Exploring the Relationships of Learners and Instructors in Online Courses

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Abstract This quantitative study explored the relationships among student-instructor connectedness, learners' anxiety, and motivation in online higher education courses. Research has shown that student-instructor connectedness can affect student motivation in online learning. Utilizing the connectedness and anxiety items of the Student-Instructor Relationship Scale in a large-scale cross-sectional survey with a representative sample of students at a comprehensive research university in the southeastern United States of America, we found significant relationships between the dependent variables (connectedness, anxiety, and motivation). Students with a higher connectedness to the instructor tended to have higher motivation and lower anxiety levels. Additionally, students with higher anxiety levels were more likely to have lower motivation levels. Students perceived a lower level of connectedness with male instructors, whereas male and transfer students had higher levels of anxiety. These findings contribute to the field of instructor connectedness in online learning and have implications for higher education institutions and faculty when considering increasing online learning offerings. We provide recommendations for enhancing student-instructor connectedness in online learning to decrease student anxiety and increase student motivation.

Keywords: Student-instructor connectedness, student motivation, student anxiety, student perceptions, instructor presence, online learning

An ongoing trend in higher education is the increased prevalence of distance education, particularly during and after the COVID-19 pandemic (Legon et al., 2022). There has also been an increase in concern about the social-emotional health of learners, particularly distance learners (Fitzgerald & Fitzgerald, 2021). Although online classes offer flexibility, students underestimate the impact of the separation between themselves and their instructors on their engagement and performance (Kaufmann & Vallade, 2020). The instructor-student relationship has been explored using various frameworks in online learning environments, including Moore's three types of interaction (Moore, 1989) and the Community of Inquiry (CoI) framework (Garrison, et al., 2007). Strategies defined within these frameworks aim to assist faculties in building interactions or communities within online environments. The CoI defines an effective online learning environment as an overlap of teaching (course structure), cognitive (assessments), and social (interaction) presence. These frameworks have been widely applied and researched in online courses (Bernard et al., 2009, Martin et al., 2022). Research has shown that using recommended strategies from either of these frameworks increases student motivation, perceived learning, engagement, and satisfaction (Richardson & Lowenthal, 2017; Yang et al., 2018). However, these frameworks are more prescriptive and focus less on the psychological or affective principles of relationship-building. For instance, building student-to-instructor interaction opportunities does not necessarily mean that interactions will increase connectedness as they may be negative (Giossos et al., 2009). This study focuses on the connections between students and instructors and their effects on student motivation and anxiety levels.

The concept of student-instructor connectedness encompasses a variety of attitudes and behaviors. For instance, in one study (Conklin & Garrett Dikkers, 2021), students described the characteristics of trust and connectedness as instructors with flexibility, exhibiting understanding and caring attributes, and being empathic toward student situations. Additionally, other studies suggest that student-instructor connectedness is aided when the instructor engages in immediacy behaviors (Creasey et al., 2009; Wilson et al., 2011), which can include smiling, making eye contact, using vocal variety, and having a relaxed body posture (Violanti et al., 2018). These behaviors are more difficult to create in asynchronous online environments because of the lack of nonverbal cues, which can hinder the development of student-instructor connectedness (Lowenthal et al., 2021; Rovai, 2000; Tang & Hew, 2018).

Some research suggests the use of strategies to increase student-instructor connectedness is an important factor in online student success (Richardson & Lowenthal, 2017; Wentzel, 2009; Wigfield et al., 2012) and can contribute to decreased anxiety (Authors, 2022; Creasey et al., 2009; Wilson et al., 2011). Student-instructor connectedness has also been related to positive student behaviors, attitudes, and outcomes (Hagenauer & Volet, 2014; Lammers & Gillaspy, 2013; Lammers et al., 2017). Studies on student-instructor connectedness in higher education have generally found a positive correlation between connectedness, student motivation, and lower anxiety (Conklin & Garrett Dikkers, 2022; Creasey et al., 2009; Wilson et al., 2011). Students also find value in relationships that may develop between themselves and the instructor (Kaufmann & Vallade, 2020). This connection can result in greater perceived cognitive and affective learning, positive attitudes, and increased participation and motivation (Kaufmann & Vallade, 2020; Sellas, 2021).

Although studies have demonstrated the beneficial effects of connectedness on student motivation and anxiety, the influence of these variables on other aspects remains relatively unexamined. In a recent study by Barcelona et al. (2023), the associations among these variables were investigated in statistics courses, revealing that a high level of teacher involvement decreases student anxiety. Nonetheless, this finding was specific to the discipline of mathematics. This study examines the relationship between student-instructor connectedness, student anxiety, and student motivation in the context of online higher education, regardless of the field of study. Specifically, this study investigates the extent to which student-instructor connectedness influences the levels of anxiety and motivation among students in online classes.

Literature Review

Student-Instructor Connectedness

Online asynchronous courses (including web conferencing) typically do not offer opportunities for face-to-face interactions and, therefore, pose a challenge to developing student-instructor connectedness or rapport (Martin et al., 2018). Rapport is defined as "a relationship characterized by agreement, mutual understanding, or empathy that makes communication possible or easy," which can allow the feeling of connection between the instructor and students (Merriam-Webster, n.d.). Research has shown that high rapport with instructors can increase student success (Glazier, 2016). Those who suggest building rapport in asynchronous online courses emphasize that the effort must be deliberate, as rapport is built organically in face-to-face environments (Martin et al., 2018; Murphy & Rodriguez-Manzanares, 2012). Instructors can use intentional strategies to build rapport with students in online classes by cultivating a "presence." Instructor or teaching presence is a concept defined within the CoI Framework (Garrison et al., 2000). Instructor or instructor social presence exists in the overlap between teaching and social presence. Instructor social presence (connectedness) stems from two concepts: immediacy (Mehrahian, 1969) and intimacy (Argley & Dean, 1965). The concept of immediacy is the degree to which communication behaviors contribute to a sense of closeness and involve nonverbal interactions with another person (Mehrahian, 1969). Meanwhile, intimacy supports and meets the needs of learners (Argley & Dean, 1965). Strategies for connecting with students in online courses include creating introductory videos, responding to online discussions, and utilizing prompt email response time (Authors, 2021; Martin et al., 2018). Flanigan et al. (2021) investigated online instructors' rapport-building strategies. They found that instructors who humanized themselves by demonstrating a sense of openness, approachability, and willingness to form rapport with students and who provided an orderly learning experience could initiate and maintain rapport through learner-centered, attentive, and courteous behaviors.

For the purpose of this research, student-instructor connectedness is defined as the ability to establish an emotional connection with the instructor. Emotional presence, based on participants' emotional intelligence, has been suggested as an additional concept to be added to the CoI (Majeski et al., 2018). Connectedness between instructors and students has been established as a need in face-to-face and online learning settings (Kim, 2011; Martin et al., 2018), because the design and facilitation of an online learning environment can affect students' learning experiences, including learning satisfaction (Anderson et al., 2001; Caskurlu, 2020; Garrison et al., 1999; Martin et al., 2018). Research has shown a correlation between connectedness and academic success in online settings (Kim, 2011). Strong student-instructor

connectedness allows learners to see the instructor as more approachable and caring (Richardson & Lowenthal, 2017). The instructor's connection with students is established through multiple elements, including building trust and providing timely and constructive feedback (Conklin & Garrett Dikkers, 2022). Instructor social presence, connectedness, intimacy, and immediacy have been linked to rapport building in online courses (Conklin & Garrett Dikkers, 2021; Baker, 2010; Sher, 2009).

Anxiety

Anxiety has been defined as "an unpleasant emotional state or condition which is characterized by a subjective feeling of tension, apprehension and worry" (Spielberger, 1972, p. 482) and can potentially have a negative impact on academic performance (Hilliard et al., 2020). Anxiety in an online learning setting can stem from multiple situations, such as being misinterpreted in a forum (Symeonides & Childs, 2015), experiencing delays in answering student messages (Allan & Lawless, 2003), and having overall feelings of uncertainty (Hilliard et al., 2020). Anxiety, regardless of medical diagnosis, can be triggered by uncertainty and is inversely correlated with learning effectiveness (Abdous, 2019; Blackburn & McGrath, 2022).

Studies indicate that perceived distinctions between online and traditional face-to-face learning may contribute to anxiety, potentially hindering the learning experience (Ajmal & Ahmad, 2019; Fawaz & Samaha, 2020; Heckler & Ringeisen, 2019; Singh, 2015). Ajmal and Ahmad (2019) examined students' anxiety in online learning and found several factors that caused anxiety among students, such as assignments, exams, and technology. Fawaz and Samaha (2020) identified a correlation between online learning and increased anxiety and depression among undergraduate students. Heckler and Ringeisen (2019) found that anxiety is negatively associated with learning satisfaction. Furthermore, previous research has demonstrated a relationship between anxiety and academic achievement. Agboola and Evans (2015) found that anxiety was significantly correlated with academic performance. Singh (2015) measured the impact of anxiety on undergraduate students' academic achievement and found that low and moderate anxiety levels were positively correlated with academic performance.

Some research has also explored methods to reduce the anxiety of online learners, including providing orientation (Abdous, 2019) and using check-in quizzes (St. Clair, 2015) and increasing instructor availability. St. Clair (2015) found that students exhibiting anxiety may feel that their instructor is less available in an online environment than in a face-to-face environment, which offers students more immediate opportunities to discuss their concerns. Increasing instructor awareness of anxiety reduction in online learning alleviates student anxiety and enhances morale and motivation, ultimately contributing to improved academic achievement (St. Clair, 2015; Rapp-McCall & Anyikwa, 2016).

Motivation

Motivation is an important aspect of education, as students accomplish more difficult activities, take an active role, and adopt a deeper approach toward learning when they feel motivated to do so (Schunk, 2008). Motivation can be described as a process in which goal-directed activities are initiated and sustained (Schunk, 2008). Student motivation in online academic settings can be affected by many factors such as interaction, instructor feedback, and technology (Conklin & Garrett Dikkers, 2021, 2022; Hartnett, 2016; Keller, 2008). For instance,

Tahir et al. (2021) explored how openness and connectedness affected learner motivation and found that a high level of openness was displaced in learner-to-learner and learner-to-instructor interactions, and a high level of connectedness was displayed in learner-to-content interaction. Additionally, Hartnett (2016) found that supportive influences by the instructor, such as ongoing guidance and supportive feedback, were viewed as important actions that increased student motivation and gave students a sense of confidence and increased motivation. Thus, increasing instructor connectedness can increase student motivation, leading to higher completion rates and achievement of course outcomes (Conklin & Garrett Dikkers, 2021; Robb & Sutton, 2014).

Research suggests that student-instructor connectedness is a critical element in the online learning environment (Conklin & Garrett Dikkers, 2022, 2021; Martin et al., 2018). As the prevalence of online courses continues to increase across all disciplines in higher education, instructors face challenges in adapting their pedagogy to online learning environments (Lowenthal, 2022; Martin et al., 2020; Moore & Kearsley, 2012). This study aimed to investigate student perceptions of instructor connectedness and provide better support for distance education students beyond the COVID-19 pandemic. Additionally, the study sought to broaden existing research by exploring the interrelationships among student-instructor connectedness, motivation, and anxiety in higher education settings across disciplines.

Methods

Research Questions

This study explored the relationship between student-instructor connectedness and student anxiety or motivation. The following research questions were addressed.

1. Are there correlations between student-instructor connectedness, student anxiety, and motivation?

2. What are student-instructor connectedness, anxiety, and motivation differences and/or correlations between various instructor/student demographics?

For the above research questions, the major variables of interest included connectedness, anxiety, and motivation, which served as dependent variables. These dependent variables were represented as a mean score for the items measuring each variable (see below for more details about the measurement scales used). The independent variables considered were instructor/student demographics, including student gender, ethnicity, degree program, whether a student was a freshman or a transfer student at the participating university, years in school, student age, number of online classes taken, course modality, and instructor gender.

One scale used to measure student-instructor connectedness is the 36-item Student-Instructor Relationship Scale (SIRS) (Creasey et al., 2009). The survey in this study included questions related to student perceptions of two dimensions of the SIRS: connectedness and anxiety. The first factor contained 11 items (e.g., "It is not difficult for me to feel connected to this instructor") designated as the connectedness dimension; higher scores denote stronger feelings of connectedness, and low scores on this scale communicate avoidance or a tendency to forgo a close relationship with the instructor. The second factor contained eight items (e.g., "I am

nervous around this instructor") labeled the anxiety dimension. Higher scores reflect generalized anxiety regarding a relationship with the instructor, whereas lower scores reflect a less threatening perception of this affiliation. This study investigated the effects of student-instructor connectedness on learner anxiety and motivation using the SIRS scale.

Procedure

This study used a correlational quantitative research design because the variables were measured and evaluated rather than manipulated (Vogt, 2011). The participants were surveyed to measure the dependent variables of connectedness, anxiety, and motivation. The Student-Instructor Relationship Scale (SIRS) (Creasey et al., 2009) contains 36-items with two subscales: Connectedness and Anxiety. For this study, only data from the 11-item connectedness subscale, utilized to assess rapport between students and instructors, were used along with the 8-item anxiety subscale. Previous reports using the SIRS showed test-retest reliability of the Connectedness subscale at $r = .69$ and internal consistency of the entire scale at $\alpha = .89$ to $.92$ (Creasey et al., 2009). The internal consistency estimate for the Connectedness subscale in the current sample was $\alpha = .89$. To measure motivation, the five questions developed by the authors (2021) were used. These five questions asked respondents to rate the perceived importance of the feeling that an online instructor could create to promote students' learning and motivation. For instance, the first question in this scale asks students to indicate how important it is for an instructor to create a feeling of trust and acceptance in order to foster learning and boost motivation. The internal consistency estimate for this scale was found to be high, with $\alpha = .93$. For each item, students expressed their agreement with a statement using a 5-point Likert scale, where 1 represented "strongly disagree" and five represented "strongly agree." Appendix A provides the specific items used to measure the dependent variables.

The survey was administered to a representative sample of undergraduate and graduate students at a regional public university in southeastern United States of America during the middle of the spring 2021 semester. This was the institution's third semester of instruction, impacted by the COVID-19 pandemic. The institution shifted to remote instruction in March 2020. The spring 2021 semester was a mix of online, hybrid, and face-to-face sessions, with 48% asynchronous,17% synchronous, and 35% face-to-face.

Participants

After receiving IRB approval, the researchers contacted the participants through the Office of Institutional Research, which supplied a random sample of 6000 students representative of the university population. The volunteers included undergraduate and graduate students (N = 472; 7.8% response rate; 98 males, 366 females, eight others; median age range = 18-24). Students (400 undergraduate and 72 graduate students) were still primarily engaged in remote learning due to the pandemic. Despite the higher representation of female respondents, this aligns with the overall university population. Additionally, the participants consisted of 472 from a random sample of 6000, surpassing the 374 threshold and providing a representative sample of the population with 95% confidence for applied statistics-based research (Singh & Masuku, 2014).

Analysis

  The first research question was addressed using Spearman's rho correlation coefficient. The use of this coefficient was appropriate given that the linearity and normality assumptions required by the Pearson correlation were not satisfied by the data after being examined using the scatterplots and Shapiro-Wilk test for normality. The Spearman's rho correlation coefficient is suitable for variables that are not normally distributed.

  This study employs multiple linear regression to address the second research question. Before conducting multiple linear regression, a set of required assumptions, including linearity, normality, homoscedasticity, and the absence of multicollinearity, were examined and tested. Specifically, the normality assumption was visually inspected using a normal P-P plot. There was only a slight departure from the normality line for all three analyses; thus, we assumed that this assumption was met. The scatter plot of the residuals was evaluated to test the homoscedasticity of the variance. No significant violation of this assumption is observed. Because both normality and the equal variance assumption were satisfied, linearity was also assumed to be met. Finally, multicollinearity was assessed using VIF values, with values greater than 10 indicating potential multicollinearity (Neter et al., 1989). No such large values were observed, and we concluded that all the required assumptions were met for the collected data to run a multiple linear regression.

  Given that little research has been conducted to examine the relationship between the dependent variables of interest and the demographic variables considered in the study, multiple linear regression was carried out in a descriptive manner; that is, backward stepwise regression was performed to identify demographic variables that were significantly associated with the dependent variables (entry probability .05, removal probability .10). Any predictors with a p-value ≤ .05 were considered statistically significant. All analyses were conducted using IBM SPSS Statistics version 28.0.1.0.

  Most of the independent variables were nominal-scale variables; therefore, a dummy variable was created and entered into the regression model. Student age was categorized into five categories and the number of online classes taken by each participant was categorized into four categories. These two variables were assumed to be continuous and were directly entered into the model. The three dependent variables were operationalized as the mean values of the items in the scale.

  Considering the weak-to-moderate relationships among the dependent variables, a multivariate regression analysis was conducted to corroborate the findings of the univariate analyses. One of the assumptions required by multivariate regression analysis is the equality of covariance matrices. Box's M test was designed to test this assumption. However, the use of Pillai's trace was desirable. The current study's data showed significance (p < .001); thus, the researchers decided to use Pillai's trace because it is one of the most robust to departures from the assumption (Heo & Toomey, 2020).

Results

Descriptive Statistics

As can be seen in Table 1, the majority of participants were female (N = 366; 77.5%), White (N = 382; 80.9%), undergraduates (N = 400; 84.7%), 18-24 years old (N = 382; 80.9%), and female instructors (N = 289; 61.2%). In addition, one-third of the students were in their first year at the participating institution at the time of investigation. Nearly half of the students were either junior (N = 128; 27.1%) or senior (N = 123; 26.1%) students in their undergraduate programs. Most students reported that they had taken two or more online classes (N = 434; 91.9%), and roughly half indicated asynchronous online learning as the primary course modality.

Table 1

Demographic Information of Participants (n=472)

Variable	N	%	Variable	N	%
Gender			Academic classification		
Male	98	20.8	Freshman	66	14.0
Female	366	77.5	Sophomore	82	17.4
Transgender	5	1.1	Junior	128	27.1
Other	2	0.4	Senior	123	26.1
Missing	1	0.2	Missing	73	15.5
Ethnicity			Age		
American Indian/Alaska Native	2	0.4	18-24	382	80.9
Asian	11	2.3	25-34	70	14.8
African American/Black	25	5.3	35-44	14	3.0
Native Hawaiian/ Pacific Islander	3	0.6	45-54	4	0.8
White	382	80.9	Over 55	2	0.4
Hispanic	32	6.8	Number online classes taken		
Other	17	3.6	0-1	38	8.1
Degree program enrolled			2-4	179	37.9
Undergraduate	400	84.7	5-7	150	31.8
Master's	64	13.6	8 or more	105	22.2
Doctorate	6	1.3			
Certificate	2	0.4			
First year student			Course modality		
Yes	150	31.8	Online asynchronous	212	44.9
No	250	53.0	Online synchronous	165	35.0

Variable	N	%	Variable	N	%
Missing	72	15.3	Face-to-face w/Zoom remote	93	19.7
Transfer student			Missing	2	0.4
Yes	65	13.8	Instructor's gender		
No	79	16.7	Male	178	37.7
Missing	328	69.5	Female	289	61.2
			Missing	5	1.1

Table 2 shows the descriptive statistics of the dependent variables: connectedness, anxiety, and motivation. As noted earlier, each dependent variable is represented as the mean of the ratings of items in the measurement scale. Thus, the minimum and maximum values are fixed at 1 and 5, respectively. The mean rating of connectedness and motivation was over four, indicating that students' overall connectedness and motivation were higher, whereas anxiety was notably lower, with a mean rating of 1.59. In addition, these variables show a skewed distribution, as shown in Figure 1.
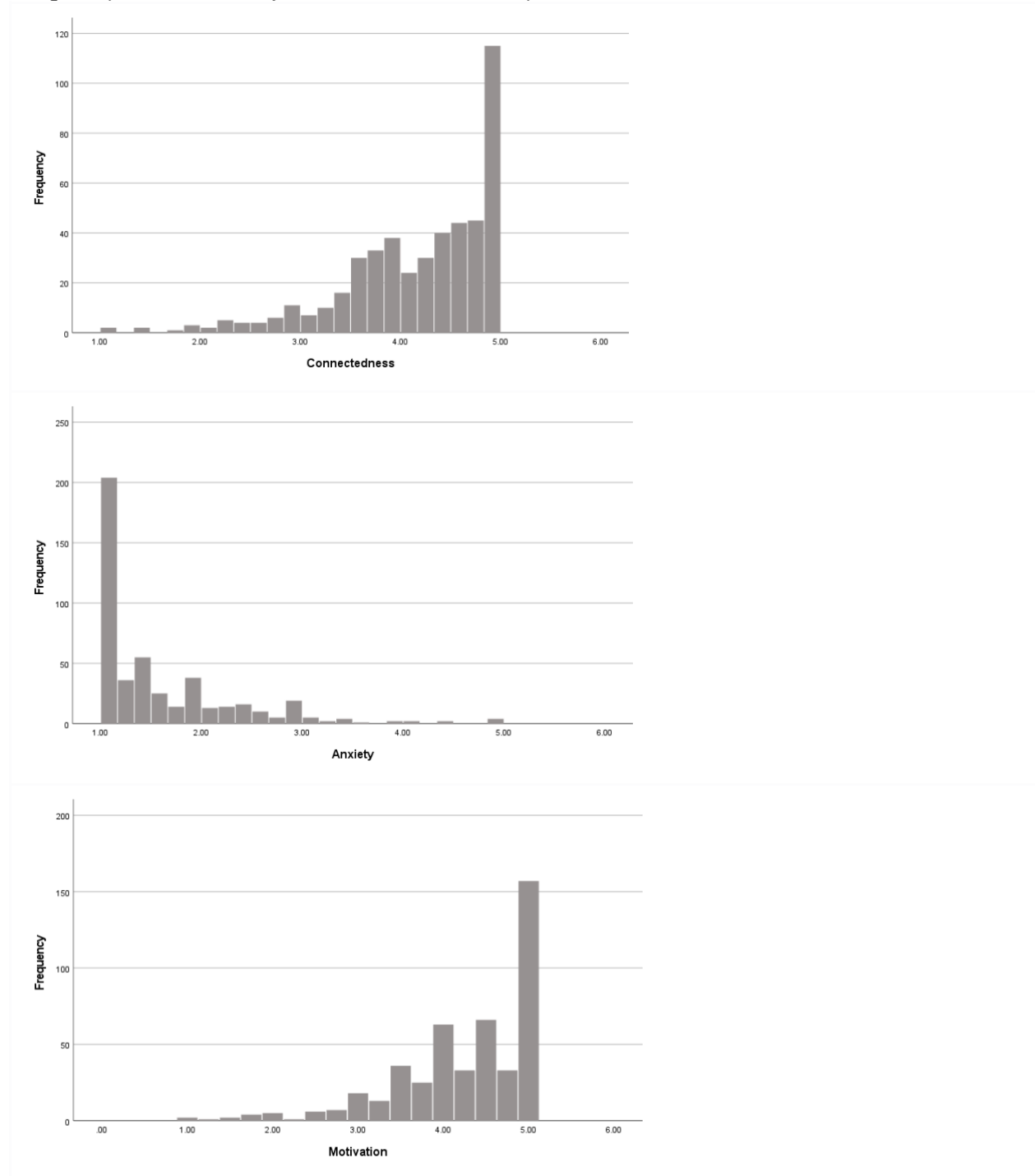
Table 2

Descriptive Statistics of Connectedness, Anxiety, and Motivation

Variables	No. of items	Mean	SD	Min	Max
Connectedness	11	4.20	0.77	1	5
Anxiety	8	1.59	0.76	1	5
Motivation	5	4.26	0.80	1	5

Figure 1

Frequency Distribution of Connectedness, Anxiety and Motivation

Research Question 1: Correlations Between Connectedness, Anxiety, and Motivation

The Spearman's rho coefficients revealed a significant relationship between the three dependent variables (Table 3). More specifically, the correlation between connectedness and anxiety was significant at the .01 alpha level, with its value of -0.42 ($p < .01$). Similarly, a negative relationship was found between anxiety and motivation (rho = -0.23, $p < .01$). In contrast, a fairly strong positive relationship was observed between connectedness and motivation (rho = 0.57, $p < .01$). The results collectively suggest that students with higher connectedness with their instructor(s) tended to have higher motivation and lower levels of anxiety. In addition, students with higher anxiety levels were likely to have lower levels of motivation.

Table 3

Correlations Between Connectedness, Anxiety, and Motivation

Variables	Connectedness	Anxiety	Motivation
Connectedness	–		
Anxiety	-0.42**	–	
Motivation	0.57**	-0.23**	–

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Research Question 2: Differences in Connectedness, Anxiety, and Motivation Between Various Instructor/Student Demographics

Connectedness

Results from the multiple linear regression analysis using the mean value of connectedness as a dependent variable identified the instructor's gender and course modality as significant predictors of connectedness (Table 4). More specifically, students perceived male instructors to form lower connectedness with their students than their female counterparts ($\beta = -0.101$, $p = .028$). In addition, asynchronous online courses led to a lower level of connectedness ($\beta = -0.090$, $p = .050$) than synchronous or face-to-face online courses. These two predictors accounted for 2.6% of the variability in connectedness, with a p value for the final model of less than .01.

A model that is statistically significant while having a small value of R^2 suggests that the independent and dependent variables are significantly related, but the prediction of the dependent variable based on the independent variable(s) may not be accurate. That is, if one wants to predict the actual level of connectedness using student age and instructor sex, then this predicted value will not be as precise as one might desire. However, it is still true that a relationship exists between connectedness, student age, and instructor sex. Considering that the primary focus of the current study was to examine the relationship between connectedness, anxiety, motivation, and demographic variables, models that showed significance were sufficient to address these research questions.

Table 4

Summary of Multivariate Regression Analysis (Model 1)

Analysis of Variance		Dependent variable: Connectedness		
Source	Sum of Squares	DF	Mean Square	F
Model	7.212	3	2.404	4.144**
Residual	271.490	468	0.580	
Total	278.702	471		
Predictors	Estimate (standardized)	Std. Error	t	Prob > $|t|$
(Intercept)	4.322 (-)	0.055	44.795	.000***
Age	0.111 (0.085)	0.059	1.864	.063
Male instructor	-0.160 (-0.101)	0.073	-2.205	.028*
Online asynchronous	-0.139 (-0.090)	0.071	-1.966	.050*

Note. $* p < .05$, $** p < .01$, $*** p < .001$; $R = .161$, $R^2 = .026$, adjusted $R^2 = .020$

Anxiety

When anxiety was entered into the regression model as a dependent variable, male and transfer students were found to be significantly related to the dependent variable (Table 5). Male students had a significantly higher level of anxiety than did female students ($\beta = 0.093$, $p = .044$). Specifically, on average, male students had 0.093 higher values in the standard unit than their male counterparts. Transfer students also reported a significantly higher level of anxiety than non-transfer students did ($\beta = 0.102$, $p = .027$). The final model accounted for 2% of the variance in anxiety, $R^2 = .020$, $F(2, 469) = 4.776$, $p < .01$.

Table 5

Summary of Multivariate Regression Analysis (Model 2)

Analysis of Variance	Dependent variable: Anxiety			
Source	**Sum of Squares**	**DF**	**Mean Square**	**F**
Model	5.429	2	2.715	4.776**
Residual	266.569	469	0.568	
Total	271.998	471		
Predictors	**Estimate (standardized)**	**Std. Error**	**t**	**Prob > $|t|$**
(Intercept)	1.430 (-)	0.068	20.924	.000***
Male student	0.174 (0.093)	0.086	2.022	.044*
Transfer student	0.280 (0.102)	0.126	2.217	.027*

Note. $* p < .05$, $** p < .01$, $*** p < .001$; $R = .141$, $R^2 = .020$, adjusted $R^2 = .016$

Motivation

The final model with motivation as a dependent variable included male students and online asynchronous mode as significant predictors (Table 6), and the dependent variables explained 3.5% of the variability in motivation, R^2=.035, $F(3, 468) = 5.737$, $p < .01$). On average, male students were found to have a lower level of motivation than female students ($\beta = -0.126$, $p = .006$). In addition, similar to the finding with connectedness, the course delivery mode of asynchronous online resulted in a significantly lower level of motivation than synchronous or face-to-face modality ($\beta = -0.108$, $p = .017$).

Table 6

Summary of Multivariate Regression Analysis (Model 3)

Analysis of Variance	Dependent Variable: Motivation			
Source	**Sum of Squares**	**DF**	**Mean Square**	**F**
Model	10.808	3	3.603	5.737**
Residual	298.893	468	0.628	
Total	304.701	471		
Predictors	**Estimate (standardized)**	**Std. Error**	**t**	**Prob > $|t|$**
(Intercept)	4.521 (-)	0.091	49.559	.000***
Male student	-0.251 (-0.126)	0.090	-2.778	.006**
White	-0.163 (-0.080)	0.093	-1.747	.081
Online asynchronous	-0.175 (-0.108)	0.073	-2.386	.017*

Note. $* p < .05$, $** p < .01$, $*** p < .001$; $R = .188, R^2 = .035, adjusted\ R^2 = .029$

Relationships Between Demographic Variables and Three Dependent Variables

The significant association among the dependent variables suggested a multivariate approach in which all dependent variables were simultaneously tested while their association was considered. For this multivariate regression model, independent variables significant in the univariate analyses were entered into the model, which included (a) student gender, (b) whether a student was a transfer student, (c) asynchronous online course modality, and (d) instructor gender. The results showed statistical significance for student sex and asynchronous modality.

Specifically, there was a statistically significant difference in connectedness, anxiety, and motivation based on the student's gender, $F(3, 132) = 3.669$, $p =.014$; Pillai's Trace = .077, partial eta squared = .077. In addition, asynchronous online course modality led to significant differences in the set of three dependent variables from the other two course modalities (face-to-face and synchronous online), $F(3, 132) = 2.946$, $p =.035$; Pillai's Trace = .063, partial eta squared = .063.

These results confirm that student gender and course modality play an important role in explaining student-instructor connectedness, student anxiety, and student motivation. The other two variables, status as transfer students and instructor gender, showed significance in the univariate analyses, in which each dependent variable was investigated individually; however, no such significance was observed at the multivariate level. This suggests that these two variables may have partial relationships with some of the dependent variables considered in this study. However, such a relationship may not be significant once the association between the dependent variables is considered.

Discussion

Research Question 1

Research question one examined the correlations between student-instructor connectedness, anxiety, and motivation. The results suggest that the more connectedness the student perceives with the instructor, the higher the motivation and the lower the anxiety the student may exhibit. The results align with previous research demonstrating that students' perceptions of connectedness with their instructors contribute to increased motivation (Conklin & Garrett Dikkers, 2022, 2021; Brooks & Young, 2015; Creasey et al., 2009; O'Sullivan et al., 2004). For instance, students reported that feelings of trust and acceptance significantly influenced their motivation (Hartline et al., 2021). Several strategies have been identified to connect with students, thereby increasing motivation, such as response time (Conklin & Barreto, 2023; Martin et al., 2020) and multiple forms of communication (e.g., email, announcements, and instructor-created videos) (Martin, 2020).

By contrast, students with high anxiety levels exhibited lower motivation. Online students are particularly susceptible to anxiety, which can impede their abilities and overall performance (Abdous, 2017). If anxiety is not alleviated throughout the course, it may hinder motivation and have a detrimental impact on achievement (Macher et al., 2012; Pekrun & Stephens, 2012). Therefore, it is crucial for instructors to implement measures that foster connections with their students, thereby enhancing their motivation and alleviating anxiety. One effective strategy for achieving this is for instructors to adopt a pedagogy of care that entails being genuine and vulnerable (Fattore, 2022). This approach involves deliberate planning and consideration of student needs, and the development of strategies to support those needs.

Research Question 2

For research question two, the differences in student-instructor connectedness, anxiety, and motivation between various instructor/student demographics were analyzed. Student perceptions of student-instructor connectedness were less favorable for male instructors than for their female counterparts. Thus far, no significant differences in student gender and motivation have been found in online learning environments (Malinauskas & Pozeriene, 2020). It has been found that students relate differently to male and female online instructors on five themes: connection, inherent power, rigidness, willingness to nurture, and subject mastery (Fernandez-Cablay, 2021). Gender differences in student motivation in online learning environments have also been established (Ajlouni et al., 2022). Males and females with different motivational types indicated that various instructional strategies might increase each gender's motivation.

Correlations between the demographics of instructors and students were analyzed for connectedness, anxiety, and motivation. This analysis suggests that students' gender and course modality can contribute to their connectedness, anxiety, and motivation. Some research has been conducted on how demographics affect connectedness, anxiety, and motivation (Alemany-Arrebola et al., 2020; Amendola et al., 2021; Gaeta et al., 2021). Thowfeek and Jaafar (2012) suggested that gender is a key factor that should be examined further in distance education, although research has demonstrated mixed results regarding gender and online learning satisfaction (Havery et al., 2017). Additionally, this study infers that engaging in asynchronous courses may diminish student connectedness and motivation, aligning with prior research that emphasizes the significance of social presence among instructors and students in online asynchronous courses (Oyarzun et al., 2018; Ali & Leeds, 2010; Lowenthal & Dunlap, 2018). As such, it is important to understand strategies for cultivating student-instructor rapport. The results of this study suggest that student gender and course modality play an important role in explaining students' connectedness, anxiety, and motivation, and that there is a slight correlation between student-instructor connectedness and student anxiety and motivation.

Limitations

This study has several limitations. First, it was undertaken during the ongoing COVID-19 pandemic, which led to unconventional circumstances for both instructors and students. While some learners had no choice but to enroll in online courses, which may not have been their preferred mode of learning, external factors could have exacerbated their stress levels, thereby impacting their perceptions of the courses and instructors. Furthermore, instructors were forced to teach in various environments, some of which may not have been comfort zones. In this regard, it is essential to recognize that the findings of this study may not generalize to all educational settings, given the unique context in which the research was conducted.

Moreover, the multiple regression model used in this study accounted for only a limited portion of the variability in dependent variables. Although this observation does not negate statistically significant findings, caution should be exercised when interpreting the results. Specifically, it may be challenging to predict the level of connectedness, anxiety, or motivation by using the models proposed in this study. Therefore, it is essential to consider the limitations of this study when applying its findings in other contexts.

Implications and Future Directions

More research needs to be conducted to determine which factors could increase the motivation of male students, and to what extent connectedness with an instructor would contribute to their motivation. Although no significant differences were found between instructor gender and student connectedness, anxiety, or motivation, this research suggests that there may be a partial relationship between instructor gender and the dependent variable (Bettinger & Long, 2015). Research needs to be conducted to determine whether an instructor's gender plays a role in their perceptions of student-instructor connectedness.

While gender has not been specifically investigated concerning connectedness, gender differences have been investigated in relation to social presence in online learning. For instance, Park and Kim (2020) investigated gender differences as a moderator between social presence and satisfaction and found that gender did not have a moderating effect. Therefore, if a strong social

presence is established and fostered, students are more likely to be satisfied regardless of gender. While this study did not specifically investigate student-instructor connectedness, social presence strategies can help build rapport and connectedness in an online environment. Instructors can establish social presence using the strategies identified by Ankenbrand (2022): applying online learning frameworks, building collaborative spaces and activities, providing a consistent structure, establishing communication norms, ensuring instructor availability including introduction and announcements, creating welcoming activities, using a friendly and empathetic tone, being real and approachable, providing acknowledgment and encouragement, ensuring one-on-one communication, incorporating storytelling and humor, self-disclosure, discussion forums, solicit student feedback, using frequent announcements and reminders, and using conversational styles. Future research could explore whether social presence strategies specific to motivational styles and genders, such as these, increase student-instructor connectedness, or the correlation between social presence and student-instructor connectedness.

Further research is needed regarding the influence of student-instructor connectedness on course completion and student satisfaction in online learning environments. However, this study did not specifically analyze student satisfaction or course completion. Thus, it can be inferred that student motivation affects retention. Additionally, if students are motivated by their instructor, they are more likely to be satisfied with the course and the instructor. Exploring motivational strategies in online learning settings for specific types of motivation may be a fruitful direction for future research.

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Appendix A

Student-Instructor Relationship Scale (SIRS)
The following statements concern how you feel about your relationship with your instructor in this successful class. Response to each statement by indicating how much you agree or disagree with it. Use the following rating scale: Strongly Agree (5) / agree (4), neither agree nor disagree (3), disagree (2), Strongly Disagree (1).

Connectedness (11 items)	The instructor is concerned with the needs of his or her students. It's not difficult for me to feel connected to this instructor. I feel comfortable sharing my thoughts with this instructor. I find it relatively easy to get close to this instructor. It's easy for me to connect with this instructor. I am very comfortable feeling connected to a class or instructor. I usually discuss my problems and concerns with this instructor. I could tell this instructor just about anything. I feel comfortable depending on this instructor. If I had a problem in this class, I know I could talk to the instructor. I know this instructor could make me feel better if I had a problem.
Anxiety (8 items)	I am afraid that I will lose this instructor's respect. I worry a lot about my interactions with this instructor. This instructor makes me doubt myself. I am nervous around this instructor. I'm scared to show my thoughts around this instructor; I think he or she will think less of me. I'm afraid that if I shared my thoughts with this instructor that he or she would not think very highly of me. I worry that I won't measure up to this instructor's standards. I often worry that my instructor doesn't really like me.

Learner Motivation Scale
Please state whether you agree or disagree on whether these are important for your learning and motivation in ANY of your online courses. This set of statements relates to the feeling an instructor can create in their online course in general. It is important to me for the instructor.

Motivation (5 items)	Creates a feeling of trust and acceptance. Creates a feeling of community among the students. Creates a feeling of community with the instructor. Makes me feel good about myself. Gives me a sense of belonging in the course.