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University Students' Emotional States and Academic Engagement: Implications for Sustainable Learning Practices in Higher Education

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Abstract

Understanding the interconnected facets of human experience, including emotional states, is essential for advancing sustainable education. However, human emotional functioning remains strongly influenced by anthropocentric, egocentric, and increasingly technocentric perspectives, which can limit students' capacity for meaningful engagement in the study process. This study explores university students' emotional states and their role in shaping sustainable academic engagement. A total of 407 undergraduate students from two Latvian universities studying in STEM participated in the research. The findings indicate that, on average, students experienced a moderate level of emotional strain. An analysis of gender differences in emotionally influenced academic behaviors revealed that emotional states had a stronger impact on academic engagement among female students than among male students. These results suggest that emotional distress consistently affects both the academic and social dimensions of student engagement. Furthermore, age

showed no meaningful correlation with any emotional or academic variable, indicating that the emotional impact on learning is independent of students' age. These findings highlight the importance of acknowledging and addressing students' emotional states as a critical factor shaping sustainable engagement in higher education.

Keywords: Academic engagement, emotional state, sustainable learning, university students.

Introduction

The fast pace of modern life, continuous exposure to information, and limited time resources have significantly intensified the emotional strain experienced by today's university students. University students occupy a vital position in the advancement of society. As future professionals and decision-makers, they possess the capacity to improve the quality of life of society. Education contributes to social progress by promoting human development, civic engagement, economic productivity, and social equity (Spiel et al., 2018).

A clearer understanding of the interconnected facets of human experience is essential for fostering sustainable learning practices. These facets include: (1) the balance between analytical thinking and intuition; (2) the relationship between mind and body; (3) interactions with material and digital environments; (4) the individual's connection to society; (5) the relationship with the Earth; and (6) the relationship with oneself. Although public support for the goals of Education for Sustainable Development (ESD) has grown, human emotional functioning and relationships are still strongly shaped by anthropocentric, egocentric and increasingly technocentric perspectives. These dominant orientations limit deeper emotional awareness, meaningful engagement and the development of learning practices that support sustainability (Suleimenova & Ivanova, 2018). Reorienting education towards greater sustainability helps prepare students for future challenges and strengthens their sustainable employability (Briede et al., 2025).

In the scientific literature, processes related to education are described as complex, dynamic, non-linear, and multidimensional. Therefore, education should not be viewed narrowly within the confines of the educational institution context, as it is closely interlinked with broader societal processes. The theoretical foundation of the research is based on the mutual influences of individuals and the environment that is constantly changing. Changes occur as a result of the mutual influences and the time factor (Sakk, 2013). From this perspective, education is a developmental process involving the individual, social groups, and society as a whole, grounded in mutual cooperation and constructive interaction, highlighting the interconnected nature of these elements and viewing the human mind as a complex adaptive system (Briede, 2016).

Many of today's university students feel pressure to combine work and studies, due to their financial situations, and they may also deal with unstable living conditions (Kharroubi et al., 2024). Another aspect causing emotional strain is related to the development of technologies, especially artificial intelligence tools that are quickly changing the labor market; many professions that were highly demanded a decade ago

no longer exist. As a result of these circumstances, many students do not complete their studies. High dropout rates are a significant problem in Latvia; fewer than half (48%) of the students who start Bachelor studies complete the degree, which is the lowest rate among the Organization for Economic Co-operation and Development (OECD) countries, for which such data are available. However, the statistics of other European Union (EU) countries are also unsatisfactory (OECD, 2022). Research into the reasons for student dropout has examined both general dimensions and specific reasons, for example, mental health problems and students' personal factors, such as their attitudes towards studies, previous experience, self-confidence, emotions, and stress that can be related to one's emotional state (Birzina et al., 2019; Masterson, 2022).

In this context, examining students' emotional states and academic engagement becomes essential for fostering sustainable learning practices in higher education. While students' emotions have been prioritized and widely recognized as important in preschool and basic education in Latvia (Ferreira et al., 2020; Martinsone, 2016; Martinsone & Vilciņa, 2017), the emotional experiences of higher education students have received far less attention.

Literature Review

The 2024 Draghi Report on the future of EU competitiveness highlighted that rapid technological progress was increasing the demand for science, technology, engineering, and mathematics (STEM) competencies, which are crucial for both the effective application and advancement of new technologies. A major factor contributing to labor shortages in STEM fields across the EU is the insufficient number of higher education graduates, driven by stagnant enrolment rates in these disciplines. On average, 54% of companies across the EU identify skill shortages as a pressing concern requiring immediate action.

In this region, Finland has the highest proportion of students enrolling in STEM fields (33.9%), while Latvia has the lowest (24.0%). In 2022, only 19.7% of graduates in Latvia were from STEM fields – one of the lowest shares in the EU, where the average stands at 26.6%. As science and technology advance, mathematics remains an indispensable component of these disciplines. This shows the need to improve the field of STEM education; one starting point is analyzing the role of emotions.

Emotions within the learning environment significantly influence students' cognitive abilities, including their capacity to focus, learn, recall, and apply information. Additionally, emotions affect students' motivation to study, shaping their interest in and attitudes toward their chosen professional fields and the educational process as a whole (King & Chen, 2019; Linnenbrink-Garcia & Pekrun, 2011; Meyer & Turner, 2006; Pekrun & Linnenbrink-Garcia, 2014; Tyng et al., 2017). This aligns with the Control – Value Theory (CVT) of achievement emotions, which is widely regarded as a foundational framework for understanding emotions in educational settings (Pekrun, 2006). According to this theory, emotions experienced in learning contexts fall into two main categories: a) activity-related emotions, which arise during the learning process itself, and b) outcome-related emotions, which are connected to the

anticipated results of learning. For instance, a student may feel joy after passing an exam, as it enhances their future career opportunities. CVT views emotions as complex configurations of interrelated psychological processes, encompassing affective, cognitive, motivational, and physiological dimensions (Pekrun et al., 2011). Emotions are influenced by two key aspects: subjective control, the extent to which learners believe they can influence their performance, and subjective value, the importance they assign to the task (Pekrun, 2006). For example, if a student perceives a strong link between their efforts and academic success and believes that the competencies acquired through their studies will support future development, they are more likely to experience positive emotions. At the same time, CVT acknowledges that emotions are shaped by cultural evolution and depend on individuals' adaptive interpretations of situations and their own ability to manage them, for example, understanding and responding to the growing role of artificial intelligence. As universities represent relatively recent developments in human civilization, it follows that students' emotional experiences are closely tied to their academic engagement (Linnenbrink-Garcia & Pekrun, 2011).

The term "academic engagement" was initially implemented in labor contexts, and later, the academic context was included. Academic engagement is conceptualized as a multi-factorial construct related to students' efforts toward positive academic objectives (Casuso et al., 2013). Theoretically, academic engagement is made up of three components (see Table 1).

Table 1
Academic Engagement Components (Schaufeli et al., 2000)

Component	Explanation
Dedication	A student's degree of involvement in and commitment to their academic activities, reflected in their active participation and the personal significance they assign to their studies, which contribute to improved academic outcomes.
Vigor	Physical and mental energy, resilience, and persistence that students demonstrate while engaging in academic tasks, even in the face of challenges or adverse situations.
Absorption	Deep concentration, immersion, and sense of enjoyment that students experience while engaging in academic activities.

Students with higher levels of academic engagement demonstrated a stronger emotional and motivational connection to their studies, reported greater self-efficacy, achieved better academic outcomes, and devoted more time and effort to fulfilling their academic responsibilities. However, students with low levels of academic engagement frequently missed classes, exhibited low motivation, showed average academic performance, and at times experienced feelings of inefficacy (Loscalzo & Giannini, 2019). The interest in studying academic engagement is increasing, partly due to the fact that high levels of participation and motivation of young people in academic activities promote the skills and values necessary for academic success (Wang & Fredricks, 2014). The quality of higher education is characterized by several indicators, including the place of

universities in prestigious global university rankings, changes in the number of foreign students, changes in student dropout rates, employer satisfaction with university graduates, student feedback on the study process, etc. The authors hypothesize that the previously mentioned factors could be improved by paying more attention to students' well-being and not just focusing on academic achievement.

In our rapidly changing world, the role of social and emotional skills in the educational landscape is increasingly significant. These skills, which enable individuals to manage emotions, forge positive relationships, and make responsible decisions, are critical for unlocking the potential and talents of learners but also for successfully coping with contemporary challenges (the United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024).

The present study aims to investigate university students' emotional states and their impact on academic engagement in mathematics. To achieve this aim, the study addresses the following research questions:

1. What is the emotional state of university students?
2. How do students' emotional states influence their academic engagement?
3. Do gender and age moderate the relationship between students' academic engagement and emotional distress?

Materials and Methods

Study Design and Sample

This study adopted a quantitative approach to examine the relationship between emotional state and academic engagement. The self-report survey is one of the most commonly used methods for measuring emotions and mental states, typically involving participants responding to a series of questions about their experiences (Hudson et al., 2020). The advantages of self-report surveys include the ease of interpretation, richness of information, participants' motivation to report, causal relevance, and overall practicality (Lucas & Baird, 2006).

A total of 407 undergraduate students from two Latvian universities – Riga Technical University and Daugavpils University – participated in the study. Riga Technical University is the only polytechnic university in Latvia; it educates and trains almost 15 thousand students. Daugavpils University is a regional university; first established as an educational institution for teachers, the university continues its pedagogical traditions simultaneously focusing on the life sciences, linguistics, social sciences, and management. In the 2024/2025 academic year, there were approximately 2000 students.

In the study sample, 233 male students (57.2%) and 174 female students (42.8%) were enrolled in undergraduate STEM programs. All the students were full-time, and their average age was 20.9 years.

Instrument

The survey used in the study included the following components:

- Socio-demographic questions, including gender, age, level of study, and type of study;

- A self-assessment question, in which students were asked to evaluate their current emotional state;
- Statements describing student behaviors that are typically associated with low academic engagement.

Procedure

As observed in mathematics teaching practice at universities, many students have difficulty concentrating and engaging in the study process or even attending lectures, due to a negative emotional state. We decided to talk about emotions within the lectures to help students understand the reasons for their emotional state, along with ways to deal with it. To determine the extent of the issue, an online survey was conducted using Google Forms. The lecturers sent e-mails to students with an invitation to fill in the survey. All students were informed in advance about the aim of the study, the voluntary nature of their involvement, and the assurance of data anonymity. Informed consent was obtained at the start of the online form as a prerequisite for participation, and all participants were adults.

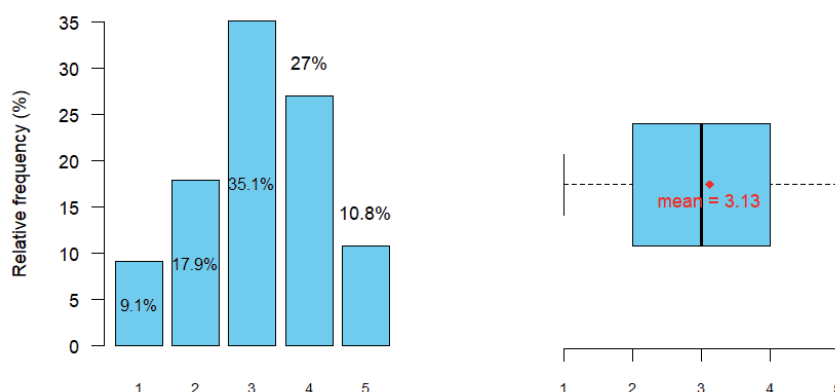
Analysis

The overall reliability of the emotional impact scale was high (Cronbach's $\alpha = 0.85$), indicating strong internal consistency. For the primary analysis, descriptive statistics (means, standard deviations, quartiles, and frequencies) were calculated for the aggregated dataset of statements. Student responses were rated on a five-point Likert scale: (1) Very rarely/never, (2) Seldom, (3) Sometimes, (4) Often, and (5) Very often/almost always. Items were coded numerically from 1 to 5, and the mean values for each statement were interpreted as follows: Never (1.00–1.79), Seldom (1.80–2.59), Sometimes (2.60–3.39), Often (3.40–4.19), and Very often/Almost always (4.20–5.00) (Pimentel, 2010). The relationships between numerical variables were examined using Spearman's rho coefficient. In this study, the strength of the relationships between variables was interpreted according to Evans' (1996) guideline for the absolute value of the correlation coefficient (r): correlations between 0.00–0.19 were considered very weak, 0.20–0.39 – weak, 0.40–0.59 – moderate, 0.60–0.79 – strong, and 0.80–1.00 – very strong. While differences in the emotional state across student groups (by gender) were assessed using the Wilcoxon rank-sum test. The minimum significance level was set at $p < 0.05$. Data analysis was performed using MS Excel and the R statistical software.

Results

Students' current emotional state was assessed using a single self-evaluation item rated on a five-point Likert scale (1 – very rarely/never to 5 – very often). The mean score for emotional distress was $M = 3.13$ ($SD = 1.11$), with a median of 3 (Figure 1), indicating that, on average, students experienced a moderate level of emotional strain. The proportion of students reporting low and high emotional distress was 27.0% and 37.8%, respectively, suggesting a relatively balanced distribution with a slight skew toward higher distress levels.

Figure 1
Means Scores for Emotional Distress



The frequency analysis showed that negative emotional experiences affecting students' interest in studies were generally very rare. Three-quarters of the respondents reported that their emotional state very rarely or never affected their relationships with teachers (76.2%) or peers (59.7%), as well as their ability to control their emotions during classes (76.7%), indicating that emotional difficulties rarely disrupted interpersonal communication. More than half of the students reported that they very rarely or never associated exam failure (67.1%), avoided classes (64.6%), or considered dropping out (58%) due to emotional distress. However, in responses concerning the influence of emotional state on social activity and academic performance, other assessment options prevailed in total (see Table 1).

Table 1
Mean Scores for Statements Describing Student Behaviors Typically Associated with Low Academic Engagement

Statements	Very rarely/ never	Seldom	Sometimes	Often	Very often/ always	M
Class attendance	64.6%	17.7%	10.8%	5.4%	1.5%	1.61
Dropout intention	58%	18.4%	15%	4.4%	4.2%	1.78
Academic performance	27%	26.8%	25.3%	14.5%	6.4%	2.46
Coursework completion	48.4%	26.3%	12.5%	9.3%	3.4%	1.93
Peer relationships	59.7%	23.3%	11.6%	3%	2.5%	1.65
Teacher relationships	76.2%	16%	4.7%	1.7%	1.5%	1.36
Exam failure	67.1%	13.8%	11.1%	6.6%	1.5%	1.62
Emotional control	76.7%	12.8%	6.4%	2.7%	1.5%	1.40
Social engagement	42.5%	20.9%	16.5%	12%	8.1%	2.22

The statement "My emotional state negatively affects my academic performance" was moderately correlated with "I do not complete the assigned work in my courses because I feel emotionally bad" ($r = 0.58$) and "How often have I felt emotionally bad in the last month?" ($r = 0.58$), "I have failed an exam/test because of my emotional state" ($r = 0.56$) and "I avoid getting involved in the social life of my studies due to my emotional state." ($r = 0.52$). The item "I am considering quitting my studies because of my emotional state" showed moderate correlations with "I do not complete the assigned work in my courses because I feel emotionally bad" ($r = 0.50$), "I feel emotionally distressed" ($r = 0.50$), and "I avoid getting involved in the social life of my studies due to my emotional state" ($r = 0.42$). Moreover, "My emotional state negatively affects my relationships with my teachers" and "My emotional state negatively affects my relationships with my classmates" were also moderately correlated ($r = 0.55$). These results indicate that emotional distress consistently influences both academic and social dimensions of student engagement. The analysis showed that age had no meaningful correlation with any emotional or academic variable, indicating that emotional impact on learning was independent of students' age.

The Wilcoxon rank-sum test was used to assess gender-based differences in the frequency of emotionally influenced academic behaviors. The results showed that statistically significant differences were observed in three statements: "My emotional state affects my overall emotional wellbeing" ($M_f = 3.39$ vs. 2.93 ; $p < 0.001$), "I cannot control my emotions during classes" ($M_f = 1.51$ vs. 1.31 ; $p = 0.007$), and "I avoid getting involved in the social life of my studies due to my emotional state" ($M_f = 2.54$ vs. 1.99 ; $p < 0.001$). However, no statistically significant gender differences were observed for the remaining statements, including class attendance, dropout intention, academic performance, coursework completion, peer and teacher relationships, or exam failure.

Discussion

Over the past 20 years, there has been increasing recognition that emotions play a central role in human achievement. No longer seen as mere by-products with little relevance, emotions are now understood to have a significant influence within academic settings. Emerging research highlights the critical importance of affect and emotions for students' academic learning, performance, personal development, and overall well-being (Efklides & Volet, 2005; Linnenbrink, 2006; Linnenbrink-Garcia & Pekrun, 2011). Cognitive and neuroscientific research has demonstrated that emotions are essential to human learning and development (Clore & Huntsinger, 2007, 2009). The study results show that, on average, students experienced a moderate level of emotional strain. The context of experiencing these emotions was not defined in the study, so we can conclude that students reported on their general emotional state, including all spheres of life. The findings of the study show that 11% ($n=44$) almost always feel emotional distress; 27% ($n=110$) reported that they often experienced emotional distress in the last month, but 35% ($n=143$) sometimes experienced emotional distress.

Emotions are typically directed toward specific objects, for example, the enjoyment of solving world problems (Pekrun et al., 2023; Schukajlow et al., 2023). Depending on the type of object they are directed toward, emotions can be categorized into several groups,

including achievement emotions, epistemic emotions, and social emotions. Achievement emotions refer to emotions experienced by students in relation to achievement-related activities or outcomes (Pekrun et al., 2023). These activities may include learning, attending classes, completing homework, or taking tests and exams. The second group of emotions – epistemic emotions – is triggered by cognitive incongruity and is closely related to processes of knowledge acquisition and exploration (Muis et al., 2015; Pekrun, 2024). The third group – social emotions – is a subset of academic emotions that specifically relate to the social dimensions of the learning environment. These include emotions associated with interpersonal interactions, relationships, and the broader social context in which learning takes place.

Conclusions

In addressing the first research question, our findings indicate that university students generally experience a moderate level of emotional distress, suggesting that emotional tension is a common element of contemporary academic life. Responding to the second research question, the results show that this emotional distress consistently shapes both the academic and social dimensions of students' engagement. Higher levels of distress affect students' dedication, vigor, and absorption, emphasizing that emotional functioning is a crucial component of sustained participation in learning. Such insights are particularly relevant in the context of sustainability, where education is expected to empower learners not only cognitively but also emotionally and socially to navigate complex and uncertain futures. With regard to the third research question, our analysis reveals that gender moderates the relationship between emotional distress and academic engagement, with female students more strongly affected than male students. In contrast, age does not influence this relationship, indicating that the emotional impact on engagement is consistent across age groups.

These findings highlight the need for higher education institutions to cultivate learning environments that support emotional resilience and meaningful engagement, which are capacities essential for developing sustainable learning practices. By addressing students' emotional experiences, universities contribute to the broader aims of ESD, fostering learners who are better equipped to act responsibly, cope with challenges, and engage constructively in shaping a sustainable future.

Limitations

The limitations of this research are primarily related to its exclusive reliance on a quantitative approach. It can be assumed that the use of qualitative methods, such as in-depth interviews, would provide a more detailed understanding of the underlying reasons for students' general emotional states and offer deeper insight into cases where emotional distress negatively affects academic engagement.

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