

Undergraduates' Perceived Cohesion with Their University During the Pandemic

Instruction

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Abstract

This study examines university students' Sense of Belonging and Satisfaction with their university during the pandemic using the *Adapted Perceived Cohesion* scale. Data collected from students attending a large midwestern university were used for confirmatory factor analysis and linear regression ($n = 1,613$). Results confirm the scale is consistent with the original instrument, and Satisfaction can be used to predict 65% of Sense of Belonging. On average, students reported low cohesion ($M = 6.7$, $SD = 1.9$), with students reporting a lower Satisfaction ($M = 3.3$, $SD = 1.0$) than Sense of Belonging ($M = 3.4$, $SD = 0.8$). Students who started their degree before the pandemic reported a lower Perceived Cohesion than students who started during the pandemic.

Introduction

As universities in the United States transitioned from face-to-face to online learning in response to the pandemic, student interactions with their campus communities changed drastically from traditional residential education. While universities continued to offer student supports and opportunities for social interactions, it is unknown how effective these supports were in building students' Sense of Belonging. Researchers have long found that students' Sense of Belonging on college campuses is a crucial component to students' persistence and success (Strayhorn, 2019; Tinto, 2017). The purpose of the study is to examine undergraduate students' Sense of Belonging, Satisfaction with their university, and the extent to which Satisfaction is predictive of students' Sense of Belonging. We ask the following questions: 1) to what extent do

the Adapted Perceived Cohesion items function in accordance to theory; 2) to what extent is students' Satisfaction with the university during the pandemic predictive of students' Sense of Belonging and 3) what differences in levels of Satisfaction and Sense of Belonging exist in student cohorts during the pandemic?

Literature Review

Universities in the United States paused or transitioned to emergency remote learning (ERL) in March of 2020 with virtually no notice. While some institutions stayed completely virtual in the fall semester, other institutions encouraged students to return to campus with a hybrid of in person and online courses. As universities adapted to continue education online, these adaptations changed students' residential locations, teaching methods and student services. Universities varied in whether students could live on campus and take a hybrid of online and in person courses or were to remain at home. With remote learning came an increase in the use of e-learning tools for teaching and communication with students (Rapanta et al., 2020). Student services and activities also transitioned to online platforms or paused until in-person activities could resume (Raaper & Brown, 2020). Remote learning reduced opportunities for students to build relationships with peers, faculty, and university personnel (Karalis & Raikou, 2020). Losing opportunities to build relationships can have a negative impact on a students' connection to their university and peers.

Sense of Belonging (SOB) is generally defined as the extent to which a student feels connect, supported, accepted, and respected by others (Strayhorn, 2019). For learners, SOB can more specifically refer to the feelings of connectedness to other students, classes, departments, and institutions (Hausmann et al., 2009; Strayhorn, 2008a). SOB is known to impact students' academic performance, persistence, and retention (Hausmann et al., 2009; Strayhorn, 2019;

Tinto, 2017). Strayhorn (2008b) connects students' feelings of Belonging, value and connection to their campus community to their Satisfaction with academic and social life. Satisfaction can be described as the "feelings of morale associated with membership in the group" (Bollen & Hoyle, 1990). While there is much research on Sense of Belonging for campus-based learning, less is known about how SOB is impacted by transitions to online learning contexts. Early studies from the pandemic indicate that students' felt greater social isolation and difficulty connecting with peers and faculty (Blankstein et al., 2020; Mahama et al., 2021). In this study, we explore differences in students' Satisfaction and Sense of Belonging with their university during the pandemic.

Methods

The *Adapted Perceived Cohesion* scale (adapted from Bollen & Hoyle (1990) *Perceived Cohesion* scale) was adapted to assess changes in university students' Sense of Belonging and Satisfaction in relation to the pandemic. The *Adapted Perceived Cohesion* (APC) scale consists of four items measuring SOB with the university and five items measuring student Satisfaction with their university (Table 1). The *APC* scale was distributed to approximately 6,500 students attending a large research university in the Midwest during Fall of 2020 (with oversampling to ensure higher representation of traditionally minoritized groups). Overall, 2,013 students responded to the survey. Participant demographics after data cleaning are presented in Table 2. Demographics were collected as institutional data when participants applied to the university and are limited in gender and ethnicity choices.

Data Preprocessing

Students who completed less than two-thirds of the *APC* scale were removed from the dataset. The remaining responses ($n = 1,613$) had negligible missing data, less than 0.1%.

Missing data was imputed using average of the students' score for that subscale. All analyses were completed using RStudio (v. 4.0.4).

Factor Analysis

We conducted a confirmatory factor analysis (CFA) using maximum likelihood estimation with RStudio's Lavaan package. In CFA, the model is specified by the researcher and assessed by the fit of the data to the defined model. An exploratory factor analysis had been performed previously, and this study will report on the results of the CFA. We determined goodness of fit using the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) which both compare the proposed, structured model to the unstructured model. CFI and TLI both range from zero to one with higher values indicating a better fitting model. The Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) can be used as stand alone, or absolute, measures of fit. RMSEA values of 0.06 or below are considered indicative of acceptable fit.

Regression and Descriptive Statistics

The scores were calculated by summing participants' responses to each of the items within the subscale. The Perceived Cohesion score was calculated as the sum of responses to both subscales (i.e., *SOB* and *Satisfaction*). To aid in interpretation, students' subscales scores were divided by the number of items, creating an average or normalized score. We conducted a simple linear regression with SOB being the dependent variable and Satisfaction as the explanatory variable. Simple regression was used to show the causal link between the outcome variable, in this case Sense of Belonging, from a predictor variable, Satisfaction. To determine goodness of fit for the linear model, we examined the R^2 , standard error (SE) and the F-value statistics. While the R^2 value estimates the strength between predictor variable and the outcome

variable, the F-value test determines whether the relationship is significant. Lastly, descriptive statistics were calculated according to student cohort, the year the student started their degree, for the overall *Adapted Perceived Cohesion* scale and each subscale, *SOB* and *Satisfaction*.

Results

Factor Analysis

We tested a confirmatory factor analysis (CFA) assuming a two-factor structure based on the theoretical model. To compare model fits, we tested a one factor and two factor model. The one factor model accounts for no covariance between items or factors and can be compared against the unstructured model. The two-factor model is based on the theoretical model that Sense of Belonging items were loaded to one factor and Satisfaction items were loaded to another. The two factor model accounts for covariance between items of a similar factor and covariance between the two factors. The CFI, TLI and RMSEA all suggested good model fit (Table 3). As shown in the comparison between the unstructured, one factor and two factor model, the two-factor model has the best model fit and is reflective of the theoretical framework (Bollen & Hoyle, 1990).

Linear Regression

A simple linear regression was calculated to explore the extent that Satisfaction predicts Sense of Belonging. The model found an R^2 value of 0.65 showing Satisfaction ($\beta = 0.63$, $SE = 0.012$) to be a moderately sized predictor of SOB ($\beta = 3.4$, $SE = 0.20$). Sense of Belonging explained a significant proportion of the variance in Satisfaction scores, $F(1, 1611) = 3019$, $p < 0.001$.

Comparison Across Student Cohorts

On average, students had moderate levels of Perceived Cohesion ($M = 6.7$, $SD = 1.9$). The potential scores are a minimum of one and a maximum ten, with the *Sense of Belonging* and *Satisfaction* subscale each having a maximum average score of five. Perceived Cohesion, SOB and Satisfaction scores were normally distributed (Table 4). Students scored higher for Sense of Belonging ($M = 3.4$, $SD = 0.8$) than Satisfaction ($M = 3.3$, $SD = 1.0$) (Table 4). To further examine the relatively large standard deviations, we were able to compare between student cohorts means and standard deviations, which can be seen in Table 5. Surprisingly, first year students, students starting in 2020, had the highest Belonging ($M = 3.6$, $SD = 0.9$) and Satisfaction ($M = 3.4$, $SD = 1.0$). Second, third and fourth year students all had similar levels of SOB and Satisfaction.

Discussion

The results of the CFA demonstrated that the *Adapted Perceived Cohesion* scale has a factor structure that is consistent with the original instrument (Bollen & Hoyle, 1990). These results supported our use of the scale for research on students' SOB and Satisfaction during a semester in the pandemic. We found that students Satisfaction with the university explained approximately 65% of the variance in their SOB.

Surprisingly, first year students averaged higher levels of overall Cohesion, SOB and Satisfaction with their university than cohorts that started before the pandemic. One potential reason for this finding is the university's efforts to connect students to their campus. First year students are more likely to live in university residence and attend onboarding programs, offering a closer connection to university resources and peers. In contrast, cohorts who started before the pandemic reported lower cohesion than first year students. Potentially, students had already

experienced a year of disruptions from the pandemic to their studies, whereas the first year students had only one semester of experience.

While first year students' Satisfaction and Sense of Belonging scores were higher than students who started before the pandemic, student Cohesion scores were an average of 6.7 out of 10, indicating that students general do not feel strongly connected with peers or fully satisfied with their university. For comparison, college students in the Bollen & Hoyle (1990) study had a SOB score of 8.0 out of 10 indicating that students felt 80% Belonging with their campus while in our study, first year students reported 72% SOB with their university ($M = 3.6$ out of 5) and second year students reported 66% SOB ($M = 3.3$ out of 5). Students in Bollen & Hoyle (1990) reported even higher levels of Satisfaction, 82% ($M = 8.2$ out of 10), with their campus whereas first year students in our study reported 68% Satisfaction ($M = 3.4$ out of 5) and second year students reported 62% Satisfaction with their university ($M = 3.1$ out of 5). Future research should examine the variance within each cohort and differences within student groups.

Conclusion

During the COVID-19 pandemic, universities were required to adapt to emergency remote learning, and it is unknown how ERL will continue to influence undergraduate students' education. In this study, we confirmed the factor structure of the *Adapted Perceive Cohesion* scale to be aligned with the original instrument and saw variance in levels of SOB and Satisfaction between cohorts. With these results in mind, universities can explore designing more programs and interventions to foster SOB for students that have been impacted by the pandemic. Universities can adapt the long-standing initiatives for first year students that were in place prior to the pandemic into supports for older cohorts who experienced the transition to emergency

remote learning. Future research should consider the social supports students developed on campuses during the pandemic and how to increase students' Social Capital.

References

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Table 1*Adapted Perceived Cohesion items.*

Sense of Belonging	I feel supported at (Name of University).
	I feel connected to the (Name of University) community.
	I feel I am a member of the campus community.
	I feel a Sense of Belonging with the campus community.
Satisfaction	I think (Name of University) has done a good job of continuing quality instruction during the time of the COVID-19 pandemic.
	I'm satisfied with my education experiences this semester.
	I'm satisfied with the amount of social opportunities I've had this semester.
	I'm happy with my (Name of University) experiences this semester.
	I am glad I chose to attend (Name of University) this semester.

Note. Responses were recorded on a 5-point, Likert scale with the following anchors: *Strongly agree, Somewhat agree, Neither agree nor disagree, Somewhat disagree, Strongly Disagree.*

Table 2*Demographic information (n = 1,613).*

	Male	Female
Gender	866	746
Ethnicity		
White	518	489
Asian	87	56
2 or More Races	44	23
Black or African American	28	63
Hispanic/Latino	35	39
International	132	69
Native Hawaiian or Pacific Islander	3	0
Unknown	19	7
Cohort Start Year		
2016 or earlier	27	21
2017	80	72
2018	110	116
2019	164	201
2020	485	336
First Generation Status	100	143

Note. Gender and ethnicity were collected from by the university at time of admission and does not acknowledge nonbinary genders and is limited in ethnicity choices.

Table 3*Comparison of CFA fit indices.*

Model	X^2	df	X^2/df	CFI	TLI	RMSEA
Null Unstructured reference	5024	36	140	-	-	-
One Factor All nine items loaded onto one factor	930	27	35	0.82	0.76	0.20
Two Factors Items loaded onto two factors based on the theoretical factors	50	12	4.0	0.99	0.80	0.062

Table 4*Mean and standard deviation for the survey and the two factors.*

	Mean	SD	Skew	Kurtosis
Perceived Cohesion	6.7	1.9	-0.3	-0.5
Sense of Belonging	3.4	0.8	-0.4	-0.5
Satisfaction	3.3	1.0	-0.2	-0.6

Note. Means and standard deviations were normalized to the same scale. Perceived Cohesion has nine items. Sense of Belonging has four items, and Satisfaction has five items.

Table 5*Mean and standard deviation for Sense of Belonging and Satisfaction grouped by cohort start date (i.e., fall of 2020).*

	Belonging		Satisfaction	
Cohort Start Year	Mean	SD	Mean	SD
2017	3.3	1.1	3.1	1.1
2018	3.3	1.0	3.1	0.9
2019	3.3	1.0	3.1	1.0
2020	3.6	0.9	3.4	1.0

Note. Means and standard deviations were normalized to the same scale. Sense of Belonging has four items, and Satisfaction has five items.