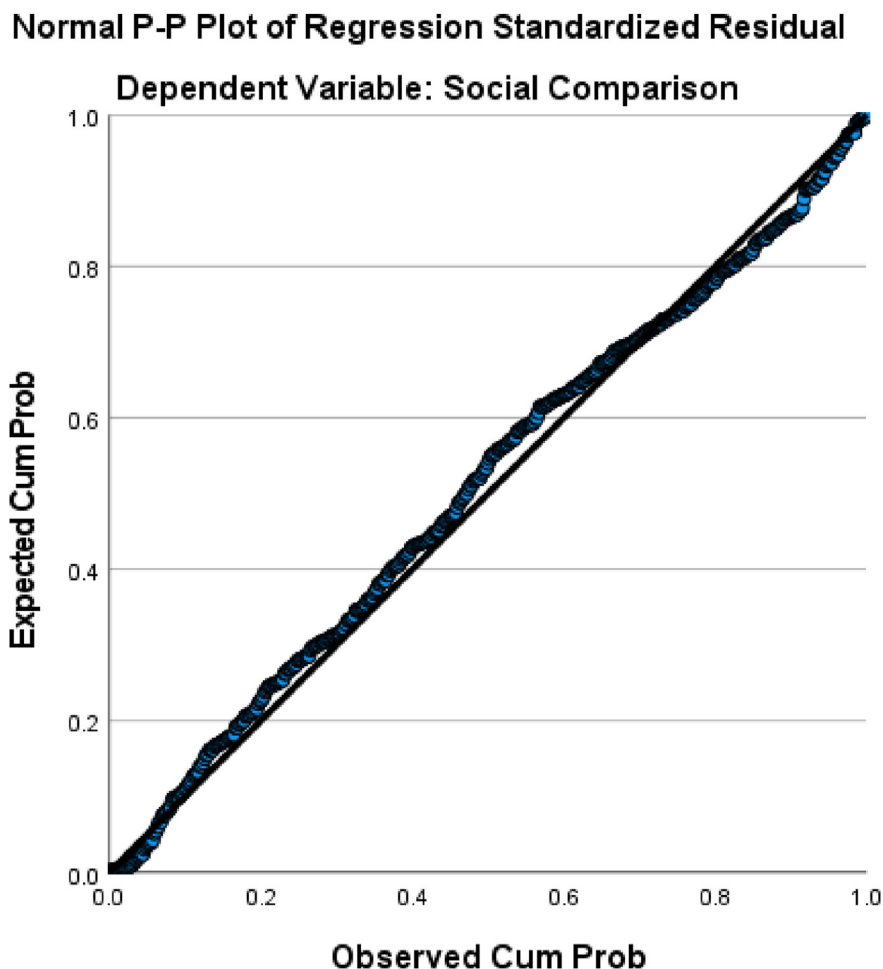

Figure 1. Normal P–P plot of regression standardized residual of social comparison.

Table 2 provides the means and standard deviations of each variable by sex, age, and ethnicity/race to contextualize our variables of interest. Males report greater levels of cyberbullying victimization and perpetration than females. Cyberbullying perpetration and social anxiety decreased with age in our sample but was not statistically significant. Latinos/Hispanics reported lower levels of cyberbullying victimization and perpetration compared to other ethnicity/racial groups. Social anxiety was not statistically significantly different by ethnicity/race. African American/Black participants reported lower levels of social comparison compared to all other races/ethnicities.

3.1. Multiple regression analysis

A multiple regression (Table 3) was performed to examine the relationships between social anxiety and social comparison as well as whether cyberbullying victimization served as a moderator between social anxiety and social comparison. In this model, social anxiety served as the dependent variable. Model 1 examined the relationship between social anxiety and social comparison. Model 2 included the cyberbullying victimization to examine whether it moderated the relationship between social anxiety and social comparison. Note that we ran the models with and without ethnicity and gender added to the models and the results did not change so we report here the results without ethnicity and gender in the models.

In Figure 1, cyberbullying victimization was examined as a moderator for the relationship between social comparison and social anxiety. Social comparison was the predictor variable and social anxiety was the outcome variable. In the first step of the regression analysis, social comparison was entered. This variable accounted for a significant

Table 3. A multiple regression analysis of cyberbullying victimization as a moderator between social anxiety and social comparison.

Predictors	β	SE	t	p	R^2 change
Step 1					0.061***
Social Comparison	.217	.106	4.790	.000	
Step 2					0.047***
Social Comparison	.225	.106	5.015	.000	
Cyberbullying Victimization	.148	.103	3.295	.000	
Step 3					0.022***
Social Comparison	.226	.123	4.309	.000	
Cyberbullying Victimization	.405	.244	2.830	.000	
SocCompxVictimization	-.005	.015	-.984	.324	

Note. ***$p < .001$. SocCompxVictimization = The interaction between social comparison and victimization.

amount of variance in social anxiety, $R^2 = .047$, $F(1,463) = 22.946$, $p < 0.001$. In the second step of the regression analysis, social comparison and cyberbullying victimization were entered. These variables accounted for a significant amount of variance in social anxiety, $R^2 = 0.069$, $F(1,462) = 10.860$, $p < 0.001$. In the third step of the regression analysis, the interaction term between social comparison and cyberbullying victimization was entered. As can be observed in Figure 2, cyberbullying victimization did not moderate the relationship between social comparison and social anxiety.

3.2. Multiple regression analysis in those who endorsed cyberbully victimization and perpetration

In Table 4, being a cyberbully victim and cyberbully perpetrator was examined as a possible moderator between social anxiety and social comparison. Social comparison was the predictor variable and social anxiety was the outcome variable. In the first step of the regression analysis, social comparison was entered. In the second step of the regression analysis, social comparison, cyberbullying perpetration, and cyberbullying victimization were entered. These variables did not account for statistically significant variance in social anxiety, $R^2 = .064$, $F(2,187) = 0.223$, $p = .801$.

4. Discussion

4.1. Social anxiety and social comparison

As far as we know, this is the largest cross-sectional study evaluating the relationship between social anxiety, social comparison, and cyberbullying in college students. We found that social anxiety decreased with age, underscoring the importance of examining these constructs in college-aged individuals and young adults, more broadly. Our results showed that higher levels of social comparison and social media use were associated with higher levels of social anxiety, consistent with recent studies (Jiang and Ngien, 2020). One possible explanation for this relationship between social comparison and social anxiety is rumination. Rumination is when one constantly thinks about negative aspects of a situation, past or present. Being on social media invites users to easily compare themselves to others (Bergagna and Tartaglia, 2018). While doing so, one can ruminate on their own situation at the expense of their mental health (Aldao et al., 2010).

4.2. Social anxiety and cyberbullying victimization

Similar to results in studies of children and adolescents (Navarro et al., 2011; Wu et al., 2020), our results showed a positive relationship between social anxiety and cyberbullying victimization among our college student sample. This aligns with other studies that have examined
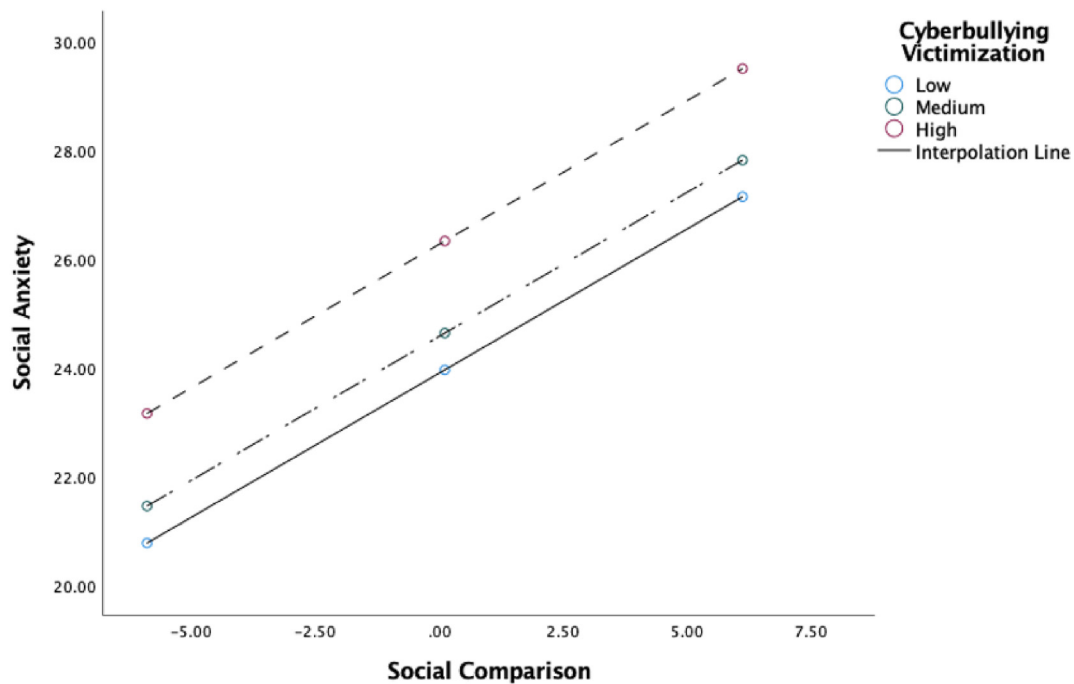
Table 2. Descriptive statistics of social comparison, social anxiety, and cyberbullying by sex, age group, and ethnicity/race.

	Social Comparison M (SD)	Social Anxiety M (SD)	Cyberbullying Victimization M (SD)	Cyberbullying Perpetration M (SD)
Sex [t (n)]	t (459) = -1.23	t (462) = -.41	t (473) = 3.40**	t (473) = 5.00***
Male	37.34 (7.30)	24.85 (16.17)	5.30 (8.58)	5.49 (8.09)
Female	38.18 (6.74)	25.52 (16.43)	3.16 (5.06)	2.61 (4.44)
Age Group [f (df, df)]	F (2, 461) = .828	F (2, 464) = 2.16	F (2, 475) = 1.23	F (2, 475) = 1.38
17–25	37.98 (6.84)	25.64 (16.40)	4.08 (7.15)	3.75 (6.60)
26–35	35.87 (8.97)	22.60 (15.85)	1.20 (1.82)	1.53 (2.00)
36–47	36.43 (7.89)	13.43 (7.07)	3.71 (4.23)	1.14 (2.61)
Ethnicity/ Race [f (df, df)]	F (6, 458) = 4.71***	F (6, 461) = 1.56	F (6, 472) = 1.95⁻	F (6, 472) = 2.27*
Caucasian/ White	39.54 (5.95)	26.02 (16.41)	5.01 (7.71)	4.57 (7.10)
Hispanic/ Latino	37.22 (7.11)	26.08 (16.55)	2.76 (4.29)	2.39 (4.05)
African American/ Black	34.84 (8.15)	20.99 (15.61)	4.21 (10.51)	4.43 (9.66)
Asian	39.00 (4.20)	36.67 (18.20)	5.50 (4.04)	4.33 (3.01)
Biracial/ Multicultural	38.33 (5.34)	26.33 (11.31)	6.11 (8.46)	5.11 (6.75)
Other	41.00 (4.90)	21.29 (13.09)	6.08 (7.02)	5.14 (5.49)

Note. ***p < .001, **p < .01, *p < .05, ⁻p < .10. To protect the anonymity of research participants, American Indian was combined with Other.

Figure 2. Moderation of cyberbullying victimization on the relationship between social anxiety and social comparison.

this relationship in college students and found a significant association between cyberbullying victimization and social anxiety (Na et al., 2015; Giumetti et al., 2022). It does not appear that this relationship is unidirectional but rather a vicious cycle (Navarro et al., 2011; Wu et al., 2020). It is possible that just like in children, college students with social anxiety symptoms, such as fear of negative evaluation or lack of social and communication skills, may appear as "easy" targets that are unlikely to retaliate and thus are at higher risk of cyberbullying victimization (Navarro et al., 2011). A consequence for the college student who is cyberbullied is feeling "inferior" and humiliated, which, in turn, heightens their focus on social threats when meeting people. Therefore, this may exacerbate socially anxious behaviors (e.g., social withdrawal or emotional restraint) to keep them safe (Gilbert, 2000; Wu et al., 2020).

4.3. Social anxiety and cyberbullying perpetration

We also found in our college student sample a positive correlation between social anxiety and cyberbullying perpetration. The fact that both social anxiety and cyberbullying perpetration were reported to be lower in participants older than 25 highlights the need to understand these constructs in college students and young adults, more broadly. Our findings add to the mixed literature on factors associated with cyberbullying perpetration. One study has shown that there is a relationship between cyberbullying perpetration with anxiety, although the type of anxiety was not specified (Campbell, 2013). Another study showed that adolescents who had taken on both roles of cyberbullying perpetrator

and victim were associated with higher social anxiety when in the company of peers (Martínez-Monteagudo et al., 2020). In contrast, a longitudinal study among adolescents aged 10–17 (n = 2128) demonstrated no relationship between social anxiety and cyberbullying perpetration in either direction (Pabian and Vandebosch, 2015). In contrast to prior studies amongst college students that found no association between perpetration and social anxiety (Giumetti et al., 2022), our results found an association in this population. It is possible that those who engage in cyberbullying perpetration and have social anxiety do so because the online world allows them to behave in a way that their social anxiety does not in the physical world (Harman et al., 2005). Therefore, it is possible that bullying others online may be a cathartic experience for someone who is socially anxious and feels restrained socially and emotionally in life outside of social media. It is also possible that these individuals do not have adequate social skills to behave assertively and so they either respond passively, passive-aggressively, or aggressively online.

4.4. Cyberbullying victimization and perpetration

In line with previous research, we found a significant association between cyberbullying victimization and perpetration (p < .01). In previous research, cyberbullying victimization predicted perpetration through mediating effects of trait anger and moral disengagement (Dou et al., 2020). We found no relationship between social comparison and cyberbullying victimization or cyberbullying perpetration. This finding was different from a previous study in Chinese adolescents that found envy on social media was correlated and mediated the relationship between social comparison and cyberbullying victimization and cyberbullying perpetration (Geng et al., 2021). In our sample, males reported higher levels of cyberbullying victimization and perpetration compared to females, while rates of social comparison were similar by gender.

4.5. Lack of moderation of social comparison and social anxiety by cyberbullying victimization

Although one of our initial hypotheses was that cyberbullying victimization would serve as a moderator between social comparison and

Table 4. A multiple regression analysis of cyberbullying victimization/perpetration as a moderator between social anxiety and social comparison in those who endorsed both cyberbullying perpetration and cyberbullying victimization.

Predictors	β	SE	t	p	R² change
Step 1					0.062
Social Comparison	.249	.164	3.538	.004	
Step 2					0.002
Social Comparison	.243	.167	3.396	.003	
Cyberbullying Victimization	045	.423	0.411	.346	
Cyberbullying Perpetration	.003	.443	0.025	.978	

social anxiety, we did not find this to be the case in our sample. One explanation for this is that the experience of cyberbullying can induce or perpetuate feelings of isolation (Nixon, 2014), which in turn can make someone less likely to think of how they compare to others. It is also possible that the lack of hypothesized interaction was an artifact from this sample.

4.6. Lack of moderation of social comparison and social anxiety by cyberbullying victimization-perpetration

In further analysis, we looked at whether being a cyberbullying victim and perpetrator moderated the relationship between social anxiety and social comparison and found no significant moderation. Because our findings showed no moderation in college students, it could be possible that there is a direct relationship between being a cyberbullying victim-perpetrator and social anxiety and/or social comparison; similar to what was seen in the adolescent studies (Kowalski and Limber, 2013; Ybarra and Mitchell, 2004). Further research is needed to examine this relationship.

Despite several important associations that were identified, our study has its limitations. Because our data is cross-sectional, we are only able to identify correlations between variables and cannot establish causation. Future studies should examine these relationships using longitudinal data. Another limitation of our study was the use of an unvalidated measure of social media use. Future research should examine the psychometric properties of our unvalidated scale. It should be noted that although we use an unvalidated scale, so does all the recently published measures on the topic of college student cyberbullying (e.g., MacDonald and Roberts-Pittman, 2010; Na et al., 2015; Johnson et al., 2016; Giumetti et al., 2022) thus highlighting an important future direction. Additionally, variables such as sex, age, and ethnicity were not explored in depth in this study. Further research could attempt to analyze how these demographic factors affect cyberbullying and mental health. Finally, our study relied on self-reported cyberbullying experiences (both victimization and perpetration), and this introduces the possibility of bias in reporting experiences.

5. Conclusion

Despite the limited nature of cross-sectional data, this study amongst college students identified several important associations and correlations in line with our hypotheses. Just as importantly, multiple associations that we thought could exist were found to not be associated with one another. It would appear that the prevalent use of social media amongst this population cultivates an interplay between social anxiety, social comparison, and cyberbullying that is not well understood. While it is clear that these relationships exist in our sample, further research is necessary to better understand these phenomena. Indeed, little attention has been given to this topic among college students in over 20 years since social media platforms have existed. Further research could examine similar relationships with longitudinal data. Additionally, research could aim to understand how specific factors such as age, sex, and ethnicity complicate, or maybe simplify, these relationships.

Declarations

Author contribution

Brayden Jensen; Travis Lam: Analyzed and interpreted the data; Wrote the paper.

Joseph D. Hovey: Conceived and designed the experiments; Contributed reagents, materials, analysis tool or data.

Michelle E. Roley-Roberts: Conceived and designed experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare the following conflict of interests:

Dr. Roley-Roberts has received research funding from American Psychological Foundation, Foundation for Education and Research in Biofeedback and Related Sciences, Foundation for Neurofeedback and Neuromodulation Research, NIMH, NIGMS, and NIH.

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Additional information

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