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Exploring Social Connections and Perceived Stress During COVID-19

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Honours Psychology Thesis

School of Behavioural and Social Sciences

Brescia University College

London, Ontario, Canada

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Abstract

This study evaluated university students' levels of overall social connectedness, social connectedness with various groups (family, friends, classmates, instructors, school community), and perceived stress during the COVID-19 pandemic. Additionally, this study investigated whether there were associations between students' overall social connectedness levels, levels of social connectedness with various groups, and perceived stress levels. Undergraduate students ($n = 91$) at a university in London, Ontario, completed a questionnaire comprising the Social Connectedness Scale, questions about social connections with particular groups, and the Perceived Stress Scale. A correlation analysis revealed a significant, negative correlation between overall social connectedness and perceived stress. Furthermore, hierarchical linear regression analyses revealed that levels of social connectedness with family and friends were the strongest significant predictors of both overall social connectedness level and perceived stress level. Students' levels of perceived stress and overall social connectedness appeared lower than in past research, which could be a result of COVID-19.

Keywords: social connectedness, perceived stress, COVID-19, relationships, university students, undergraduate, late adolescence

Exploring Social Connections and Perceived Stress During COVID-19

The adverse consequences of stress for undergraduate university students have been widely studied. Leppink et al. (2016) found that higher levels of perceived stress in undergraduate students were linked to poorer physical and psychological health as well as an increase in impulsive behaviours, such as compulsive sexual behaviour and problematic internet use. Smith et al. (2014) observed that stress was a significant predictor of depressive symptoms in university students and that these depressive symptoms significantly predicted suicidality among students. Other studies have found that university students often utilize maladaptive coping strategies, such as binge drinking, to manage high stress levels (Metzger et al., 2017; Stoltzfus & Farkas, 2012). These findings highlight the detrimental impact of stress on university students, and thus, the importance of investigating factors that may act as buffers against stress in this population (Maykrantz & Houghman, 2020).

Social connection may be one such buffering factor against stress. Social connection is defined as “subjective feelings of friendship, love, and caring that can be felt both from and toward others” (Hutcherson et al., 2015, p.1). It has also been described more broadly as a person’s subjective opinion of themselves in relation to their social world and the extent to which they feel generally close to other people (Lee & Robbins, 1995). This unique kind of belongingness was first characterized by Lee and Robbins (1995), who developed the Social Connectedness Scale (SCS) by deriving items from the theory of self-psychology. Social connection is believed to be a universal human need (Baumeister & Leary, 1995; Lieberman, 2014), and higher social connectedness has been linked to numerous benefits for psychological well-being (Lee et al., 2001; Lee & Robbins, 1998; Seppala et al., 2013).

Higher social connectedness is often demonstrated by a strong sense of similarity, emotional closeness, and affection toward others (Seppala et al., 2013). A higher level of social connection has been found to correspond to several positive physiological and psychological outcomes, while the effect of a lower level of social connection appears to be deleterious. Lee and Robbins (1998) observed that higher social connectedness was associated with lower trait anxiety and with increased self-esteem and sense of social identity. Additionally, Kimweli and Stillwell (2002) reported that a stronger sense of belongingness and closeness with one's community was associated with higher quality of life and increased subjective well-being. Relatedly, lower levels of social connectedness have been associated with poorer psychological well-being. Lee et al. (2001) found that individuals with lower social connectedness tended to engage in more dysfunctional interpersonal behaviours, which were related to psychological distress. Other research has provided further evidence that a person's level of social connectedness is closely related to their psychological health (e.g., Baumeister & Leary, 1995; Holt-Lunstad et al., 2017; Seppala et al., 2013; Williams & Galliher, 2003).

In addition, connections with particular groups, such as friends, family, and the classroom/school community are important for psychological well-being in late adolescence. The late adolescent age group generally encompasses those aged 18 to 21 (Laible et al., 2004), and thus includes first-year university students. The benefits of strong connections with friends during late adolescence have been demonstrated in several studies (Fass & Tubman, 2002; Pittman & Richmond, 2008). Both Wilkinson (2004) and Laible et al. (2004) demonstrated that stronger relationships with friends were linked to higher self-esteem throughout adolescence. Miething et al. (2016) observed that friendship quality in late adolescence was positively associated with well-being, such that as friendship quality increased, so too did well-being. The

importance of family connections in late adolescence has also been consistently demonstrated (Hair et al., 2008; Oldfield et al., 2016). For example, Hamdan-Mansour and Dawani (2008) found that perceived social support from family was the most important form of social support in reducing perceived stress. Connections to other groups, such as the classroom/school community have also been linked to better outcomes for well-being in late adolescence (McKinney et al., 2006; Pittman & Richmond, 2008).

Certain types of social connections may be more important for psychological well-being in late adolescence than others. Fass and Tubman (2002) found that university students with the strongest connections to both parents and peers had increased self-esteem, optimism, internal locus of control, and a stronger sense of self. Wilkinson (2004) observed that stronger attachment to parents was related to stronger attachment to peers, but the strength of connections with peers, rather than parents, had the strongest positive impact on well-being in late adolescence. Oldfield et al. (2016) found that adolescents' levels of connection with parents, peers, and school community impacted different aspects of well-being. Here, stronger connections with parents were associated with decreased emotional difficulties and conduct problems, while higher connectedness with peers and the school community predicted enhanced prosocial behaviour (Oldfield et al., 2016). Overall, it seems that there are important links between specific social connections in adolescence and various aspects of psychological well-being (Gorrese & Ruggieri 2012; Laible et al., 2004). However, there does not yet appear to be a consensus in the literature as to which type of social connection (e.g., family vs. friends vs. classmates, etc.) has the greatest impact on well-being outcomes in late adolescence.

Past research has examined the link between social connectedness and physical and psychological outcomes and has identified that social connectedness and stress are closely

related. This link was demonstrated by Lee et al. (2002), who found that as overall social connectedness in university students increased, perceived stress tended to decrease (Lee et al., 2002). Another study reported that students who were maladaptive perfectionists tended to be more stressed and less socially connected (Rice et al., 2006). More recently, physiological evidence of the link between social connectedness and perceived stress has been provided. Sladek and Doane (2015) found that higher levels of daily social connection in university students were associated with physiological indications of reduced stress, namely sleeping longer that night and a more adaptive Cortisol Activation Response the following day (Sladek & Doane, 2015).

The year 2020 has been marked by unprecedented times. The ongoing COVID-19 pandemic has affected people in countless ways, including how we connect and relate with one another. As a result of shutdowns, social distancing requirements (CDC, 2020), limits on social gatherings (COVID-19 in Ontario, 2021), and the move to online learning, university students may be missing out on vital social connections. However, some research also suggests that people may be working to find alternative methods of connecting with others to maintain a stable sense of social connection (Folk et al., 2020). Undergraduate university students represent a population for which the need for social connectedness and the level of perceived stress are already particularly high (Leppink et al., 2016; Pittman & Richmond, 2008). Given the detrimental effects of stress and the novel context of COVID-19, it is important to evaluate social connectedness and its link to perceived stress in university students.

The current study aimed to characterize social connections and investigate the association between social connectedness and perceived stress among first-year university students at a Canadian university during COVID-19. Overall social connectedness was measured using the

Social Connectedness Scale-Revised (Lee et al., 2008). Levels of connectedness with particular groups (family, friends, classmates, instructors, school community) and the importance of these relationships to students were also assessed, using questions created for the purpose of this study. Lastly, levels of perceived stress were assessed using the Perceived Stress Scale (Cohen et al., 1983).

Due to the lack of access to resources and social connections brought about by COVID-19 (Hwang et al., 2020), we predicted that we would observe higher levels of perceived stress and lower levels of overall social connectedness, as compared to past research. We further hypothesized, based on past findings (Lee et al., 2002), that a negative correlation would be observed between social connectedness and perceived stress, indicating that as a student's level of social connectedness increased, their level of perceived stress decreased.

In terms of the value of students' connections with various groups, it was predicted that students would report the highest levels of social connection with family and friends and that connections with these two groups would also be the most positively correlated with overall social connectedness and the most negatively correlated with perceived stress. It was predicted that social connections with classmates would follow, in terms of level of social connection, as well as strength of correlations with overall social connectedness and perceived stress. Instructors and school community were expected to be the groups for which the lowest levels of social connection and also the weakest correlations with overall social connectedness and perceived stress were found. These final hypotheses around social connections with various groups were informed by the literature's strong emphasis on the importance of relationships with family and friends in late adolescence (Fass & Tubman, 2002; Wilkinson, 2004), as well as our expectation that these closer connections may take precedence in the context of a global crisis.

Method

Participants

Ninety one undergraduate students (89 identified as female; 2 identified as male), ages 18 to 32 ($M = 19.32$), from a Canadian women's university participated in this study. To be eligible to participate, students were required to be 18 years of age or older and enrolled in the first year psychology course, PSY 1015B, which occurred during the winter term (January - April 2021) of the 2020/21 academic year. Participants were recruited via a research participation software that they accessed as part of their psychology course. Participants received one research participation credit for participating in the study. All study procedures were approved by the Brescia University College Research Ethics Board and all participants provided informed consent before beginning the study.

Materials

The study consisted of an online survey, which contained four sets of questions assembled from a variety of sources.

Demographic questions

First, participants completed 11 demographic questions (Appendix A) created for the purpose of this study to collect information on attributes previously shown to be related to social connectedness, such as gender and age (Hair et al., 2008; Miething et al., 2016). An example of a demographics question is, "What is your gender?".

Social Connectedness Scale-Revised

Participants were then asked to complete 15 questions from the Social Connectedness Scale-Revised (SCS) to obtain information about their overall level of social connectedness. The SCS has been widely used as a measure of social connection (Lee et al., 2002; Rice et al., 2006),

and the version of the SCS used in the present study was acquired from Lee et al. (2008), who removed items from the SCS-Revised that overlapped with extraversion. Responses were chosen from 6-point Likert scales, ranging from “Strongly Disagree” to “Strongly Agree”. An example of a question from the SCS-Revised is “I feel distant from people”.

Additional social connectedness questions

The next 11 questions on the survey (Appendix B) were formulated by the researchers to quantify and qualify students’ connections with specific social groups that have been previously associated with well-being in late adolescence, including family, friends, classmates, instructors, and school community (Hair et al., 2008; Hamdan-Mansour and Dawani, 2008; Miething et al., 2016; Walton & Cohen, 2011). Responses were chosen from 5-point Likert scales. An example of a question aiming to quantify a student’s connection with a specific group is “In the past month, how connected have you felt to your family?”, with responses ranging from “Not at all connected” to “Very connected”. An example of a question that aimed to qualify a student’s connection with a particular group is, “How do you feel about your level of connection with your friends?”, with responses ranging from “Want a lot less connection” to “Want a lot more connection”.

Perceived Stress Scale

The final 14 questions on the survey were acquired from the Perceived Stress Scale (PSS; Cohen et al., 1983) and were included to obtain information on participants’ levels of perceived stress. Responses were chosen from 5-point Likert Scales. An example of a question from the PSS is, “In the past month, how often have you found that you could not cope with all the things that you had to do?”, with responses ranging from “Never” to “Very often”.

Procedure

Participants accessed the study online through a research participation software. Once they clicked on the link to begin the study, participants were shown a letter of information and asked to indicate their consent before continuing to the survey. Participants then completed the survey, which had specific instructions embedded before each new set of questions or scale. Completion of the survey took approximately 30 minutes. Upon completing the survey, participants were shown a debriefing form that contained information for contacting the researcher if they had further questions about the study.

Results

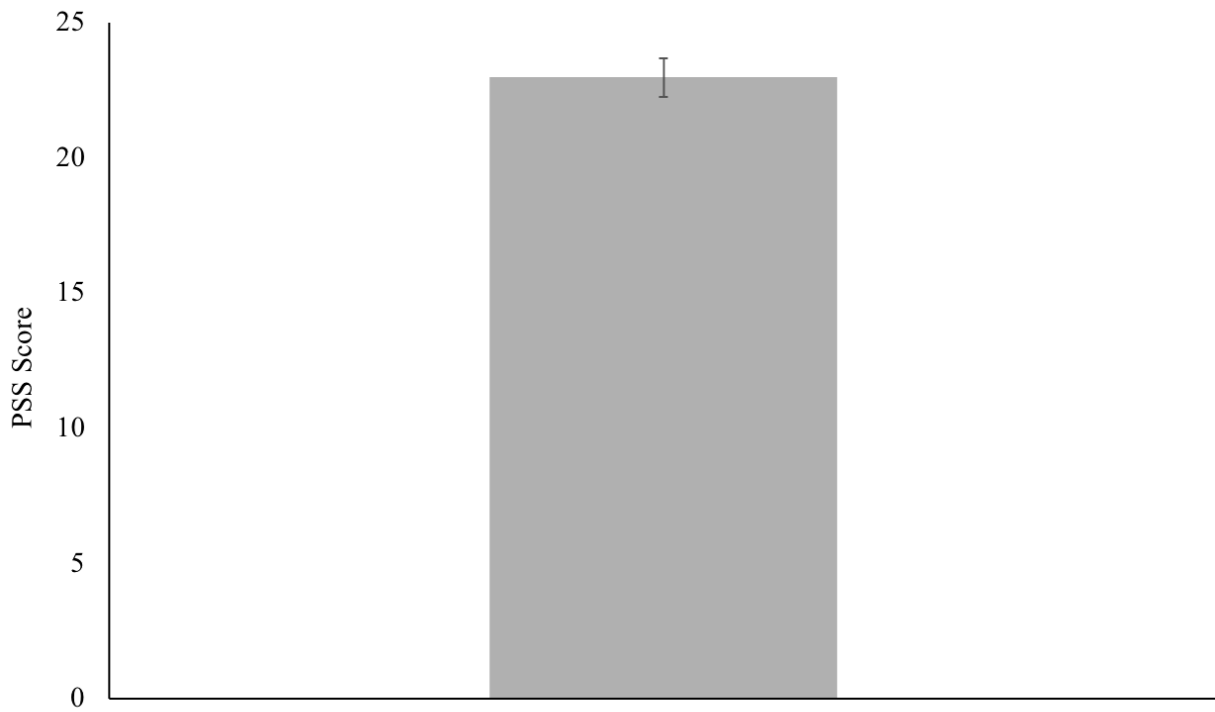
Before any data analyses were conducted, the data from the only two participants in the study who indicated their gender as different than ‘female’ were excluded. These participants indicated their gender as ‘male’ and were excluded from all analyses because the male sample was not large enough to represent the male gender and evidence suggests that there are sex differences in social connectedness (Bonny et al., 2000).

Characterizing Perceived Stress, Overall Social Connection and Social Connections with Groups

Descriptive statistical analyses were performed to obtain means and standard deviations for the PSS (Figure 1), the SCS (Figure 2), and the levels of social connection (SC) with various groups (Figure 3). Perceived Stress levels were reported as $M = 22.97$, $SD = 6.72$ (Figure 1) and Overall Social Connection levels were reported as $M = 4.19$, $SD = 0.83$ (Figure 2). Then, in order to determine if there were statistically significant differences between the levels of SC with various groups, a repeated measures ANOVA with within subjects factors of Social Group (5 levels: Family, Friends, Classmates, Instructors, School Community) was conducted.

Figure 1

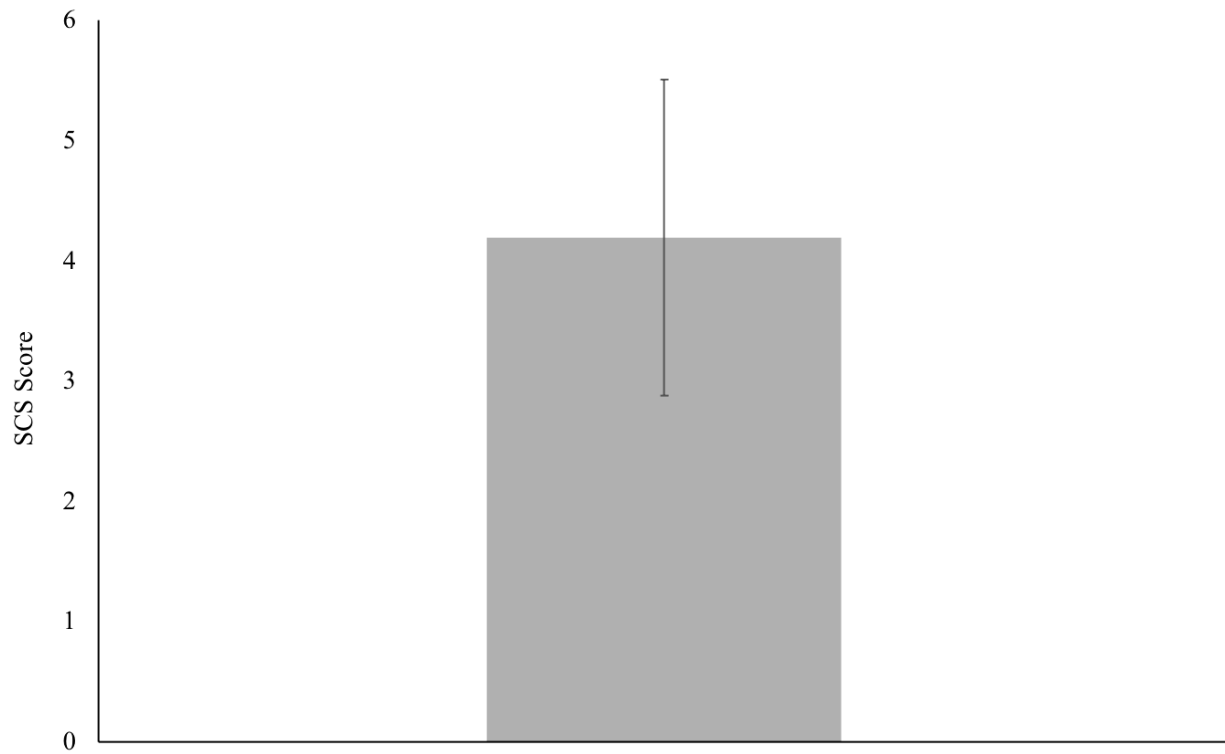
Mean level of perceived stress



Note. Height of bar indicates mean PSS score. Error bars represent Standard Error of the Mean (SEM).

Figure 2

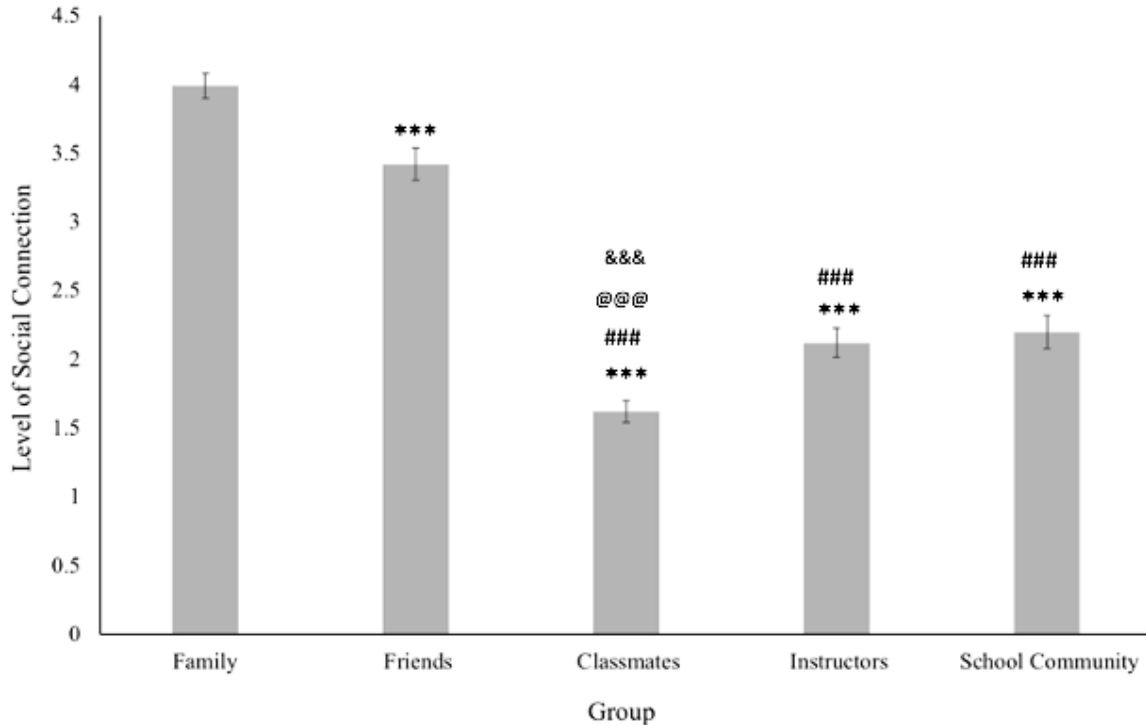
Mean level of social connectedness



Note. Height of bar indicates mean SCS score. Error bars represent SEM.

Figure 3

Mean levels of social connection with various groups



OPTION 2: Note. Height of bars indicate means. Error bars represent SEM. Levels of reported social connection differed significantly among groups. *** $p < .001$; significantly lower than Family. ### $p < .001$; significantly lower than Friends. @@@ $p < .001$; significantly lower than Instructors. &&& $p < .0001$; significantly lower than School Community.

The ANOVA revealed that there were significant differences in SC levels between the various groups, $F(4, 352) = 121.24, p < .001, \eta^2 = .45$.

As shown in Figure 3, the highest levels of social connection were reported with family and friends. SC levels with various groups were reported as Family $M = 3.99, SD = 0.87$; Friends $M = 3.42, SD = 1.10$; Classmates $M = 1.62, SD = 0.78$; Instructors $M = 2.12, SD = 1.01$; School community $M = 2.20, SD = 1.14$. Tukey's Post Hoc tests indicated that participants were significantly more socially connected with Family than any other social group, including Friends ($p < .001$), Classmates ($p < .001$), Instructors ($p < .001$), and School Community ($p < .001$). Post hoc comparisons also revealed that participants were significantly more socially connected with Friends than with Classmates ($p < .001$), Instructors ($p < .001$), and School Community ($p < .001$). Lastly, participants were significantly less connected with Classmates than with Instructors ($p < .001$) and School Community ($p < .001$). There was no significant difference between participants' levels of connection with Instructors and School Community ($p = .972$).

Relationship between Social Connection with Groups and Overall Social Connectedness

The relationships between participants' levels of SC with various groups and their overall SCS score were evaluated using a Kendall's Tau correlational analysis. As shown in Table 1, a participant's SCS score was significantly, positively correlated with their level of SC with Family, Friends, Classmates, and School Community. However, there was no significant relationship between SCS score and level of SC with Instructors.

Given the significant correlations between SCS score and levels of SC with several groups, a hierarchical linear regression analysis was conducted to explore whether SC with Family, Friends, Classmates, and School Community predicts overall SCS score. We hypothesized that social connections with family and friends would be most important for first

Table 1*Correlations between PSS, SCS, and levels of SC with various groups*

Variable	SCS Score	PSS Score
PSS Score	$r = -.473$ ***	—
SC Family	$T_b = .234$ **	$T_b = -.229$ **
SC Friends	$T_b = .356$ ***	$T_b = -.224$ **
SC Classmates	$T_b = .175$ *	$T_b = -.260$ **
SC Instructors	$T_b = .149$	$T_b = -.196$ *
SC School community	$T_b = .174$ *	$T_b = -.252$ **

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Bolded text indicates a Pearson correlation, regular text indicates a Kendall's Tau correlation.

year students, so for the first block analysis, the predictor variables, SC Family and SC Friends, were analyzed. The results of the first block analysis revealed a statistically significant model ($F(2, 86) = 23.43; p < .001$). Additionally, the R^2 value of 0.35 associated with this model suggests that SC with family and SC with friends account for 35% of the variation in SCS scores. Since 65% of variation in SCS scores could not be explained by SC with Family and SC with Friends alone, a second block analysis was performed.

We hypothesized that social connections with classmates would be of more importance to first year students, so for the second block analysis, the predictor variable SC Classmates was added to the analysis. The results of the second block analysis revealed a statistically significant model ($F(3, 85) = 15.52; p < .001$). The change in R^2 was 0.00, which was a non-significant change ($F(1, 85) = 0.15; p = .70$), indicating that the addition of SC Classmates to the model did not predict significantly more of the variation in SCS than SC Family and SC Friends alone. SC Classmates was then removed from the model.

Finally, in order to evaluate the contribution of SC School Community to SCS scores, a third block analysis was conducted adding SC School Community as a predictor variable. The third block analysis revealed a similar outcome to the second block analysis. While the third block analysis revealed a statistically significant model ($F(3, 85) = 15.54; p < .001$), the change in R^2 was 0.00, which was not a significant change, ($F(1, 85) = 0.19; p = .662$). This suggests that the addition of SC School Community to the model did not predict any more of the variation in SCS than SC Family and SC Friends alone. SC School Community was then removed from the model.

Therefore, the results of the hierarchical regression analysis indicated that the two predictor variables of SC Family and SC Friends explained 35% of the variance in SCS score (R^2

=.35, $F(2, 86) = 23.43, p < .001$). It was found that SC Family significantly predicted SCS score ($\beta = .30, p < .001$), as did SC Friends ($\beta = .49, p < .001$).

Relationship between Overall Social Connection and Perceived Stress Score

To assess the strength of the relationship between participants' SCS scores and PSS scores, a Pearson correlational analysis was conducted. As shown in Table 1, there was a significant, negative correlation between SCS score and PSS score, indicating that as a participant's level of overall social connectedness increased, their level of perceived stress tended to decrease. A scatterplot of the relationship between SCS score and PSS score is shown in Figure 4.

Given this significant correlation, a linear regression analysis was performed to evaluate whether a participant's SCS score was predictive of their PSS score. A significant portion of the variance in PSS scores, 22%, was accounted for by SCS score, $R^2 = .22, F(1, 87) = 25.02, p < .001$. Therefore, a participant's SCS score was a significant predictor of their PSS score.

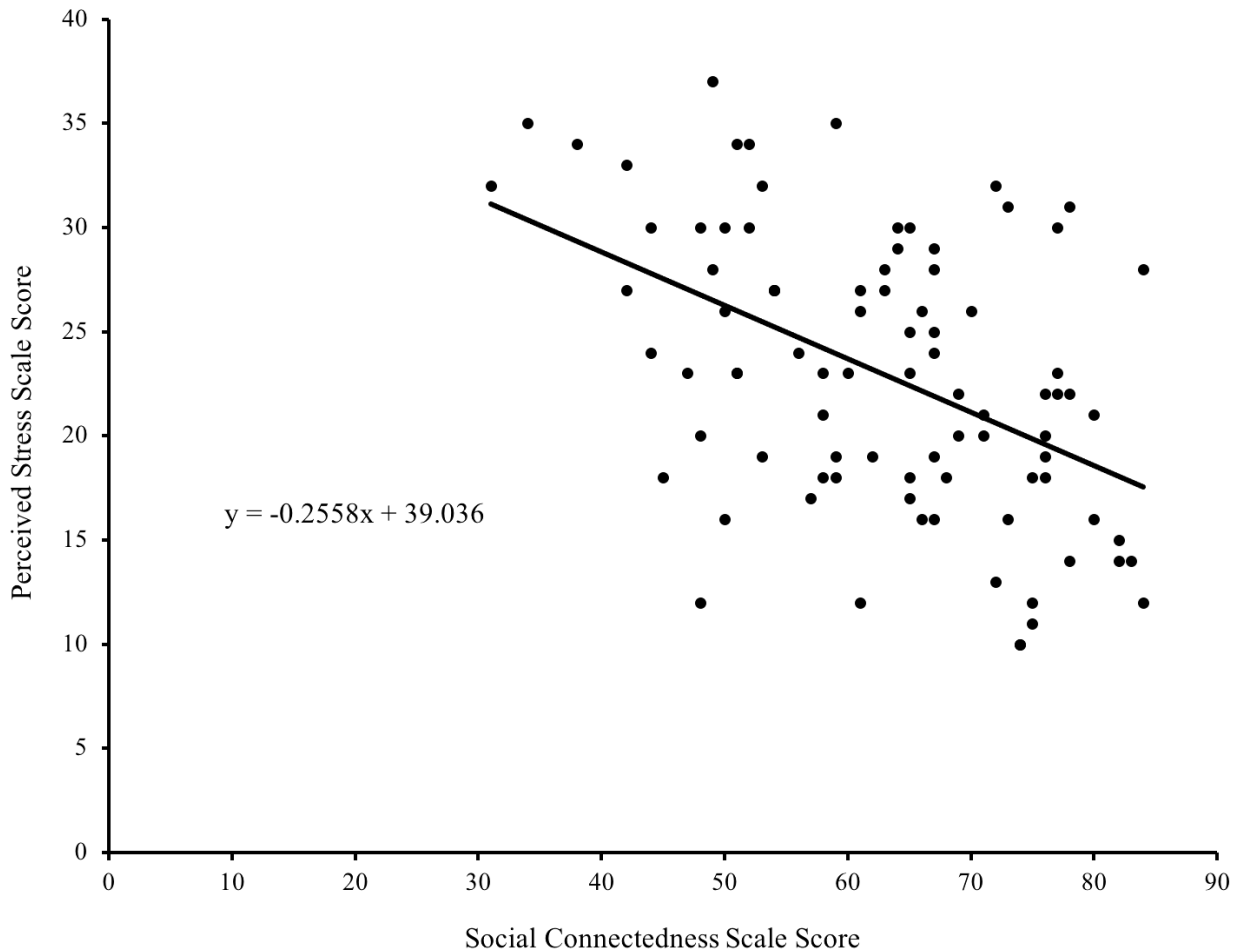
Relationship between Social Connection with Groups and Perceived Stress Score

A final Kendall's Tau correlational analysis was conducted to explore the relationships between levels of SC with each group and overall PSS score. A participant's PSS score was significantly, negatively correlated with their level of SC with Family, Friends, Classmates, Instructors, and School Community (Table 1) such that as social connection went up, perceived stress went down.

Given the significant correlations between SC with all groups and PSS score, a hierarchical linear regression analysis was conducted to explore whether SC with Family, Friends, Classmates, Instructors, and School Community predicts PSS score. For the first block analysis, the predictor variables, SC Family and SC Friends, were analyzed because of their

Figure 4

Association between social connectedness and perceived stress



Note. Each dot represents one participant’s data. The association between social connectedness and perceived stress was significant, such that higher levels of social connectedness were associated with lower levels of perceived stress. Error bars indicate Standard Error of the Mean.

hypothesized importance for the psychological wellness of first year students. The results of the first block analysis revealed a statistically significant model ($F(2, 86) = 8.73; p < .001$).

Additionally, the R^2 value of 0.17 associated with this model suggests that SC with Family and SC with Friends account for 17% of the variation in PSS scores. Since 83% of variation in PSS scores could not be explained by SC with Family and SC with Friends alone, a second block analysis was performed.

We hypothesized that social connections with classmates would be of the next highest importance to first year students (after SC Family and SC Friends), so for the second block analysis, the predictor variable SC Classmates was added. The results of the second block analysis revealed a statistically significant model ($F(3, 85) = 7.74; p < .001$). The change in R^2 was 0.05, which was a significant change ($F(1, 85) = 4.95; p = .029$), indicating that the addition of SC Classmates to the model predicted significantly more of the variation in PSS scores than SC Family and SC Friends alone. The R^2 value associated with this second model was 0.22, suggesting that SC with Family, SC with Friends, and SC with Classmates account for 22% of variation in PSS scores.

In order to evaluate the contribution of SC Instructors to PSS scores, a third block analysis was conducted adding SC Instructors as a predictor variable. While the third block analysis revealed a statistically significant model ($F(4, 84) = 6.02; p < .001$), the change in R^2 was 0.01, which was not a significant change ($F(1, 84) = 0.88; p = .352$). This suggests that the addition of SC Instructors to the model did not predict any more of the variation in PSS scores than SC Family, SC Friends, and SC Classmates. SC Instructors was then removed from the model.

Finally, a fourth block analysis was conducted adding SC School Community as a predictor variable to evaluate the contribution of SC School Community to PSS scores. The fourth block analysis revealed a similar outcome to the third block analysis. Again, the fourth block analysis revealed a statistically significant model ($F(4, 84) = 6.04; p < .001$). However, the change in R^2 was 0.01, which was a non-significant change ($F(1, 84) = 0.96; p = .331$), suggesting that the addition of SC School Community to the model did not predict any more of the variation in PSS score than SC Family, SC Friends, and SC Classmates. SC School Community was then removed from the model.

Therefore, the results of this hierarchical regression analysis indicated that the three predictor variables of SC Family, SC Friends, and SC Classmates explained 22% of the variance in PSS score ($R^2 = .22, (F(3, 85) = 7.74; p < .001$). It was found that SC Family significantly predicted PSS score ($\beta = -.22, p = .028$), as did SC Friends ($\beta = -.25, p = .014$), as did SC Classmates ($\beta = -.23, p = .029$).

Discussion

The first aim of this study was to evaluate the overall level of social connectedness of undergraduate university students, as well as their levels of social connection with particular groups, during the COVID-19 pandemic. The second main aim of this study was to investigate the links between overall social connectedness, social connections with various groups, and perceived stress. This study provides further support for the existing literature by demonstrating that there is a link between social connectedness and perceived stress in university students and that a sense of connection with family and friends is particularly important for this population. This study also extends what is known in the literature by demonstrating that students are experiencing higher perceived stress levels and lower social connectedness levels during the

COVID-19 pandemic, and are experiencing less connection with classmates than any other social group during this time.

It was hypothesized that the level of perceived stress found in this study would be higher than levels reported in previous research, due to the effects of COVID-19 (Hwang et al., 2020). This hypothesis was confirmed, as the mean score on the PSS in the current study appeared substantially higher than mean levels indicated in past research findings (Cohen & Williamson, 1988). Relatedly, it was hypothesized that students' levels of overall social connectedness in this study would be lower than previously reported. This prediction was also supported as the mean SCS score in the current study appeared to be lower than the levels reported in past research (Lee et al., 2008).

This finding that students' levels of perceived stress were higher than those reported in previous research, and that levels of social connectedness were lower, may be a result of the COVID-19 pandemic. The pandemic presents a worrisome situation and many people also do not have access to the resources and supports they may have typically used to cope with worry and stress (Hwang et al., 2020). Since the pandemic began, rates of depression and anxiety among the general population have risen considerably (Shamblaw et al., 2021). Therefore, it is unsurprising that the students in our sample reported higher levels of stress and lower levels of social connectedness in this time. Still, new research has indicated that for some people, social connectedness levels have not changed significantly since COVID-19 began (Folk et al., 2020). Further exploration of the nature of social connections during the COVID-19 pandemic, and whether people are finding alternate methods of connecting with others, is needed.

It was further predicted that students in this study would report the highest levels of social connection with family and friends, followed by classmates, with the lowest levels of

connection indicated for instructors and school community. As predicted, the highest levels of social connection were reported with family and friends. Overall, students indicated feeling significantly more socially connected to family than all other groups. Still consistent with our predictions, students reported feeling significantly more socially connected with friends than with classmates, instructors, and school community. However, in contrast to our prediction, participants reported feeling significantly less connected with classmates than with instructors and school community, indicating that students felt more connected at the time of this study with their instructors and school than with other students.

Most past research on the topic of social relationships in late adolescence has focused on relationships with family and friends. The current study evaluated students' levels of social connectedness with family and friends, but also examined students' connections with other social groups (classmates, instructors, and school community). This study's result that students felt most socially connected to their family and friends is aligned with previous findings, which have highlighted the importance of these two social groups in late adolescence (Fass & Tubman, 2002; Laible et al., 2004). Wilkinson (2004) found that friends are the primary source of social support for many adolescents, while other studies (such as Oldfield et al., 2016) point to the continued importance of relationships with family in adolescence. In the current study, students reported a higher level of connection with family than friends. This could perhaps be related to increased time spent at home with family due to COVID-19-related lockdowns and restrictions (COVID-19 in Ontario, 2021).

Our finding that students felt significantly less connected to their classmates than all of the other social groups we studied may also be indicative of the effects of the COVID-19 pandemic. While we predicted that students would feel most connected to their family and

friends, we also predicted that they would still feel more connected to other students in their courses than to their instructors and overall school community. However, this was not the case in our sample. Perhaps this unanticipated result is a product of online/distance learning, which has meant that many students have few opportunities to connect with their classmates, especially if the delivery of their courses is asynchronous. With “asynchronous” courses, the instructor posts content on a weekly basis for students to access, but there is neither a scheduled class time nor a live lecture delivered through a video call. It is possible that students still feel somewhat connected to their instructors if they see them in the videos they post or attend their virtual office hours. The fact that students still feel somewhat connected to their school community may be because they are still taking courses and being a student is still a part of their identity. However, it seems that a consequence of the online learning model that has been adopted during the pandemic may be a lack of opportunity for university students to connect with their classmates.

In terms of the links between levels of social connection with various groups and overall social connectedness, we hypothesized that levels of connection with family and friends would be most positively correlated with overall SCS score (followed most closely by classmates, and then instructors and school community). This hypothesis was mostly supported as the social connection group most strongly correlated with SCS score was friends, followed by family, then classmates, and school community. The correlation between SCS score and instructors was not significant. The results of the hierarchical linear regression analysis performed also supported our hypothesis. It revealed that levels of social connection with family and friends were significantly predictive of overall SCS score (together accounting for 35% of the variance in SCS scores), while social connection with classmates and school community did not add to the predictive capacity of the model.

The finding that students' levels of connection with family and friends were most predictive of their overall SCS score in the current study is also consistent with previous research. Fass and Tubman (2002) reported that strong connections with both parents and friends were associated with increased self-esteem and a stronger sense of self in university students. Oldfield et al. (2016) found that adolescents who had stronger relationships with their parents tended to have fewer emotional difficulties and conduct problems, while those with stronger friendships tended to report more prosocial behaviour. As SCS score has often been considered an indicator of positive well-being (Kimweli and Stillwell, 2002; Lee and Robbins, 1998; Lee et al., 2001), our study supports these past research findings, which indicate that a stronger sense of connection with family and friends in late adolescence is associated with increased well-being.

The lack of a significant correlation in the current study between level of connection with instructors and overall SCS score may indicate that this type of social connection is not captured by the SCS-Revised questionnaire. The questions seem to address mostly how a person feels about how they fit in with peers and their direct social world, while perhaps not accounting for less direct social connections. Past research suggests that connections with instructors are an important component in how connected a student feels to their classroom community and may help bolster well-being (Garrison et al., 1999). Thus, if it is true that scales like the SCS are not adequately capturing this kind of social connection, a person's score may not indicate their connectedness to more distant social groups that are still important for well-being.

As predicted, SCS score and PSS score were negatively correlated, such that as social connectedness increased in our study, perceived stress decreased. Moreover, the linear regression analysis that was conducted indicated that overall social connectedness was a significant predictor of perceived stress, explaining a significant portion (22%) of the variance in PSS scores

in this study. This study's results support past research that points to a relationship between social connectedness and perceived stress in the general population. Helliwell and Putnam (2004) reported that having stronger social relationships was positively associated with physical and emotional well-being. Several other studies have also emphasized the close link between social connectedness and numerous markers of well-being (Holt-Lunstad et al., 2018; Seppala et al., 2013). The significant, negative correlation in the current study between SCS scores and PSS scores is also consistent with past studies conducted with university students prior to the COVID-19 pandemic. Lee et al. (2002) found that higher levels of overall social connectedness were associated with lower levels of perceived stress in university students. Sladek and Doane (2015) found that on days when students reported increased social connection, physiological indicators of reduced stress tended to follow, such as sleeping longer that night and a more adaptive Cortisol Activation Response the following day.

Our final set of hypotheses pertained to the links between students' levels of social connection with particular groups and their level of perceived stress. We once again hypothesized that family and friends would be the social connection groups that were most highly correlated with, and most predictive of, PSS score (followed by classmates, instructors, and school community). The negative correlations between all of the above social groups and PSS score were significant. Contrary to our hypothesis, the Kendall's Tau correlation values for all of the groups were quite similar, with the correlations for SC with classmates and SC with school community being slightly stronger than the rest. However, the hierarchical linear regression analysis results were aligned with our hypothesis, revealing that SC levels with family, friends, and classmates significantly predicted PSS score, while SC with instructors and classmates did not contribute to the predictive capacity of the model.

The fact that all of the correlations between the various social groups in the current study and PSS score were found to be significant and negative lends further support to the idea that social connectedness and perceived stress are closely related in university students (Lee et al., 2002; Sladek and Doane, 2015). When examining specific groups in our study, SC levels with family and friends were the strongest predictors of PSS score, and only SC levels with family, friends, and classmates significantly predicted PSS score. This suggests that strong relationships with these groups are particularly important for psychological well-being in university students. Miething et al. (2016) found that stronger friendships were associated with greater well-being, and Hamdan-Mansour and Dawani (2008) reported that social support from family was most important in reducing perceived stress. In terms of the question of which particular social relationship (i.e., family vs. friends) is most likely to act as a buffer against perceived stress in university students, more exploration is needed.

Some methodological limitations must be considered when discussing the results of the present study. Firstly, the sample consisted almost entirely of participants who identified as 'female'. Only two participants did not identify as female (they indicated their gender as 'male'). While the two male participants' data were excluded from statistical analyses, this is still an important limitation for the generalizability of this study's findings because significant gender differences have been previously reported for social connectedness (Bonny et al., 2000). It also must be noted that participants' levels of social connection with each specific social group (i.e., Family, Friends, etc.) were measured using only one question, created for the purpose of this study. The use of a modified version of a standardized, multi-item scale to assess each type of social connection could have increased the rigour of this study. Lastly, while there were qualitative questions included in the survey to assess how students felt about their level of

connection with each group (i.e., wanting more, less connection, etc.), the analysis of these questions was not possible within the scope of this paper. This additional assessment of the nature and quality of students' social relationships would have enhanced understanding of how students' relationships contribute to perceived stress and is planned for future research.

Future studies should include qualitative elements, such as qualitative questions on a survey or semi-structured interviews, in order to explore more deeply how participants feel about their level of social connection during the COVID-19 pandemic. For example, it is possible that a student feels very connected to their family, but they are unhappy about the level of forced closeness resulting from lockdown measures, and would thus prefer less connection. This kind of nuance is important in truly understanding the effect of COVID-19 on university students, especially given that both low quantity and low quality of social relationships have been linked to negative impacts on mental health (e.g., Umberson & Montez, 2010). Future research should also attempt to include more equal numbers of male and female participants, as well as non-binary participants. This would allow for an examination of whether there are gender differences in the findings regarding the links between overall social connectedness, social connections with specific groups, and perceived stress. Lastly, it is essential that future studies continue to explore the importance of connections with various social groups for well-being in late adolescence. There has been very little research comparing a variety of social groups and attempting to assess their relative impact on emotional health during this stage of life. This research is necessary, especially during the COVID-19 pandemic, to inform interventions that may help bolster types of connection that are particularly vital.

In spite of its limitations, the current study contributes significant information to the literature about university students' levels of social connection and their levels of perceived

stress during COVID-19, as well as how these two variables are linked. The results from the present study suggest that students are experiencing higher levels of perceived stress and lower levels of social connectedness during the pandemic. Students also appear to be experiencing less connection with classmates than all other social groups during this time. This study's findings further indicate that a sense of connection with family and friends is particularly important in late adolescence. In regards to social connection and perceived stress, our findings support the well-documented idea that social connectedness is an important factor for psychological well-being in university students (Lee et al., 2002; Rice et al., 2006; Sladek & Doane, 2015).

Holt-Lunstad et al. (2018) argue that social connectedness is a highly important determinant of health and well-being. The results of the current study support this notion and also have important implications for interventions to support the well-being of university students. Stress in university students can lead to many harmful consequences, including impulsive behaviours (Leppink et al., 2016), depressive symptoms (Smith et al., 2014), and maladaptive coping (Metzger et al., 2017). Interventions at post-secondary institutions aiming to reduce students' stress levels should ensure they address their levels of social connectedness and include strategies for bolstering their level of connection with family and friends, in particular.

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Appendix A

First, we would like to learn about you as an individual:

1. What is your program? (Please check all that apply.)

Social Sciences (Sociology, Psychology, Criminal Justice, Family Studies)

Food and Nutritional Sciences

Kinesiology

Health Sciences

Humanities (i.e. English, French etc...)

Leadership and Management

2. Are you enrolled at Brescia University College?

a. Yes

b. No

3. What is your age? _____

4. Please specify your gender:

A. Male

B. Female

C. Another gender identity

D. Prefer not to say

5. Which category best describes your ethnic group? (Please check all that apply)

Black or African-American

East Asian (e.g., Chinese, Japanese)

Hispanic or Latinx

Indigenous (First Nations, Inuit, Metis)

Middle Eastern Asian (e.g., Arab, Hebrew)

South Asian (e.g., Indian, Sri Lankan)

White

Another ethnic group. Please list: _____

6. Where are you currently living or staying?
- A. In residence at Brescia or Western
 - B. Off-campus, but still in London, Ontario
 - C. Outside of London, Ontario, but still in Canada
 - D. Outside of Canada
7. Who are you currently living with?
- A. With parents/family
 - B. With partner/spouse
 - C. With roommates who are my friends
 - D. With roommates who I don't know
 - E. I live alone
8. How many courses are you taking this semester? _____
9. How many of your courses this semester have in-person components? _____
10. How many of your courses this semester are synchronous online (with scheduled class times)?
- _____
11. How many of your courses this semester are asynchronous online (with no scheduled class times)?
- _____

Appendix B

Now, we want to ask you some questions about your level of social connectedness and your relationships with different groups of people:

Social connection is the feeling that you belong to a group and generally feel close to other people. For the questions below, please think about your social connections/relationships in the **past month**.

27. In general, how important is social connection to you?

- Unimportant
- Of little importance
- Somewhat important
- Moderately important
- Very important

28. In the past month, how connected have you felt to your family?

- Not at all connected
- A little connected
- Somewhat connected
- Moderately connected
- Very connected

29. How do you feel about your level of connection with your family?

- Want a lot less connection
- Want a little less connection
- Satisfied
- Want a bit more connection
- Want a lot more connection

30. In the past month, how connected have you felt to your friends?

- Not at all connected
- A little connected
- Somewhat connected
- Moderately Connected
- Very connected

31. How do you feel about your level of connection with your friends?

- Want a lot less connection
- Want a little less connection

- Satisfied
- Want a bit more connection
- Want a lot more connection

32. In the past month, how connected have you felt to the other students in your classes?

- Not at all connected
- A little connected
- Somewhat connected
- Moderately Connected
- Very connected

33. How do you feel about your level of connection with the other students in your classes?

- Want a lot less connection
- Want a little less connection
- Satisfied
- Want a bit more connection
- Want a lot more connection

34. In the past month, how connected have you felt to the instructors in your classes?

- Not at all connected
- A little connected
- Somewhat connected
- Moderately Connected
- Very connected

35. How do you feel about your level of connection with your instructors?

- Want a lot less connection
- Want a little less connection
- Satisfied
- Want a bit more connection
- Want a lot more connection

36. In the past month, how connected have you felt to the Brescia community as a whole?

- Not at all connected
- A little connected
- Somewhat connected
- Moderately Connected
- Very connected

37. How do you feel about your level of connection with the Brescia community?

- Want a lot less connection
- Want a little less connection
- Satisfied
- Want a bit more connection
- Want a lot more connection