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What Drives First-Semester Student Engagement in Large Lecture-Based Sociology Courses in Germany?

Aida Montenegro [1,*] and Manuela Schmidt [2]

[1] Institute for Sociology, University of Bonn, 53113 Bonn, Germany
[2] Department of Social Sciences, RPTU Kaiserslautern-Landau, 67663 Kaiserlautern, Germany; manuela.schmidt@rptu.de
* Correspondence: aida.montenegro@uni-bonn.de

Abstract

Research on the complex dimensions of engagement in large, lecture-based courses remains scarce. Lecture-based courses are often characterized by passive learning environments, raising concerns about their capacity to foster motivation. This study investigates how motivational factors shape multiple dimensions of engagement—cognitive, behavioral, emotional, and agentic—in introductory sociology courses. A quantitative, cross-sectional survey was conducted with 434 first-year students enrolled at seven public universities in North Rhine–Westphalia, Germany. All participants had completed the Abitur at the Gymnasium and experienced hybrid learning during their final years of secondary education due to the COVID-19 pandemic. The study formulated three hypotheses: (1) mastery (self-improvement) goals positively predict emotional, behavioral, and cognitive engagement (validated); (2) perceived autonomy support increases emotional engagement (validated); and (3) performance goals (motivation to outperform peers) have a stronger effect on emotional than cognitive engagement (rejected). Results indicate that performance goals neither enhance emotional engagement nor exert a stronger influence on emotional than on cognitive engagement, challenging common assumptions about the role of competitive motivation in large lecture settings. Additionally, despite low levels of agentic engagement—attributed to the structural constraints of large lecture-based learning environments—students' internal engagement was in line with other studies. These findings highlight the critical role of educational culture, particularly the emphasis on autonomy within the German school system, and the influence of learning spaces in shaping student engagement. We suggest that engagement is shaped by familiarity with hybrid formats that support autonomy, as well as by an academic culture in which active silent engagement is often the norm. In such contexts, mastery goals and autonomy-supportive backgrounds help foster more reactive dimensions of student engagement.

Keywords: agentic engagement; achievement goals; autonomy; school culture; Abitur; post pandemic; higher education; COVID-19 pandemic; sociology; positioning

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1. Introduction

Student engagement is widely recognized as a crucial component of success in higher education, shaping academic achievement, retention, and personal development (Kahu & Nelson, 2018; Pepple, 2022). Research on the transition to university life has highlighted how motivational factors such as achievement goals and perceived autonomy support can sustain student engagement during this formative period. Yet, despite this, there remains a

research gap in understanding how these motivational factors operate specifically within large lecture-based courses, which continue to dominate many university programs.

Lecture halls are typically designed for instructor-centered teaching, with fixed seating and a podium that limit opportunities for dialogue and small-group collaboration (Scott-Webber et al., 2000). While lectures can still offer valuable spaces for intellectual growth and critical thinking (Friesen, 2011), they often struggle to foster deeper forms of student engagement, raising important questions about what sustains motivation when active participation is constrained. Addressing this question has become particularly timely after the COVID-19 pandemic, which introduced hybrid and online learning formats and reshaped students' expectations and habits.

This study focuses on German universities, where students coming from the Gymnasium and holding the Abitur certificate typically enter higher education at around 18–19 years old. The German university system, especially in disciplines such as sociology, offers a high degree of flexibility, allowing students to independently select lectures, seminars, and exams to shape their academic trajectories (Mohle, 1992). While this flexibility promotes autonomy, it also requires students to exercise self-direction and responsibility—skills initially fostered in the more structured environment of secondary education (Artelt & Sixt, 2023). Understanding how these prior learning experiences interact with students' current engagement is especially relevant now, as this generation also navigated hybrid learning during the pandemic.

Engagement itself is a multidimensional construct that includes emotional engagement (positive and negative feelings during learning), cognitive engagement (how strategically they approach studying), and behavioral engagement (observable effort and commitment to academic tasks) (Fredricks & McColskey, 2012). In 2011, agentic engagement was introduced as a fourth dimension to describe students' proactive efforts to influence their learning environment through self-initiated contributions during class (Reeve & Tseng, 2011; Montenegro, 2017). Yet, little is known about how students maintain active engagement (behavioral, emotional, and cognitive) when opportunities for agentic engagement (proactive behavior) are limited by the learning space.

Understanding the multidimensional nature of student engagement is essential for evaluating learning processes, especially in traditional lecture-based courses where opportunities for active participation and agency are limited (Montenegro, 2022). The theoretical framework underlying this study, described in more detail in the following section, draws on motivation and engagement theory, particularly the role of achievement goals and perceived autonomy support in shaping students' affective, behavioral, and cognitive responses to instruction.

Grounded in prior research, our study aims to test three hypotheses:

H1. *Students who endorse mastery goals, oriented toward self-improvement and understanding, will report higher levels of behavioral, cognitive, and emotional engagement compared to students primarily oriented toward performance or avoidance goals (Pekrun et al., 2009; Lüftenegger et al., 2016).*

H2. *Perceived autonomy support will positively predict students' emotional engagement, as it fulfills the basic psychological need for autonomy and promotes enjoyment and interest (Deci & Ryan, 2008; Montenegro & Schmidt, 2023).*

H3. *Students who predominantly pursue performance goals will exhibit higher emotional engagement relative to cognitive engagement, reflecting their focus on demonstrating competence rather than deeply processing course content (Elliot & Murayama, 2008).*

The first hypothesis—that self-improvement or mastery goals increase emotional, behavioral, and cognitive engagement—is central to the framework of our study. In the context of lecture-based courses—often criticized for limiting autonomy and interaction—students who adopt mastery goals may be better positioned to maintain engagement. By examining this relationship empirically, this study explores how mastery-oriented learners respond to environments with fewer opportunities of proactive engagement (agentic behavior).

Hypothesis two posits that emotional engagement increases with perceived autonomy support—an idea well established in self-determination theory (Deci & Ryan, 2008). The inclusion of the third hypothesis—that the motivation to outperform peers has a stronger effect on emotional than cognitive engagement—reflects our focus on how contextual factors influence individual achievement goals, particularly performance goals related to peer comparison. Our framework emphasizes the social context of student motivation and posits that the drive to outperform peers more strongly impacts emotional engagement than cognitive engagement.

By examining these hypotheses, this study aims to clarify how different motivational orientations and perceptions of autonomy contribute to varying forms of engagement. In doing so, it contributes to a more nuanced understanding of how traditional educational settings can still foster meaningful learning under certain conditions.

Specifically, this study examines how mastery and performance achievement goals, together with perceived autonomy support from lecturers, influence different dimensions of engagement among first-year sociology students in large lecture-based courses. It also explores whether students' prior school culture (e.g., having the Abitur and hybrid learning experiences) helps sustain internal engagement even when levels of agentic engagement remain low.

The significance of this research lies in its integrated theoretical approach, combining the achievement goal model with a multidimensional model of student engagement. It also adapts a validated survey instrument for online administration to capture students' current perspectives in the post-pandemic context, broadening participation and ensuring inclusivity. By doing so, this study contributes new insights into how to foster motivation and engagement in large lecture-based courses—an urgent challenge for educators aiming to support diverse student populations in evolving educational environments.

2. Theoretical Background

2.1. What Makes Students Engage in Learning Activities?

Student engagement is a multidimensional construct that integrates four key dimensions, reflecting the complex interaction of action, cognition, emotion, and social participation in learning (Reeve, 2013). Behavioral engagement refers to observable student actions, such as attending classes and participating actively, while cognitive engagement captures the depth of mental effort and strategic thinking students invest in their studies (Hiver et al., 2021). Emotional engagement involves students' affective reactions, including their interest and sense of belonging, which strongly influence motivation and persistence (Fredricks & McColskey, 2012).

The fourth dimension, agentic engagement—introduced in 2011—refers to students' proactive input in learning and predicts a positive classroom climate and increased motivation (Patall et al., 2022). It encompasses learners actively shaping their educational experience by initiating actions such as providing feedback, asking questions, and expressing preferences regarding content and teaching methods (Reeve, 2012; Bielak & Mystkowska-Wiertelak, 2024).

When teachers actively support and respond positively to students' initiative as it emerges in the classroom, this proactive behavior can influence and shape the subsequent learning opportunities (Pineda-Báez et al., 2019; Reeve et al., 2020). Such student self-initiated contributions aim to influence instructors to adapt lessons to better align with students' interests and goals (Reeve & Jang, 2022). In contrast to reactive engagement, agentic engagement highlights students' ownership and intentional influence over the learning process rather than merely responding to teacher-directed activities.

A useful way to understand student engagement for learning is to classify its four dimensions into two main groups: internal and external (Reeve, 2013). The internal dimensions include cognitive and emotional engagement, while the external ones comprise behavioral and agentic engagement. External engagement can often resemble observable participation—for example, arriving on time, completing assigned readings, or taking notes consistently. In contexts where opportunities for interaction or choice are limited—as is frequently the case in lecture-based courses—agentic engagement tends to decline.

Behavioral, emotional, and cognitive engagement primarily arise from externally initiated pedagogical activities and student reactions, forming the foundation upon which agentic engagement can build (Reeve, 2012; Goodman, 2016). Indeed, Oga-Baldwin (2019) suggests a hierarchical relationship where behavioral engagement predicts emotional and cognitive involvement, which together may set the stage for more proactive, agentic actions.

Agency—the capacity to make independent decisions and act intentionally—is gaining recognition as a critical driver of deeper engagement in education (Sorokin & Froumin, 2022; Patall, 2024). It develops through the interaction of personal motivation, social influences, and institutional conditions (Tomanović, 2019). Recent studies show that when students believe their agentic efforts can positively influence their learning and motivation, they are more likely to engage proactively, fostering a sense of ownership linked closely to autonomy-supportive teaching practices (Patall et al., 2022; Reeve & Cheon, 2021; Reeve et al., 2022).

2.2. The Role of Achievement Goals and Autonomy Support in Student Engagement

The achievement goal framework distinguishes between two broad categories of goals: mastery and performance, each further divided into approach and avoidance orientations (Elliot & McGregor, 2001; Pintrich, 2000). Mastery goals typically yield positive outcomes—effort, good strategies, well-being, and achievement—while performance goals often cause anxiety, avoidance, and poor results, especially for less confident students (Senko, 2019).

Mastery goals emphasize the development of competence and understanding. Encouraging mastery goals is closely associated with higher levels of student engagement (Miller et al., 2021). Specifically, students with mastery-approach goals actively seek to deepen their knowledge and master new skills, while those with mastery-avoidance goals strive to prevent the loss or misunderstanding of previously acquired knowledge.

In contrast, performance goals focus on demonstrating competence relative to others. Students with performance-approach goals aim to prove their abilities and outperform peers, whereas those with performance-avoidance goals work to avoid appearing less competent (Elliot & Murayama, 2008). There are mixed perspectives in the literature on whether performance-approach goals are beneficial. Some scholars argue that a performance-approach orientation can be adaptive, particularly when combined with mastery goals (Pintrich, 2000).

Other researchers suggest performance-approach goals may facilitate high achievement under challenging conditions (Senko & Dawson, 2017) and even positively predict well-being (Gillet et al., 2014). However, recent empirical findings highlight possible drawbacks (Miller et al., 2021). For instance, Lee and Anderman (2020), in their study of

undergraduate students' perfectionistic behaviors, found that those who held both mixed perfectionism and performance-approach orientations reported higher levels of academic exhaustion. Similarly, students with a high mastery-avoidance orientation expressed less satisfaction with their studying efforts to achieve better grades. Interestingly, students who sought to appear perfect without investing significant effort reported lower exhaustion (Lee & Anderman, 2020).

Distinctions in goal orientations are critical because they differentially influence how students engage with their academic work, as well as how achievement goals impact emotions, cognitions, and behavior (Bossert et al., 2025; Daumiller et al., 2019). Mastery-approach goals have been consistently linked to deeper cognitive engagement and more positive emotional experiences, such as enjoyment and interest (Pekrun et al., 2009; Lüftenegger et al., 2016). On the other hand, performance-approach goals tend to predict higher behavioral and emotional engagement driven by competitiveness, though their effect on cognitive engagement is less consistent. Avoidance-oriented goals, both mastery-avoidance and performance-avoidance, generally correspond to surface-level learning strategies and lower overall engagement (Pintrich, 2000).

Despite the broad research on achievement goals in educational psychology, their role in lecture-based university courses has received comparatively less attention. Nevertheless, existing studies shed light on how these goals function in such settings. For instance, Pekrun et al. (2009) investigated 218 students in an introductory psychology lecture course and found that mastery goals positively predicted emotional engagement by increasing enjoyment and reducing boredom, with no significant gender differences. Similarly, Lüftenegger et al. (2016) reported consistent findings in a research methods course, where mastery goals were more strongly linked to enjoyment than avoidance goals.

Expanding on this, Montenegro and Schmidt (2023) studied 340 first-semester sociology students and discovered that students simultaneously endorsed both mastery and performance goals. This suggests that students in lecture settings pursue a blend of learning-focused and competitive aims. Importantly, their study emphasized the role of perceived autonomy support—a contextual factor that enhances motivation by making students feel their choices and perspectives are valued—especially in large lectures where students might otherwise feel anonymous or overwhelmed.

Further reinforcing these insights, Kolić-Vehovec et al. (2008) examined dominant goal orientations among 352 undergraduates and found that students rarely adhere to a single goal orientation. Those who combined mastery and performance goals demonstrated more adaptive motivational profiles and employed more effective reading strategies than students focused solely on avoidance goals. In a similar vein, Wijnia et al. (2011) compared motivation in problem-based learning (PBL) and traditional lecture courses. While PBL students reported higher perceived competence, both groups exhibited similar levels of autonomous motivation. However, controlling factors such as mandatory attendance and unclear expectations negatively affected motivation, highlighting the importance of fostering autonomy and clarity in any instructional context.

Central to these findings is the concept of perceived autonomy support, defined as the extent to which students feel they have meaningful choices and that their voices are acknowledged in the learning environment (Deci & Ryan, 2008; Reeve, 2016). Research indicates that autonomy-supportive teaching practices—such as providing meaningful choices, relating content to students' interests and cultural backgrounds, and emphasizing the relevance of learning—enhance emotional engagement and intrinsic motivation (Patall et al., 2024; Reeve & Cheon, 2021).

3. Materials and Methods

3.1. Participants

This quantitative, cross-sectional study was conducted at seven public universities in North Rhine–Westphalia, Germany, during the winter semester of 2024, and focused on large introductory lecture courses in the social sciences. While participants were enrolled in various degree programs, the lectures themselves centered specifically on sociology and related disciplines. The universities were selected because of their similar curricular structures and common reliance on large lecture formats, providing a coherent setting to investigate student engagement at the start of university education.

Data collection took place in October and November 2024 using a standardized online survey. To ensure broad participation, lecturers distributed invitations that included detailed study information and a short explanatory video produced by the research team. The online format enabled students to participate even if they were unable to attend lectures in person on the day of data collection. This study also built on a previous validation study conducted by the same authors, which had originally used paper-based measures; these instruments were adapted into an online survey to reach a wider and more inclusive sample of first-year students.

The online survey link was distributed to students across ten different courses. A total of n = 2089 were enrolled in these courses, though their actual participation in the lectures could not be verified. A total of n = 503 students started the survey, with an estimated response rate of 24.1%. After excluding incomplete cases (n = 61) and speeders (n = 8), the final sample comprised n = 434 valid responses.

The study population comprised first-year students attending these introductory lectures. Among them, 67.3% identified as female, 31.3% as male, and 1.4% as diverse. A majority (61%) were aged 20 or younger, which is typical for recent graduates of the Gymnasium, Germany's academically oriented secondary school track culminating in the Abitur. This qualification, usually earned at ages 18–19, is designed to foster critical thinking and prepare students for autonomous study at university. Most participants (94%) were born in Germany, and 73.7% were in their first semester of study (Table 1).

Table 1. Sample characteristics, n = 434.

Variables	Percent
Gender	
female	67.3
male	31.3
diverse	1.4
Age	
Up to 18 y.o.	12.0
19–20 y.o.	49.0
21–23 y.o.	27.7
24 y.o. and older	11.3
Born in Germany	94.0
Semester	
First	73.7
Second	1.4
Third	14.1
Fourth and more	10.9
Field of study	
Social Sciences	74.0
Education	14.7
Humanities	7.1
Others	4.2

3.2. Measures

The survey comprised three main motivational constructs: student engagement, achievement goals, and perceived autonomy support. Behavioral, emotional, and agentic engagement items were adapted from Reeve (2013), while cognitive engagement items were derived from the Program for International Student Assessment (PISA) index of elaboration strategies, which includes rehearsal, elaboration, organization, and metacognitive strategy use (Organisation for Economic Cooperation and Development [OECD], 2013).

The three reactive engagement dimensions—behavioral, cognitive, and emotional—as well as perceived autonomy support were measured using a 4-point agreement scale: 1 = "strongly disagree", 2 = "disagree", 3 = "agree", and 4 = "strongly agree". Sample items included: "I try to connect new content to what I already know" (cognitive engagement); "I feel interested during the lectures" (emotional engagement); and "The lecturer allows me to express my own ideas" (perceived autonomy support).

In contrast, agentic engagement, which reflects proactive actions, was assessed using a 4-point frequency scale: 1 = "never", 2 = "less frequently", 3 = "in about every second lecture", and 4 = "in every or almost every lecture", exemplified by the item: "I ask questions during this lecture". This differentiation aligns with the theoretical distinction between reactive engagement, as attitudinal agreement with externally structured activities, and agentic engagement as the frequency of self-initiated actions.

The achievement goals were adapted from the Achievement Goal Framework developed by Elliot and Murayama (2008), which identifies four distinct types of goals: mastery-approach (acquiring knowledge), performance-approach (proving superior ability), mastery-avoidance (avoiding loss of knowledge), and performance-avoidance (avoiding failure). This scale measured these goals on a range from "strongly agree" (1) to "strongly disagree" (4). Sample items included: "My goal is to learn as much as possible" (mastery-approach), "to perform better than other students" (performance-approach), "to fully understand the course content" (mastery-avoidance), and "to avoid performing poorly compared to others" (performance-avoidance).

The four items measuring autonomy support were adapted from the 2010 PISA index (Organisation for Economic Cooperation and Development [OECD], 2010), focusing on specific instructional behaviors such as "demonstrating interest in students' learning", "providing additional assistance", "offering clarification until students grasp the material", and "creating opportunities for students to express their opinions". Both the autonomy support and achievement goals items were measured using a 4-point agreement scale. To further enrich insights into student engagement and motivation, the survey also included eight items exploring students' self-reported reasons for limited oral participation in lecture-based courses.

In designing the instrument, distinct response scales were employed to align with the theoretical nature of each construct. All items were adapted from previously validated instruments to ensure conceptual consistency and measurement validity. Following these adaptations, a piloting phase was conducted to assess and confirm the clarity and linguistic appropriateness of the German-language items.

The survey included eight items related to reasons for course participation and six socio-demographic questions (age, main field of study, academic semester, gender, and place of birth), resulting in a total of 52 items, which took approximately six minutes to complete.

3.3. Method

In order to reduce the complexity of the categorical variables derived from the survey instrument, Categorical Principal Component Analysis (CATPCA) was employed to assess

the construct validity of the engagement, achievement goals, and autonomy support measures. This technique is particularly well suited for variables measured with Likert-type items, as it accommodates their ordinal nature without assuming interval-level properties. CATPCA applies optimal scaling procedures to transform categorical data into quantifiable dimensions, thereby enabling the identification of latent structures within multidimensional datasets (Linting et al., 2007).

In the present study, CATPCA was used to extract principal components representing students' perceptions of engagement, achievement goals, and autonomy support. This process reduced the original item categories to a set of composite variables that retained the most significant variance in the data, simplifying the analytical model while enhancing interpretability and statistical coherence. Importantly, this approach also allowed us to examine whether items clustered consistently along the expected theoretical dimensions. The extracted components aligned closely with constructs validated in a previous study by the authors, providing a reliable basis for subsequent analyses.

The resulting components demonstrated satisfactory internal consistency, with Cronbach's alpha coefficients ranging from 0.78 to 0.88. Specifically, the internal consistency coefficients were behavioral engagement ($\alpha = 0.83$), cognitive engagement ($\alpha = 0.81$), emotional engagement ($\alpha = 0.85$), agentic engagement ($\alpha = 0.78$), and perceived autonomy support ($\alpha = 0.88$). These values are comparable to, and in some cases slightly exceed, those reported in the original validation studies (α range: 0.75–0.86), supporting the reliability of the adapted instrument in the current university context.

To investigate the predictive effects of students' mastery and performance goal orientations on the four engagement dimensions, multiple regression analyses were conducted. To account for contextual variance between lecture-based courses, fixed effects for the individual courses were included in the models. Course 9, which had the largest sample size, was used as the reference category to ensure a stable baseline for comparison. This analytical strategy enabled the study to isolate the specific contributions of achievement goals and perceived autonomy support to student engagement.

4. Results

4.1. Descriptive Statistics and Construct Validity

Students' emotional engagement appeared notably high, with 71.2% reporting that they found the lectures both interesting and enjoyable. Cognitive engagement, however, yielded more varied responses. While 59.8% of respondents agreed—and 18% strongly agreed—that they actively linked new knowledge to previous learning, only 42% felt they were able to apply what they learned to practical contexts. Responses were particularly divided regarding the generation of new solutions, with 44.2% in agreement and 41.9% in disagreement. Moreover, 56.9% of students recognized the relevance of course content for cross-disciplinary thinking, suggesting a moderate level of integrative cognitive processing. Notably, many students also emphasized that the lecture format demands considerable time and concentration to effectively engage with and assimilate the material presented.

Students' behavioral engagement was primarily reflected in consistent attendance and focused presence. A majority (68.7%) reported regularly arriving on time, and 83.4% remained until the end of lectures. Additionally, 63.1% indicated attentive listening throughout the sessions. However, these indicators coexist with distractions, as 70% of students acknowledged sending private messages during class, revealing a simultaneous presence of engagement and off-task behaviors.

Agentic engagement, in contrast, appeared considerably limited when measured through overt participation. A significant share (25.8%) reported never asking questions during lectures, only 2.5% actively responded to the professor's inquiries, and just 3.9%

consistently sought clarification on complex topics. Moreover, 91% stated that they never proposed new themes for discussion. At first glance, this could be interpreted as a passive learning style, shaped by the predominantly lecture-based format. However, following the findings of the preceding study (Montenegro & Schmidt, 2023), a more nuanced interpretation is necessary. Rather than reflecting disengagement, the low frequency of agentic behaviors in lectures may correspond to silent engagement—a form of active inner involvement closely tied to cognitive engagement.

In terms of students' goal orientations, mastery-approach goals were predominant: over 90% expressed a desire to acquire deep understanding. Mastery-avoidance goals were also present, with 72.1% aiming to avoid making mistakes and striving for perfection. Performance goals displayed more variation. While 30.2% did not feel pressured to outperform peers (performance-approach), a significant 84.9% sought to match or avoid falling below the average level of performance (performance-avoidance).

Finally, students' perceptions of autonomy support were notably high, with 73.8% agreeing that their professor showed genuine interest in their learning progress. This perceived support may serve as an important contextual factor influencing students' motivational orientations and overall engagement within the lecture-based learning environment.

Construct validity was evaluated through Categorical Principal Component Analysis (CATPCA) for each of the four engagement dimensions (emotional, behavioral, cognitive, and agentic). The resulting factors demonstrated satisfactory explanatory power, showing strong alignment with the theoretical constructs: the emotional engagement component accounted for 59.12% of the variance (eigenvalue = 2.36), the behavioral engagement component explained 44.43% (eigenvalue = 2.22), and the cognitive engagement factor captured 51.72% of the variance (eigenvalue = 2.58). These values indicate the proportion of total variance in the respective sets of items successfully summarized by the extracted dimensions. All items loaded consistently above the 0.30 threshold, supporting the unidimensionality of each construct (Figure 1).

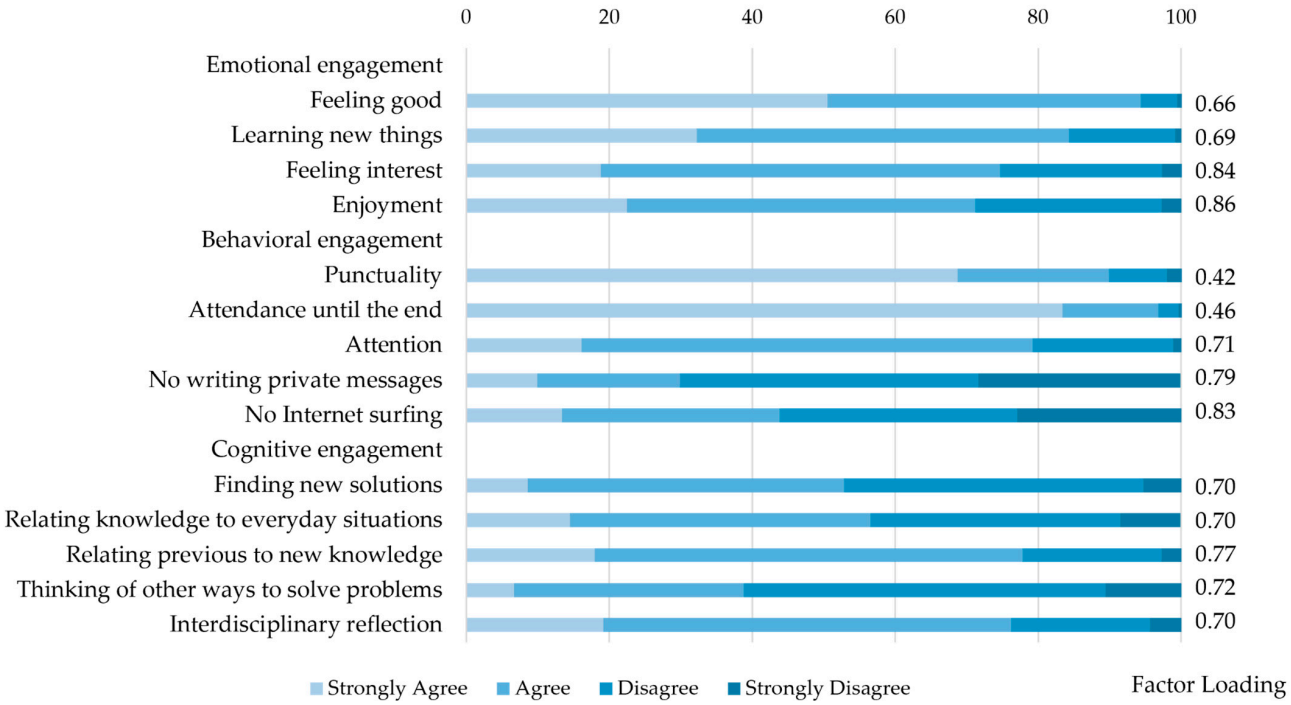

Figure 1. Reactive dimensions of engagement, distributions and factor loadings (CATPCA).

The reliability of the extracted factors was further supported by Cronbach's α values of α = 0.77 for emotional, α = 0.69 for behavioral, and α = 0.74 for cognitive engagement. Among the behavioral engagement items, indicators such as "attendance until the end" (loading = 0.46) and "punctuality" (loading = 0.42) exhibited moderate factor loadings. While these values were lower compared to other items, they remained above the commonly accepted minimum threshold of 0.30, thereby supporting their retention within the overall factor structure.

Emotional, behavioral, and cognitive engagement—commonly classified as reactive dimensions—capture how students respond to external instructional stimuli. In contrast, agentic engagement reflects a proactive dimension, characterized by students' self-initiated efforts to influence and shape their learning experience. Given the specific characteristics of the lecture-based teaching format and the distinctive nature of agentic engagement, different assessment approaches were applied: while reactive engagement was measured using agreement-based Likert statements (Figure 1), agentic engagement was evaluated through frequency-based items capturing active, student-initiated behaviors (Figure 2). This dual approach acknowledges the differentiated expression of engagement within lecture-driven contexts and the methodological sensitivity required to capture its multifaceted nature.

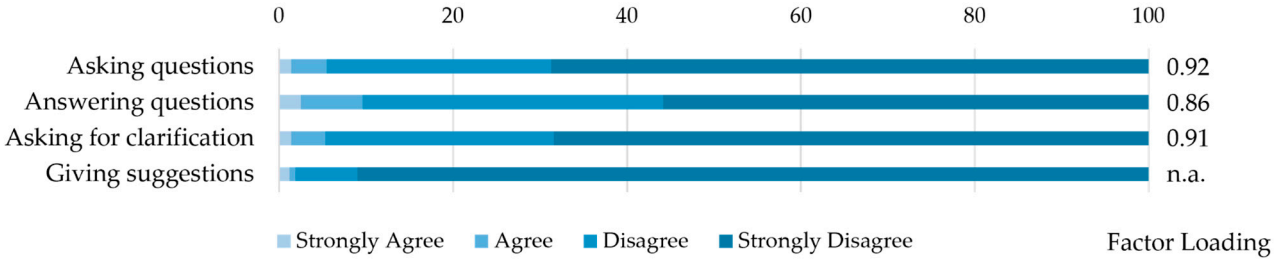

Figure 2. Agentic engagement, distributions and factor loadings (CATPCA).

Concerning agentic engagement, the item "giving suggestions" exhibited limited variability, with over 90% of students selecting the response "never". This lack of variance indicates that this behavior may not function as a reliable indicator of agentic engagement within the present study's context. Such a pattern likely reflects prevailing cultural norms in the German academic setting of lecture-based courses, where silent engagement and attentive listening are often valued more highly than overt verbal participation.

The evaluation of construct validity through CATPCA shows a good result for the three items solution with an eigenvalue of 2.42, explaining 80.58% of item variance, and the high (>0.8) factor loading on all items. The reliability of the extracted factor was further supported by a Cronbach's α value of 0.86.

Both achievement goal dimensions demonstrated strong internal consistency and construct validity, with Cronbach's alpha values of α = 0.83 (performance goals, four items; eigenvalue = 2.70) and α = 0.73 (mastery goals, four items; eigenvalue = 2.37). Additionally, these two goal orientations were significantly correlated, showing a moderate positive relationship (Pearson's r = 0.41, $p < 0.01$). Regarding perceived autonomy support, assessed through a four-item scale, the resulting factor exhibited good reliability with a Cronbach's alpha of α = 0.79 and an eigenvalue of 2.59 (Figure 3).

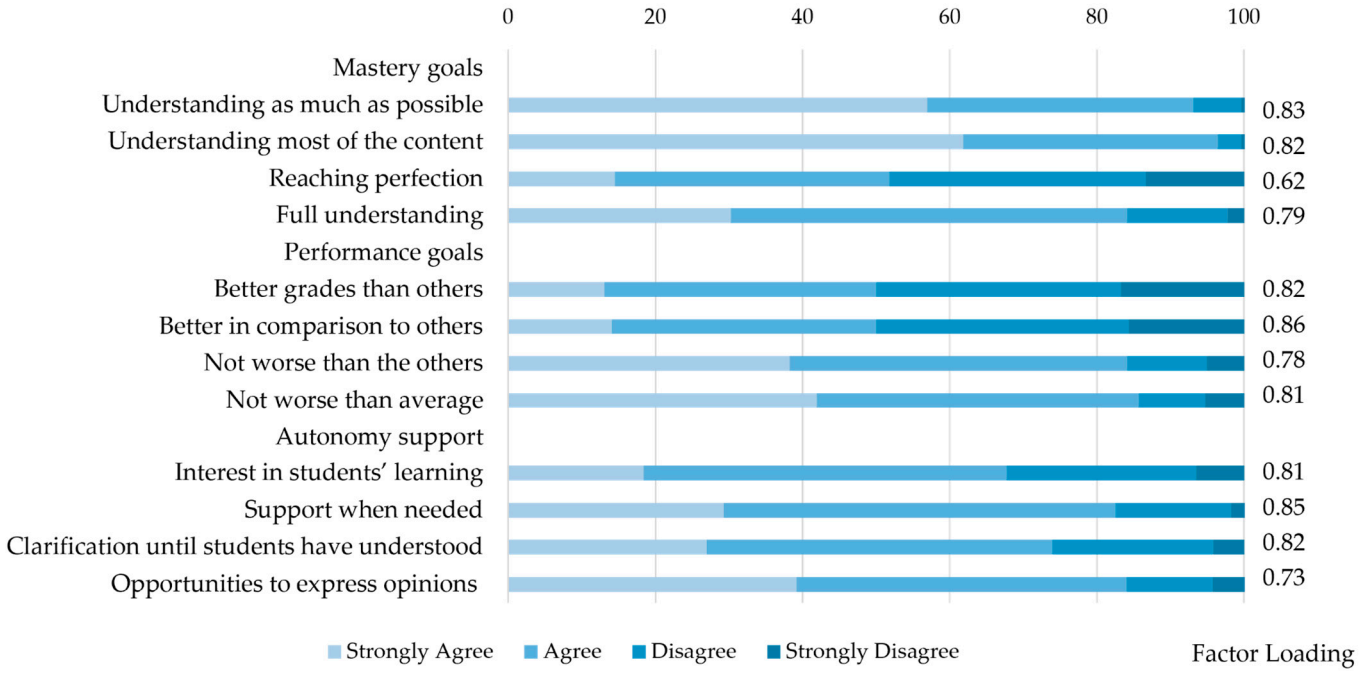

Figure 3. Achievement goal and autonomy support items, distributions and factor loadings (CATPCA).

4.2. Correlation Analysis

The emotional engagement dimension demonstrates robust and statistically significant positive correlations with both behavioral and cognitive engagement dimensions, with correlation coefficients of r = 0.372 and r = 0.436, respectively ($p < 0.001$) (Table 2). These findings suggest that students who experience higher levels of emotional engagement—such as enjoyment and interest—are also more likely to exhibit consistent behavioral participation and deeper cognitive processing during lectures. This interconnectedness highlights the integrated nature of reactive engagement dimensions, where affective responses align closely with observable behaviors and mental involvement in learning activities.

Table 2. Inter-dimension correlation matrix of reactive dimensions of engagement.

	Emotional	**Behavioral**	**Cognitive**
Behavioral	0.372 **		
Cognitive	0.436 **	0.297 **	
Agentic	−0.024	−0.042	−0.092

** $p < 0.01$.

In contrast, agentic engagement, representing students' proactive and self-initiated involvement, shows weak and statistically non-significant correlations with the other engagement dimensions. Specifically, its correlations are r = −0.024 with emotional engagement, r = −0.042 with behavioral engagement, and r = −0.092 with cognitive engagement. These near-zero correlations imply that agentic engagement operates somewhat independently from the reactive dimensions. This pattern may reflect the distinctive characteristics of agentic engagement as an active, intentional form of participation that is less directly tied to emotional, behavioral, or cognitive responses elicited by the lecture format. It further underscores the importance of treating agentic engagement as a separate construct, given its unique role and manifestation in educational settings.

4.3. Regression Models for Student Engagement and Motivational Variables

To examine the influence of achievement goals and autonomy support on each engagement dimension, four distinct regression models were estimated, controlling for sociodemographic factors and the specific lecture/class context. The models demonstrated a satisfactory level of explained variance (Table 3), accounting for 17.9% of the variance in cognitive engagement (Model 1), 25.2% in behavioral engagement (Model 2), and 32.5% in emotional engagement (Model 3). In contrast, the agentic engagement model (Model 4) accounted for a notably lower variance of 9%, indicating that this dimension may be driven by factors beyond those included in the current analysis. These results underscore the necessity for further investigation to elucidate the distinct mechanisms underlying agentic engagement compared to other engagement types.

Table 3. Beta coefficients of multiple regressions on student engagement.

Model	Model 1	Model 2	Model 3	Model 4
Predictors	**Cognitive (β)**	**Behavioral (β)**	**Emotional (β)**	**Agentic (β)**
Achievement Goals				
Performance Goals	0.067	0.055	−0.034	−0.047
Mastery Goals	0.339 ***	0.372 ***	0.320 ***	0.023
Autonomy Support				
Autonomy Support	0.146 **	0.094 *	0.336 ***	0.015
Sociodemographics				
Male	0.112 *	0.064	0.015	−0.190 ***
Age	0.029	0.172 ***	0.094 *	−0.252 ***
Born in Germany	0.022	−0.018	−0.044	−0.024
Course Effects (Ref. Course 9)				
Course 1	−0.100	−0.135 **	0.096 *	−0.053
Course 2	−0.051	−0.012	0.034	−0.015
Course 3	−0.196 ***	0.002	−0.242 ***	−0.028
Course 4	−0.071	0.128 **	−0.153 ***	−0.009
Course 5	−0.019	0.087	−0.012	−0.010
Course 6	−0.083	0.071	−0.040	−0.028
Course 7	−0.003	0.049	0.014	0.012
Course 8	0.008	0.029	−0.029	−0.099 *
Course 10	0.075	0.027	0.026	−0.094
Adjusted R^2	**0.179**	**0.252**	**0.325**	**0.090**
Achievement Goals				
Performance Goals	0.067	0.055	−0.034	−0.047
Mastery Goals	0.339 ***	0.372 ***	0.320 ***	0.023
Autonomy Support				
Autonomy Support	0.146 **	0.094 *	0.336 ***	0.015
Sociodemographics				
Male	0.112 *	0.064	0.015	−0.190 ***
Age	0.029	0.172 ***	0.094 *	−0.252 ***
Born in Germany	0.022	−0.018	−0.044	−0.024
Course Effects (Ref. Course 9)				
Course 1	−0.100	−0.135 **	0.096 *	−0.053
Course 2	−0.051	−0.012	0.034	−0.015
Course 3	−0.196 ***	0.002	−0.242 ***	−0.028
Course 4	−0.071	0.128 **	−0.153 ***	−0.009
Course 5	−0.019	0.087	−0.012	−0.010
Course 6	−0.083	0.071	−0.040	−0.028

Table 3. *Cont.*

Model	Model 1	Model 2	Model 3	Model 4
Predictors	**Cognitive (β)**	**Behavioral (β)**	**Emotional (β)**	**Agentic (β)**
Course 7	−0.003	0.049	0.014	0.012
Course 8	0.008	0.029	−0.029	−0.099 *
Course 10	0.075	0.027	0.026	−0.094
Adjusted R^2	**0.179**	**0.252**	**0.325**	**0.090**

Note: Standardized beta coefficients reported. Course 9 is the reference category. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

In Model 1, cognitive engagement is significantly influenced by mastery goals, which show a positive effect with a beta coefficient of 0.339. Autonomy support also contributes notably to this dimension (β = 0.146), indicating that students who perceive greater autonomy in their learning environment tend to be more cognitively engaged. Additionally, male students exhibit slightly higher levels of cognitive engagement, and minor variations across different courses were observed. These findings underscore the critical role of mastery goals and autonomy support in enhancing cognitive involvement.

Regarding behavioral engagement (Model 2), mastery goals again emerge as a strong predictor (β = 0.370), highlighting their importance not only in driving active participation but also in fostering a learning atmosphere focused on personal development and comprehension. Autonomy support continues to play a vital role, reinforcing the connection between perceived learner control and engagement. Furthermore, behavioral engagement appears to increase with student age, suggesting developmental factors also contribute to student engagement.

Model 3 underscores the central role of mastery goals and autonomy support in shaping students' emotional engagement. Mastery goals show a substantial positive effect (β = 0.320), highlighting their capacity to foster emotionally meaningful connections with academic content. In contrast, performance goals do not contribute positively (β = −0.034), suggesting limited relevance for enhancing students' emotional investment in learning. The positive influence of autonomy support indicates that when students perceive their learning environment as supportive of their independence, they are more likely to respond with enthusiasm and interest. Additionally, this model reveals notable and statistically significant variations across courses, pointing to the influence of contextual factors such as instructional approach or classroom climate in nurturing emotional engagement.

The influence of autonomy support on different engagement dimensions shows considerable variation across models. In Model 1, a significant and positive association is observed (β = 0.146, $p < 0.01$), indicating that students who perceive higher autonomy tend to demonstrate increased cognitive engagement. Although still statistically significant, the strength of this relationship diminishes in Model 2 (β = 0.094, $p < 0.05$), suggesting a more modest impact on behavioral engagement. Notably, in Model 3, the relationship intensifies substantially (β = 0.336, $p < 0.001$), pointing to the particularly strong role autonomy support plays in fostering emotional engagement. This finding aligns well with self-determination theory, which highlights autonomy as a key driver of students' emotional investment in learning. In contrast, Model 4 shows a negligible effect (β = 0.015), implying that autonomy support may not meaningfully influence agentic engagement in the context of this study.

The results of the first three models support H1: students who endorsed mastery goals consistently showed higher levels of cognitive (β = 0.339), behavioral (β = 0.370), and emotional engagement (β = 0.320), indicating that a mastery orientation fosters comprehensive student involvement across engagement dimensions. H2 was also supported: perceived autonomy support was a significant positive predictor of emotional engagement (β = 0.336).

Further, it also showed some weak-to-moderate significant effects on cognitive (β = 0.146) and behavioral (β = 0.094) engagement, underscoring the motivational value of autonomy in fostering enthusiasm and interest. In contrast, H3 was not supported, as the effect of performance goals did not significantly predict any of the engagement dimensions.

Model 4, which focuses on agentic engagement, offers limited explanatory power. The results indicate that neither type of achievement goal nor perceived autonomy support has a significant effect on students' proactive form of engagement. This suggests that, within lecture-based settings, students may view the course structure as adequately aligned with their academic goals, reducing the perceived need to actively influence or modify the learning environment through agentic behaviors. The minimal levels of agentic engagement observed could reflect a general acceptance of the passive role typically associated with such instructional formats, likely because students consider this approach effective and sufficient for their learning objectives.

Nonetheless, some noteworthy patterns emerge from the control variables. Agentic engagement significantly declines with age, and male students report lower levels of proactive participation compared to female students. Unlike the other engagement dimensions, however, no significant variation was found between the different lecture-based courses in this model.

5. Discussion

The 2020 school lockdown in Germany presented teachers, students, and parents with unprecedented challenges (Huber & Helm, 2020). Consequently, teachers shifted to online instruction, utilizing a range of digital tools and resources to address these challenges and adapt their teaching practices (Eickelmann & Gerick, 2020; König et al., 2020). This evolution underscores the importance of re-examining mastery goals in the current post-COVID-19 era.

Findings from the present study show that most students prioritize a deep understanding of lecture content and actively strive for mastery. This supports the hypothesis that self-improvement goals enhance emotional, behavioral, and cognitive engagement. Students motivated by mastery goals appear to engage more deeply with course material, leading to increased participation and more meaningful learning experiences. Moreover, the preference expressed by 83.2% of students to first process information and take notes before contributing in other learning formats, such as tutorials or seminars, highlights the value they place on reflective engagement.

The results also confirm that perceived autonomy support significantly predicts emotional engagement, consistent with self-determination theory (Deci & Ryan, 2008) and earlier findings by Reeve et al. (2004) and Reeve and Cheon (2021). When students perceive that their lecturers support their autonomy—through flexible structures, acknowledgment of student perspectives, and genuine interest in their learning—they become more emotionally invested in the learning process. In this study, autonomy support extended beyond formal aspects such as grading policies or attendance requirements; students valued instructors' communicative behaviors and attentiveness, which fostered a greater sense of agency and belonging.

These findings also resonate with Wijnia et al. (2011), who highlighted the critical role of autonomy and clarity in enhancing student motivation across educational settings. Although Wijnia et al. found comparable levels of autonomous motivation among students in problem-based and lecture-based environments, our study emphasizes the importance of autonomy support specifically in driving emotional engagement within lecture-based contexts. Similar to Wijnia et al.'s observation that controlling factors like mandatory attendance negatively influence motivation, our results suggest that fostering autonomy

and providing clear guidance can help mitigate such challenges. This is particularly relevant in the German educational system, where the non-mandatory attendance policy in lecture-based courses offers students greater freedom. When combined with supportive teaching practices, this freedom appears to enhance engagement and motivation.

Contrary to expectations, the motivation to outperform peers (performance goals) did not significantly influence emotional engagement. Instead, cognitive engagement was most strongly associated with mastery goals, suggesting that students driven by a desire to deepen their understanding engage more thoughtfully and persistently with academic content. These findings align with research by Pekrun et al. (2009), which demonstrated that mastery goals reduce boredom and promote enjoyment, and extend this insight by showing that mastery goals also support behavioral engagement. This pattern underscores the importance of fostering a mastery-oriented learning climate, particularly in large lecture-based courses where anonymity can otherwise diminish students' motivation and sense of belonging.

The study also highlights the role of the broader cultural and institutional context in shaping engagement. In the German higher educational setting, lectures are traditionally viewed as spaces for attentive listening and reflective note-taking, while active discussion and debate typically occur in complementary formats such as seminars or tutorials. This context helps explain why mastery goals and perceived autonomy support predict reactive forms of engagement—cognitive, emotional, and behavioral—but not agentic engagement, which involves proactively shaping or influencing the learning environment. The absence of a significant effect on agentic engagement suggests that students may not perceive lectures as spaces where proactive participation is expected or encouraged. Instead, agentic behaviors may be reserved for smaller, dialogic settings that structurally invite interaction.

Compared to data collected in 2017 and published in 2023, which suggested that balanced mastery and performance goals together enhance emotional engagement, the present study shows a stronger emphasis on mastery goals. One possible explanation is that this cohort encountered digital learning earlier in their secondary education, which may have strengthened their digital literacy, autonomy, and focus on self-improvement. Moreover, in digital or hybrid contexts, opportunities for direct peer comparison that typically reinforce performance goals were reduced, especially in asynchronous formats. Before the pandemic, digital tools were not central to teaching in German universities (Persike & Friedrich, 2016), and efforts to promote digital competence were limited (Jäger-Biela et al., 2020; Fischer et al., 2020). The rapid transition to online learning during the spring 2020 lockdown forced universities to adopt new teaching strategies (Hoss et al., 2022), which may have influenced students' engagement and motivational orientations.

The findings suggest that mastery goals and perceived autonomy support strongly predict reactive engagement, consistent with Reeve's (2012) distinction between reactive and agentic forms of engagement. Students displayed high cognitive engagement, possibly reflecting the influence of prior educational experiences that emphasized higher-order thinking and self-regulated learning. Emotional engagement, similarly, was closely related to mastery-approach goals, which focus on understanding, growth, and the intrinsic value of learning. While these goals foster deeper emotional and cognitive investment, they are less likely to stimulate agentic engagement in lecture-based contexts, where structural opportunities for proactive participation remain limited.

Importantly, the instructor's communicative style emerged as a central factor shaping engagement. Assertive and inclusive communication strategies—such as explicitly inviting student questions, validating diverse perspectives, and connecting theoretical content to contemporary issues—can enhance students' sense of autonomy and academic identity. Po-

sitioning students as emerging sociologists, for example, or prompting them to apply theory to real-world scenarios can deepen engagement across cognitive and emotional dimensions.

Finally, the findings highlight the need to understand engagement within its cultural and institutional context. In lecture-based courses in Germany, attentive listening and reflective note-taking are culturally accepted and institutionally reinforced as legitimate forms of participation. This educational structure likely contributes to the observed pattern in which reactive engagement is high, while agentic engagement remains limited. Although mastery goals and perceived autonomy support enhance students' investment in learning, promoting proactive agentic engagement may require deliberate pedagogical strategies—such as integrating interactive activities, encouraging student-led discussions, or creating spaces for students to influence course content—even within large lecture formats.

The results suggest that our participants, who experienced digital learning during their secondary education, may be less influenced by peer competition and more focused on mastery goals. Additionally, they likely witnessed firsthand the challenges that schoolteachers encountered during the early transition to remote learning, including unclear structures and technical difficulties. Furthermore, it is likely that universities and their instructors are now better prepared to offer improved support options, including enhanced communication skills related to autonomy support, compared to what was available prior to the pandemic.

5.1. Pedagogical Implications

In lecture-based courses, strategies that reduce psychological distance—such as involving other lecturers or guest practitioners and adopting an approachable teaching style—can foster stronger student engagement. For example, integrating regular dialogue with experienced professionals helps students connect theoretical concepts to real-world applications, thereby deepening understanding and motivation. Given the structured and externally controlled nature of large lectures, it becomes especially important to create moments of pedagogical openness that go beyond passive listening and invite students to participate proactively.

Encouraging critical thinking and assertive communication further promotes agentic engagement, enabling students not only to absorb content but to actively shape their learning process. Beyond supporting motivation and attention, these communicative strategies help position students as emerging experts who reflect critically on complex social issues discussed in class. Even within structurally constrained lectures, fostering agentic engagement encourages students to personalize their learning and apply theoretical knowledge to real-world challenges.

Moreover, these findings suggest that fostering immediacy and assertive communication in formal teaching settings can be a transferable strategy across diverse institutional contexts—particularly in traditional lecture formats that typically limit student agency. By explicitly supporting agentic engagement, educators help create conditions that strengthen autonomy, academic identity, and meaningful participation.

Importantly, this study highlights that agentic engagement is not driven solely by students' individual perceptions of autonomy. Instead, it is also shaped by broader educational norms and structural features of course design. This perspective extends self-determination theory by showing that autonomy support, while necessary, may be insufficient on its own. Effective agentic engagement requires both pedagogical invitations and structural affordances that empower students to act proactively. Recognizing this interplay helps explain why agentic engagement often remains limited in large lecture-based courses—even when behavioral, emotional, and cognitive engagement are high—and points to concrete directions for instructional innovation aimed at nurturing student agency.

5.2. Limitations and Further Research

While this study provides valuable insights into the dimensions of student engagement within large introductory lecture-based courses in Germany, several limitations must be acknowledged to contextualize the findings and guide future research.

First, the cross-sectional design limits the ability to draw causal inferences about the relationships between engagement dimensions and predictors such as achievement goals and perceived autonomy support. Longitudinal studies following students over multiple semesters would help clarify how these relationships develop as students progress through their academic careers and move between passive and more interactive learning environments. Such designs could also compare engagement trajectories across disciplines, for instance between sociology and STEM fields, where teaching formats and student expectations may differ significantly.

Second, the sample is highly specific, comprising primarily students who completed the German *Abitur* during a period marked by hybrid and online learning due to the COVID-19 pandemic. These factors may limit the generalizability of the findings beyond this cohort and institutional context. Future research should therefore include students from a wider range of cultural and educational backgrounds, including those with migrant experiences who did not complete their secondary education in Germany. Comparative studies that span multiple educational systems would illuminate how prior schooling cultures, digital literacy, and experiences with autonomy shape student engagement in higher education. Such insights are vital for designing culturally responsive pedagogical strategies that address the needs of increasingly diverse student populations.

Third, potential clustering effects within lecture courses were not explicitly modeled, but the course group was included as a fixed-effect predictor to partially account for between-group differences. If students' responses are correlated within course groups, this could bias estimates of predictor effects. Future studies should adopt multilevel or hierarchical linear modeling approaches to better account for nested data structures, disentangling individual-level predictors from course-level influences such as instructional style, class size, and curriculum design.

Fourth, the reliance on self-report measures introduces possible biases, including common method variance, social desirability effects, and inaccuracies in students' retrospective accounts of engagement. Incorporating multi-method approaches such as direct classroom observations, experience sampling methods (ESMs), student diaries, or digital behavioral tracking would provide a more comprehensive and objective assessment of engagement, particularly for dimensions such as agentic behavior, which may not be fully captured by self-report alone.

Fifth, this study found limited variation in achievement goals and engagement across lecture-based course groups. Although some significant associations emerged at the group level, their overall impact was relatively modest. Future research should further investigate the extent of between-class differences in engagement and examine possible moderating influences, such as specific instructional strategies, lecturer communicative behaviors, and the degree of autonomy support embedded in course design.

A promising direction for future research is to test web-based interventions aimed at fostering agentic engagement specifically within large lecture-based settings. Building on innovative approaches such as those introduced by Patall et al. (2022) in U.S. physics and chemistry courses, scholars could examine how digital tools, structured interactive activities, or student-led initiatives promote proactive participation, especially among international and culturally diverse student cohorts.

Combining quantitative survey data with qualitative insights from classroom observations, interviews, or ESMs would help capture the situational and evolving nature of

agentic engagement. Mixed-methods longitudinal designs could reveal how structural and relational factors interact to facilitate or constrain students' agency over time.

Finally, to deepen understanding of the links between mastery goals and reactive forms of engagement, future research should examine contextual and individual differences that may shape these dynamics. Factors such as instructors' pedagogical beliefs, communicative style, course size, the availability of interactive elements, and students' personality traits and cultural backgrounds are likely to influence how mastery-oriented goals translate into sustained cognitive, emotional, behavioral, and agentic engagement.

6. Conclusions

This study advances a nuanced understanding of student engagement within large lecture-based university courses by distinguishing between reactive engagement (cognitive, behavioral, emotional) and agentic engagement, and by examining how these dimensions relate to motivational factors and the educational context. The findings reveal a complex interplay between personal achievement goals, perceived autonomy support, and the cultural and structural norms that shape learning in lecture-based settings.

Regarding the hypotheses, the study provides clear evidence in support of some and challenges others:

Hypothesis 1 is supported. Mastery goals significantly and positively predict cognitive, behavioral, and emotional engagement. This underscores the critical role of self-improvement and deep learning strategies in fostering multiple forms of reactive engagement among students.

Hypothesis 2 is supported. Perceived autonomy support exerts its strongest and most consistent influence on emotional engagement, aligning with self-determination theory's assertion that autonomy is a key driver of emotional investment in learning.

Hypothesis 3 is not supported. Performance goals do not enhance emotional engagement, nor do they exert a stronger influence on emotional than cognitive engagement, challenging common assumptions about the role of competitive motivation in large lecture settings.

Theoretically, this study highlights mastery goals and autonomy support as central motivational mechanisms that sustain student engagement in traditionally structured large lecture courses. It also explains why agentic engagement remains limited: despite valuing autonomy, students perceive that the academic culture and course design do not typically encourage or reward proactive, self-directed contributions to their learning.

Practically, these findings suggest that fostering mastery-oriented goals and creating autonomy-supportive environments can enhance students' emotional, cognitive, and behavioral engagement, even within less interactive lecture formats. However, the observed decline in agentic engagement with increasing age—particularly among male students—indicates demographic disparities that require targeted interventions. Efforts should focus on empowering all students to take a more active role in shaping their learning experiences, especially in large, impersonal courses.

Moreover, the study reveals a notable shift in engagement patterns compared to data collected before the COVID-19 pandemic. Students who experienced digital and hybrid learning modalities during secondary education tend to prioritize mastery goals over competitive performance goals more strongly than previous cohorts. This suggests that early exposure to technology-enhanced learning environments fosters intrinsic motivation and self-regulatory capacities, which reshape motivational orientations in higher education. The pandemic-induced changes thus represent a pivotal contextual factor influencing student engagement, underscoring the need for ongoing research into the long-term effects of digital learning on motivation and engagement.

Finally, this research underscores the importance of contextual factors such as prior learning experiences within the German school system and culturally embedded expectations of lecture-based courses. First-year university students' previous schooling critically shapes their engagement patterns and motivational orientations. Future research should consider more heterogeneous student populations to better understand how diverse educational and cultural backgrounds influence engagement, motivation, and adaptation to university learning contexts. Such insights are essential for developing inclusive pedagogical strategies that effectively address varied student needs.

In sum, this study highlights the critical roles of autonomy support and achievement goals in shaping diverse dimensions of student engagement in large introductory lecture courses. It calls for pedagogical strategies that not only promote mastery-oriented and autonomy-supportive environments but also address demographic differences in agentic engagement. Moreover, it emphasizes the significance of accounting for changes brought about by the pandemic and the importance of students' prior schooling culture, especially in first-year cohorts.

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References

Artelt, C., & Sixt, M. (2023). The National Educational Panel Study (NEPS)—Framework, design, and research potential. *Zeitschrift für Erziehungswissenschaft*, *26*(2), 277–298. [CrossRef]

Bielak, J., & Mystkowska-Wiertelak, A. (2024). Emotions and emotion regulation in L2 classroom speaking tasks: A mixed-methods study combining the idiodynamic and quantitative perspectives. *Modern Language Journal*, *108*, 688–718. [CrossRef]

Bossert, S., Daumiller, M., Janke, S., Dresel, M., & Dickhäuser, O. (2025). On the influence of social norms on individual achievement goals. *British Journal of Educational Psychology. Online ahead of print*. [CrossRef]

Daumiller, M., Dickhäuser, O., & Dresel, M. (2019). University instructors' achievement goals for teaching. *Journal of Educational Psychology*, *111*(1), 131–148. [CrossRef]

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, *49*(3), 182–185. [CrossRef]

Eickelmann, B., & Gerick, J. (2020). Lernen mit digitalen medien: Zielsetzungen in zeiten von corona und unter besonderer berücksichtigung von sozialen ungleichheiten [Learning with digital media: Objectives in times of corona and under special consideration of social inequities]. *Die Deutsche Schule*, *16*, 153–162. [CrossRef]

Elliot, A. J., & McGregor, H. A. (2001). A 2×2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*, 501–519. [CrossRef] [PubMed]

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology*, *100*(3), 613–628. [CrossRef]

Fischer, C., Fischer-Ontrup, C., & Schuster, C. (2020). Individuelle förderung und selbstreguliertes Lernen: Bedingungen und optionen für das lehren und lernen in präsenz und auf distanz. In D. Fickermann, & B. Edelstein (Eds.), *"Langsam vermisse ich die schule…". Schule während und nach der corona-pandemie* (pp. 136–152). DDS—Die Deutsche Schule, Beiheft, Band 16. Waxmann. [CrossRef]

Fredricks, J. A., & McColskey, W. (2012). The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 763–782). Springer Science+Business Media. [CrossRef]

Friesen, N. (2011). The lecture as a transmedial pedagogical form: A historical analysis. *Educational Researcher*, *40*(3), 95–102. [CrossRef]

Gillet, N., Lafrenière, M. K., Vallerand, R. J., Huart, I., & Fouquereau, E. (2014). The effects of autonomous and controlled regulation of performance-approach goals on well-being: A process model. *Social Psychology*, *53*(1), 154–174. [CrossRef]

Goodman, A. (2016). *The manifestation of student engagement in classrooms: A phenomenological case study of how teachers experience student engagement and how it influences pedagogical decision making* [Doctoral dissertation, University of Nevada]. Available online: https://digitalscholarship.unlv.edu/thesesdissertations/2780 (accessed on 19 April 2025).

Hiver, P., Al-Hoorie, A. H., Vitta, J. P., & Wu, J. (2021). Engagement in language learning: A systematic review of 20 years of research methods and definitions. *Language Teaching Research*, *28*(1), 201–230. [CrossRef]

Hoss, T., Ancina, A., & Kaspar, K. (2022). German university students' perspective on remote learning during the COVID-19 pandemic: A quantitative survey study with implications for future educational interventions. *Frontiers in Psychology*, *13*, 734160. [CrossRef]

Huber, S. G., & Helm, C. (2020). COVID-19 and schooling: Evaluation, assessment and accountability in times of crises—Reacting quickly to explore key issues for policy, practice and research with the school barometer. *Educational Assessment, Evaluation and Accountability*, *32*(2), 237–270. [CrossRef]

Jäger-Biela, D. J., Kaspar, K., & König, J. (2020). Lerngelegenheiten zum erwerb von digitalisierungsbezogenen medienkompetenzen: Analysen des studienangebots und des nutzungsverhaltens von lehramtsstudierenden am fallbeispiel der universität zu Köln. In K. Kaspar, M. Becker-Mrotzek, S. Hofhues, J. König, & D. Schmeinck (Eds.), *Bildung, schule, digitalisierung* (pp. 64–70). Waxmann.

Kahu, E. R., & Nelson, K. (2018). Student engagement in the educational interface: Understanding the mechanisms of student success. *Higher Education Research and Development*, *37*(1), 58–71. [CrossRef]

Kolić-Vehovec, S., Rončević, B., & Bajšanski, I. (2008). Motivational components of self-regulated learning and reading strategy use in university students: The role of goal orientation patterns. *Learning and Individual Differences*, *18*(1), 108–113. [CrossRef]

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education*, *43*(4), 608–622. [CrossRef]

Lee, Y. J., & Anderman, E. M. (2020). Profiles of perfectionism and their relations to educational outcomes in college students: The moderating role of achievement goals. *Learning and Individual Differences*, *77*, 101813. [CrossRef]

Linting, M., Meulman, J. J., Groenen, P. J. F., & van der Koojj, A. J. (2007). Nonlinear principal components analysis: Introduction and application. *Psychological Methods*, *12*(3), 336–358. [CrossRef] [PubMed]

Lüftenegger, M., Klug, J., Harrer, K., Langer, M., Spiel, C., & Schober, B. (2016). Students' achievement goals, learning-related emotions and academic achievement. *Frontiers in Psychology*, *7*, 603. [CrossRef]

Miller, A. L., Fassett, K. T., & Palmer, D. L. (2021). Achievement goal orientation: A predictor of student engagement in higher education. *Motivation and Emotion*, *45*(3), 327–344. [CrossRef]

Mohle, H. (1992). German Democratic Republic: System of education. In B. R. Clarke, & G. Neave (Eds.), *The encyclopedia of higher education* (Vol. 1). Oxford University Press.

Montenegro, A. (2017). Understanding the concept of agentic engagement for learning. *Colombian Applied Linguistics Journal*, *19*(1), 117–128. [CrossRef]

Montenegro, A. (2022). Lecturers' perceptions of student engagement and their role in supporting it. *European Journal of Education Studies*, *9*(4), 134–153. [CrossRef]

Montenegro, A., & Schmidt, M. (2023). Achievement goals, student engagement, and the mediatory role of autonomy support in lecture-based courses. *Education Sciences*, *13*(9), 912. [CrossRef]

Oga-Baldwin, W. L. (2019). Acting, thinking, feeling, making, collaborating: The engagement process in foreign language learning. *System*, *86*, 102–128. [CrossRef]

Organisation for Economic Cooperation and Development (OECD). (2010). *Mathematics teaching and learning strategies in PISA*. OECD Publishing. [CrossRef]

Organisation for Economic Cooperation and Development (OECD). (2013). *PISA 2012 results: Ready to learn: Students' engagement, drive and self-beliefs* (Vol. III). OECD Publishing. [CrossRef]

Patall, E. A. (2024). Agentic engagement: Transcending passive motivation. *Motivation Science*, *10*(3), 222–233. [CrossRef]

Patall, E. A., Vite, A., Lee, D. J., & Zambrano, J. (2024). Teacher support for students' psychological needs and student engagement: Differences across school levels based on a national teacher survey. *Teaching and Teacher Education*, *137*, 104400. [CrossRef]

Patall, E. A., Zambrano, J., Kennedy, A. A. U., Yates, N., & Vallín, J. A. (2022). Promoting an agentic orientation: An intervention in university psychology and physical science courses. *Journal of Educational Psychology*, *114*(2), 368–392. [CrossRef]

Pekrun, R., Elliot, A. J., & Maier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology*, *101*(1), 115–135. [CrossRef]

Pepple, D. G. (2022). An ecological perspective of student engagement through digital technology: Practical application and implications. *British Educational Research Journal*, *48*(6), 1216–1231. [CrossRef]

Persike, M., & Friedrich, J.-D. (2016). *Lernen mit digitalen Medien aus Studierendenperspektive*. Arbeitspapier Nr. 17. Hochschulforum Digitalisierung. Available online: https://hochschulforumdigitalisierung.de/sites/default/files/dateien/HFD_AP_Nr_17_Lernen_mit_digitalen_Medien_aus_Studierendenperspektive.pdf (accessed on 19 April 2025).

Pineda-Báez, C., Hennig Manzuoli, C., & Vargas Sánchez, A. (2019). Supporting student cognitive and agentic engagement: Students' voices. *International Journal of Educational Research*, *96*, 81–90. [CrossRef]

Pintrich, P. R. (2000). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, *92*(3), 544–555. [CrossRef]

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149–172). Springer.

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, *105*(3), 579–595. [CrossRef]

Reeve, J. (2016). Autonomy-supportive teaching: What it is, how to do it. In W. C. Liu, J. C. K. Wang, & R. M. Ryan (Eds.), *Building autonomous learning: Perspectives from research and practice using self-determination theory* (pp. 129–152). Springer.

Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist*, *56*(1), 54–77. [CrossRef]

Reeve, J., Hyeon-Cheon, S., & Jang, H. (2020). How and why students make academic progress: Reconceptualizing the student engagement construct to increase its explanatory power. *Contemporary Educational Psychology*, *62*, 101899. [CrossRef]

Reeve, J., & Jang, H. (2022). Agentic engagement. In A. L. Reschly, & S. L. Christenson (Eds.), *Handbook of research on student engagement* (pp. 95–107). Springer. [CrossRef]

Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion*, *28*(2), 147–169. [CrossRef]

Reeve, J., Jang, H.-R., Shin, S. H., Ahn, J. S., Matos, L., & Gargurevich, R. (2022). When students show some initiative: Two experiments on the benefits of greater agentic engagement. *Learning and Instruction*, *80*, 101564. [CrossRef]

Reeve, J., & Tseng, C.-M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, *36*(4), 257–267. [CrossRef]

Scott-Webber, L., Marini, M., & Abraham, J. (2000). Higher education classrooms fail to meet needs of faculty and students. *Journal of Interior Design*, *26*(1), 16–34. [CrossRef]

Senko, C. (2019). When do mastery and performance goals facilitate academic achievement? *Contemporary Educational Psychology*, *59*, 101795. [CrossRef]

Senko, C., & Dawson, B. (2017). Performance-approach goal effects depend on how they are defined: Meta-analytic evidence from multiple educational outcomes. *Journal of Educational Psychology*, *109*(4), 574–598. [CrossRef]

Sorokin, P. S., & Froumin, I. D. (2022). 'Utility' of education and the role of transformative agency: Policy challenges and agendas. *Policy Futures in Education*, *20*(2), 201–214. [CrossRef]

Tomanović, S. (2019). Reconstructing changes in agency in the young people's social biographies through longitudinal qualitative research. *Young*, *27*(4), 355–372. [CrossRef]

Wijnia, L., Loyens, S. M. M., & Derous, E. (2011). Investigating effects of problem-based versus lecture-based learning environments on student motivation. *Contemporary Educational Psychology*, *36*, 101–113. [CrossRef]