The Impact of Learning Environment Perception on Student Well-Being and Performance Revealed by Survey Data

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Abstract: The present study investigated the connection between learning and well-being in undergraduate science courses at a large, public research-intensive university in North America. Understanding the implication of assessing learning environments through the lens of well-being is especially important for building resilience amid today's turbulent world events. An existing assessment tool was validated in ten courses (*N*=843). Results showed that life satisfaction scores decrease as students perceive their learning environment more negatively. Students who perceive their learning environment as negative also have the lowest final course grades (P<0.001). Our aim is to use this data in focused conversations with professors to show how they can use instructional strategies to promote both student learning and well-being.

Introduction

"*Well-being and higher education are connected, and those connections matter.*" (Harward, 2016, p. 3)

Until recent years, there has been scant investigation into the role of professors as the front line of support regarding student well-being (Smith, 2020). The purpose of the present study is to understand the connections between student well-being and learning, with the intention of building on two prior studies, amassing evidence relevant to our university context, and laying the groundwork for professor engagement with student well-being.

The first study informing our work was conducted at Simon Fraser University, and it explores the relationship of well-being and learning using a tool called the *Healthy Environments and Learning Practices Survey (HELPS)* (Zandvliet et al., 2019). This work links well-being to the concept of flourishing and includes five components: positive emotion, engagement in life and work, positive relationships, meaning in life and work, and accomplishments. The HELPS tool was validated through a study of 988 students from diverse disciplines. It showed that positively-perceived learning environments contributed significantly to student well-being, where student involvement and teacher support were most impactful (Zandvliet et al., 2019). One limitation of the tool is that there is no link to student performance, a factor which amplifies students' anxiety and stress.

A second study motivating the present work focused on student mental health promotion, and it identified many new student-supporting and assessment-related activities geared towards helping students succeed (Smith, 2020). Promoting inclusivity requires a multi-systemic intervention involving the validation and adaptation of instructor resources, connecting community members, and preparing instructors for their role in student mental health promotion (Smith, 2020). Though there is sometimes a general tendency to conflate the two constructs of mental health and well-being without appreciating their strength-based origins and how they complement each other, Keyes and Lopez (2009) bring them together in a four-quadrant model to illuminate distinct states: flourishing (high well-being and high mental health), languishing (low well-being and high mental health), struggling (high well-being and low mental health), and floundering (low well-being and low mental health). Combining these concepts, it is clear that professors have the opportunity to positively impact students in the realms of mental-health and well-being if they themselves are aware of student needs and have strategies and resources capable of providing the necessary support.

This paper reports findings towards this larger goal of providing a scientific framework for the interpretation of HELPS data and the provision of resilience-building resources in relation to the following research questions:

1. What are student perceptions of their learning environment and sense of overall well-being in undergraduate science courses at a large public research-intensive university?
2. How does the addition of items related to academic achievement affect our findings?
3. How can results from the HELPS survey be used to support professors and the larger campus community in understanding the connection between well-being and learning?

Methods

Participants

This study took place within ten undergraduate courses in the Faculty of Science at a public research-intensive university in North America. Nine professors volunteered their involvement in this study, and all participating students (N=843) were self-selected since survey participation was optional. Respondents could further consent to providing the authors with their final course grades for analysis after the end of term.

Data collection

The HELPS instrument was administered using Microsoft Forms over a four-week period during March-April 2023. Students were given 10 minutes to respond to the short survey, with questions replicated from the original HELPS tool (Zandvliet et al., 2019), and the addition of seven questions about students' beliefs about learning science. Additionally, data was collected regarding student demographics.

The HELPS tool divides questions into sections probing several scales relevant to learning environments (*Cohesiveness*, *Autonomy*, *Support*, and *Involvement*), learning attitude (*Classroom Satisfaction*), and student well-being (*Classroom Well-being* and *Flourishing*), (Zandvliet et al., 2019). Responses were collected using a five-point Likert-type scale ranging from strongly disagree to strongly agree, except for the questions on *Flourishing*, which used a 7-point Likert scale, as done previously. Questions regarding *Life Satisfaction* and *Work/Life Balance* used a 10-point scale. After the term ended and final grades were determined, final course grades were extracted and aligned to the survey responses of all students who consented. All analysis was performed using anonymized data.

Data analysis

First, all Likert scale responses were converted to numerical scores, ranging from 1 to 5, where "strongly disagree" = 1 and "strongly agree" = 5. Then, student responses to questions probing the specific scales (e.g., *Cohesiveness* or *Classroom Satisfaction*) were averaged, providing each student with a mean score for each scale. Each student's response scores for *Cohesiveness*, *Autonomy*, *Support*, and *Involvement* were averaged to establish that student's Learning Environment (LE) perception score. Final course grades were collected from students who provided consent. After data anonymization, students were grouped based on their LE perception scores, and final grades within each group were averaged. Students whose LE perception score was below 3.25 (out of 5) were described as having a negative LE perception; those with a score of 3.5 to 4.0, were described as neutral, and those with scores above 4.25 were described as positive, as per the original study (Zandvliet et al., 2019).

Statistical analysis including one-way Analysis of Variance (ANOVA) and the Games-Howell post hoc tests were performed using IBM SPSS Statistics software. Figures were created using OriginPro 2023b data analysis software by OriginLab.

Results

Student life satisfaction

To validate the HELPS tool in our context, we established the distribution of the *Life Satisfaction* (LS) variable in each Learning Environment (LE) Perception Group. The LE perception of students was determined based on their responses probing the Learning Environment scales: *Cohesiveness*, *Autonomy*, *Support*, and *Involvement*. Of these three groups, the most students (N = 314) perceived their LE as neutral, followed by students who perceived their LE negatively (N = 238), and the least number of students perceived their LE positively (N = 88). Because the data analysis involved separating the groupings by a small margin, some students (N = 203) did not fall within any of the three distinct LE perception groups. This loss is a feature of the original study we seek to address through future regression analysis.

The descriptive statistics reported in Table 1 show that students who perceive their LE as negative reported a lower mean LS score (6.02) than the students who saw their LE as either neutral or positive, which showed identical mean LS scores, both at 6.67, though the variance of the positive LE group was higher.

Table 1
*Life Satisfaction (LS) Scores of Learning Environment Perception Groups*

Learning environment perception	Sample (N)	Mean LS score	Standard deviation	Standard error	95% Confidence interval for mean		Min.	Max.
					Lower bound	Upper bound		
Negative	238	6.02[a]	1.945	0.126	5.77	6.27	0	10

Neutral	314	6.67[b]	1.778	0.100	6.47	6.87	1	10
Positive	88	6.67[b]	2.196	0.234	6.21	7.14	0	10
All	640	6.43	1.925	0.076	6.28	6.58	0	10

Subscripts a and b designate groups which are significantly different at the $p < 0.05$ level.

After one-way ANOVA analysis rejected the homogeneity assumption between these three groups, we used the Games-Howell post hoc test to determine significant differences between groups on the LS measure. The negative group was significantly different from the neutral group at the $p < 0.001$ level, and from the positive group at the $p < 0.05$ level (see Figure 1a). The negative and positive LE perception groups' LS scores were not significantly different from one another.

Figure 1
Life Satisfaction (LS) Score (a) and Final Grade (b) Distributions among the LE Perception Groups

(a)
(b)
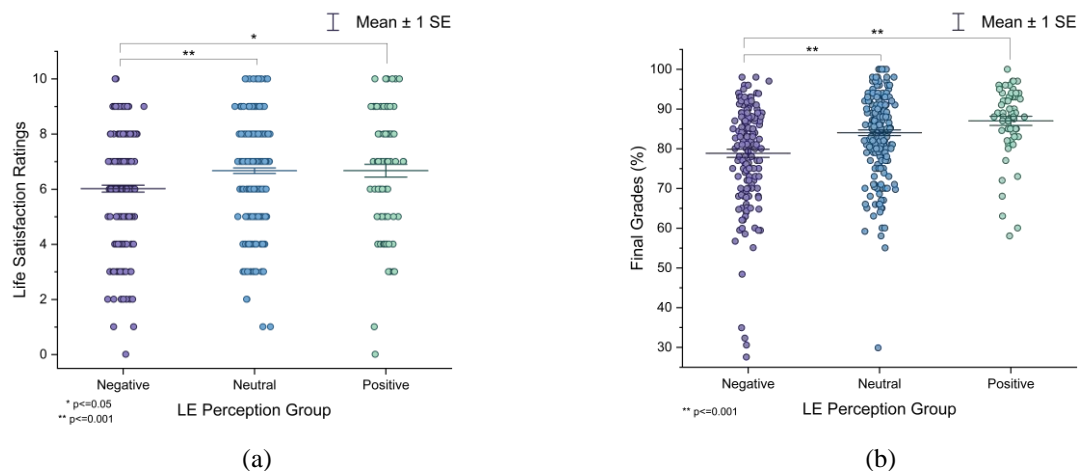
Student academic performance

Next, we wanted to expand on the basis laid by the original HELPS study (Zandvliet et al., 2019) by probing whether or not LE perception had an impact on student academic performance. Table 2 shows the results for the 400 students who consented to providing the authors their final course grades and whose LE perception scores fell within the category range for each grouping.

As shown in Table 2, the mean final grade for students who perceived their LE as negative was lowest at 78.78%. Students who perceive their LE as neutral had a mean final grade of 83.84%, and students who perceive their LE as positive had the highest-achieving final course grade mean, at 87.03%. The distribution of the final grades for each LE perception group is visualized in Figure 1b.

Table 2
Final course grades of Learning Environment Perception Groups

Learning environment perception	Sample (N)	Mean final grade	Standard deviation	Standard error	95% Confidence interval for mean		Min.	Max.
					Lower bound	Upper bound		
Negative	146	78.78[a]	13.096	1.084	76.64	80.92	27	98
Neutral	194	83.84[b]	10.307	0.740	82.38	85.30	30	100
Positive	60	87.03[b]	8.865	1.144	84.74	89.32	58	100
All	400	82.47	11.591	0.580	81.61	83.61	27	100

Subscripts a and b designate groups which are significantly different at the $p < 0.001$ level.

After one-way ANOVA analysis, the Games-Howell post hoc test was once again employed to determine significance comparisons between groups. The post hoc test revealed that final grades of students who perceive their LE as negative are significantly different from both the neutral and positive groups at the $p < 0.001$ level.

Though the positive group had a mean final grade 3.19% higher than the neutral group (see Table 2), these groups were not significantly different at the $p < 0.05$ level.

After data analysis, research team members met with each professor to show the distribution of anonymized survey responses. The structure of these conversations conformed to the Focused Conversation Method (FCM), which builds on the premise that people engage in better decision making when they see objective data and explore their emotional reactions to the topic (Nelson & Nelson, 2017). Seeing unfortunately negative or shockingly positive responses allowed professors to reflect with the research team on practical ways their learning environments are succeeding or could be improved. These discussions aim to use data from the professors' actual students to form the basis for strategic classroom development conducive to student well-being.

Discussion and future work

The results of this first semester of data collection suggest that students who perceive their Learning Environment as negative have lower *Life Satisfaction*, and they also finish the semester with lower grades than students who perceive their LE as either neutral or positive. Our results somewhat differ from the original study, which showed a steady increase in LS score from the negative to neutral to positive groups (Zandvliet et al., 2019). Many factors could impact this difference in results, including that the original study was performed prior to the COVID-19 pandemic, as well as other differences such as university contexts, class sizes, or the fact that our study was exclusive to undergraduates in the Faculty of Science. It is encouraging to consider that if professors could make small differences in practice to try to push student LE perception from negative to neutral, students could be impacted not only in terms of their final grade but also in terms of well-being.

These results summarize only one semester's data of an ongoing multi-year study. In terms of data analysis, future goals include performing regression analysis to better understand the interactions of factors such as *Support* or *Cohesiveness* to the outcomes of Life Satisfaction or Final Grades. This sort of regression analysis would pin down which factors correlate the most strongly with student well-being and achievement outcomes, providing evidence of the impact of teaching practice reform. We would also like to explore the impact of some demographic factors the survey collects as well.

As student responses are collected, certain professors sometimes stand out by obtaining exceptional responses in a certain probed scale, excelling in *Support* or *Involvement*, for example. We aim to pull a case study resource from discussions with these professors, effectively determining best practices for professors' consideration when designing a classroom learning environment. Our aim is to conduct an ongoing evidence-based conversation involving professors within the Faculty of Science, exploring the implication of assessing learning environments through the lens of student well-being to support not only the redesign of the undergraduate student experience but also the redefinition of student success.

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