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Student-perceived program coherence in seven disciplines: associations with student motivation and identification

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Introduction: Program coherence is considered a critical factor for student learning and professional development in higher education. In teacher education, the subjective perception of coherence—defined as the degree to which learning opportunities and contents are coordinated and aligned—has been linked to professional development and well-being. Yet, little is known about how students in other programs perceive coherence, and empirical evidence on how coherence relates to student outcomes remains limited. This study investigated (1) differences in perceived coherence among students from various degree programs and examined whether higher perceived coherence is associated with (2) stronger achievement motivation and (3) greater identification with the field of study.

Methods: The sample comprised 326 first-semester students enrolled in teacher education, medicine, law, psychology, economics, biology, and nutritional sciences. Measures included perceived program coherence, learning motivation (task values, self-concept), and study-related identity (social identification, identity commitment and reconsideration).

Results: Mean comparisons indicated that teacher education students perceived their programs as less coherent than students in other disciplines (small to medium effects), though average coherence ratings in all programs exceeded the theoretical midpoint. Latent regression analyses revealed that perceived coherence positively predicted academic motivation and identification with the field of study.

Discussion: Overall, the findings highlight the relevance of strengthening program coherence as a promising avenue for enhancing the quality of study programs in higher education.

KEYWORDS

expectancy-value motivation, personal identity, program coherence, social identity, university students

1 Introduction

In research on the quality of study programs in higher education, the coherence of such programs is widely recognized as a critical factor for student learning success and professional development (e.g., Darling-Hammond, 2006; Nordine et al., 2021). There is, however, comparably little empirical evidence on the potential benefits that a

coherent study program has on students. Addressing this gap, we examine possible effects of coherence perceptions on students' academic motivation and their identification with their field of study. Our study is situated in the first year at university. The transition to university is a critical life period for young people (Dietrich et al., 2012), making motivation and identification especially important outcomes to consider. Going beyond existing studies, our study consists of students not only in teacher education, but also in other programs. We investigate (1) differences in perceived coherence among the students from various degree programs and examine whether higher perceived coherence is associated with (2) stronger achievement motivation and (3) greater identification with the field of study.

In higher education research, *program coherence* at the university level refers to the extent to which learning contents and different opportunities to learn are coordinated, linked, and aligned. Coherence is not only a topic in higher education research, but also in health psychology (*sense of coherence*, Antonovsky and Sagy, 1986; Born et al., 2008; Eriksson and Lindström, 2007; Togari et al., 2008) and identity development (*identity coherence*, van Doeseelaar et al., 2018). The various definitions share some commonalities: First, coherence is characterized by links or similarities between different contexts (such as recurring key concepts across courses). Second, coherence is characterized by structure (i.e., to-be-learned information is ordered and structured). Finally, perceiving coherence creates meaning. In other words, designing coherent learning opportunities and establishing systematic connections between them should enable students to perceive different courses or learning situations as integrated and meaningful (Canrinus, et al., 2017; Hatlevik and Hovdenak, 2020).

In higher education, program coherence could refer to the curriculum, its courses and contents, to the alignment between learning objectives and assessment, or to links between theory and practice. For example, a student teacher might perceive her studies as coherent when she perceives links between her courses focusing on subject knowledge, on pedagogical content knowledge, and those focusing on general pedagogical/psychological knowledge. In a coherent study program, core ideas would be addressed in a variety of courses (Darling-Hammond, 2006). In the present study, we focus on such coherence of contents and activities (internal coherence, Lindvall and Ryve, 2019).

Research attention for coherence in university education is particularly prominent in the context of teacher education (e.g., Canrinus et al., 2017; Darling-Hammond, 2006 Doetjes et al., 2024; Hellmann, 2019), because course contents in teacher education focus on different knowledge domains which are not systematically connected (e.g., content knowledge and pedagogical-psychological knowledge). Almost nothing is known about how students in other disciplines like law, economics or psychology perceive the coherence of their studies. And notwithstanding the large body of research on program coherence in teacher education, there are only few studies addressing potential effects of coherence on students with a primary focus on professional development (Lindvall and Ryve, 2019; Smeby and Heggen, 2014). Other studies, focusing on the design of specific learning activities, point to possible benefits of coherence on cognitive learning (e.g., Harr et al., 2014;

Lehmann et al., 2019). Building on this foundation, the next sections will delve into the theoretical underpinnings of how coherence might influence also non-cognitive outcomes in higher education, like achievement motivation.

Achievement motivation is a central non-cognitive factor influencing students' learning outcomes and educational careers. Abundant research shows that that motivation relates to achievement and students' achievement-related choices such as college major choice (e.g., Eccles and Wigfield, 2002). In the present study, we examine achievement motivation from the perspective of expectancy-value theory (Eccles and Wigfield, 2020). According to the theory, expectancy ("will I succeed in this") and value beliefs ("do I want to do this") are decisive in learning and achievement. More stable expectancy beliefs are conceptualized as students' academic self-concept ("am I good at this"), which we focus on in the present study. The value dimension has different facets, including intrinsic value ("do I enjoy this"), attainment value ("is it important for me to succeed"), utility value ("is it useful to engage in this"), and cost value ("does it have negative consequences to engage").

Concerning possible mechanisms linking program coherence to motivation, it has been argued that the connected learning experiences in coherent university programs support knowledge acquisition and skill development, and by this, support feelings of competence and strengthen expectancy beliefs (Newmann et al., 2001). Indeed, studies show that for concrete learning tasks, a more coherent presentation of contents led to better performance (Harr et al., 2014; Lehmann et al., 2019). Concerning program coherence, Goh and Canrinus (2019) found that teacher students who perceived higher coherence reported higher self-efficacy for teaching.

Moreover, according to the definition of sense of coherence (Antonovsky and Sagy, 1986; Togari et al., 2008), students should be better able to create value related to their studies if they perceive their courses as coherent (Togari et al., 2008). While qualitative findings support this idea (e.g., Biberman-Shalev, et al., 2024; Doetjes and Zaki, 2024), studies have yet to show if there exists a systematic relationship between program coherence and students' valuing of their studies (for a study with secondary school students see Seidel et al., 2005). In addition, based on its potential impact on students' valuation of their studies, program coherence may also contribute to students' development of a professional identity, including their identification with their identification with their field of study.

Student identification includes both personal and social dimensions, and the personal aspects of identity are particularly important for students' career development (Dietrich et al., 2012; Eccles, 2009; Marttinen et al., 2018). In adolescence and young adulthood, society expects young people to establish a career identity, to make career choices, and to identify with these commitments. Relevant processes of personal identity development are commitment and exploration (Crocetti et al., 2008). While commitment refers to making decisions and identifying with them, exploration refers to gathering information about the self and the world of work (Marttinen et al., 2018). Exploration occurs not only before but also after the transition to university, in cases where students reconsider their choice.

Moreover, identification can be rooted in social identities such as the feeling of belonging to the social group of people in the

same field of study (e.g., Eccles, 2009). Social identity has several facets (Leach et al., 2008), two of which are particularly relevant for this study: group centrality, the subjective importance of the social group (“being a law student”) for one’s self, and group satisfaction, the positive feelings associated with belonging to the group.

Again, although coherence is seen as a core component of personal identity (van Doeseelaar et al., 2018), there is a paucity of empirical studies that would explore if and how coherence is systematically related to different facets of identification. A study with in-service teachers found that they were more committed to working in their school when they perceived that the school provided a coherent instructional environment (Fiegener and Adams, 2025). Based on the literature including some qualitative studies (e.g., Biberman-Shalev et al., 2024) we suggest that when learning opportunities are coherent, students more easily perceive their studies as meaningful. This, in turn, may not only promote certainty about their career choice (i.e., higher identity commitment), it might also impact the subjective importance of belonging to the chosen field of study (i.e., increased group centrality), and lead to more positive feelings about it (i.e., higher group satisfaction). On the other hand, when courses are perceived as fragmented and coherence as low, students might be more likely to question their choice and think about other options (i.e., reconsider their commitment).

With the present study we aim to shed light on program coherence and its potential outcomes in students, especially motivation and identification. Doing so, the study builds on a sample of students in teacher education and students in other study programs that share a similar disciplinary homogeneity. That is, students study only one subject, while in teacher education, students study typically two subjects (e.g., math, history, German, etc.), in addition to educational sciences.

We expected that teacher students would report lower coherence than students of other subjects (Hypothesis 1), given that for teacher students it is particularly challenging to make connections between the various learning experiences in their studies (Canrinus et al., 2017). We then explored the extent to which students of the other subjects differed from one another in the perceived coherence among their courses.

Concerning student motivation, we expected that students would report higher achievement motivation when they perceive their studies as more coherent (Hypothesis 2). Higher motivation was operationalized as higher academic self-concept, higher positive value (intrinsic, attainment, and utility value), and lower negative value (effort cost, emotional cost, and opportunity cost).

Finally, we hypothesized that students would report higher identification when they perceive their studies to be more coherent (Hypothesis 3). Greater identification was measured as higher identity commitment and lower reconsideration (personal identification), as well as higher in-group centrality and in-group satisfaction (social identification). In addition, we explored if three further aspects of social identity would be related to program coherence. These were self-stereotyping (perceiving oneself as a typical member of the student group), in-group homogeneity (perceiving that fellow students share commonalities), and in-group solidarity (feeling a psychological bond with fellow students).

2 Materials and methods

2.1 Sample and design

All study procedures were approved by the institutional review board at the Faculty of Social and Behavioural Sciences, Friedrich-Schiller-University Jena, and all ethical standards were met in the conduct of the study. The hypotheses, design and sample size of this study was preregistered (doi: 10.23668/psycharchives.5591). Data collection took place in January 2022 with students enrolled in teacher education, medicine, psychology, biology, nutritional sciences, law, and economics at one German university. We conducted an *a priori* power analysis to determine the necessary sample size and therefore aimed for $n = 40$ participants for each study program (total of $N = 280$). Data collection resulted in a total of 341 students. We excluded participants for the following reasons: having all missing data on the variables used in this article, studying another major than those listed above, and careless response behavior as indicated by unrealistically short processing time for the entire questionnaire.

The analysis sample thus consisted of $N = 326$ students (70.39% female, 29.33% male, 0.29% non-binary; $M_{\text{age}} = 20.13$, $SD = 2.44$; n per discipline = 39–53). All students except those from teacher education studied the respective discipline without additional major or minor subjects (e.g., biology students only studied biology). Teacher students studied three subjects: two majors (such as math and biology) and education studies. Psychology, economics, biology, and nutritional sciences were studied in three-year bachelor programs whereas law, medicine and teacher education were five-year state examination programs. Because some of these study programs had admission restrictions, the students in the sample were, on average, relatively high-achieving, as reflected in their high-school grade point averages ($M_{\text{GPA}} = 1.80$, $SD = .61$; ranged from 1 = *very good* to 4 = *passed*). Table 1 shows descriptive sample statistics per study program.

The students, recruited via course instructors at the end of their first semester, completed an online questionnaire. Each participant received €5 upon completion.

2.2 Measures

We report all items of all measures, descriptive item statistics, and confirmatory factor analysis results in Appendix A in the online supplement (<https://osf.io/s2c9h/>).

2.2.1 Coherence

Participants were first instructed to list all courses they attended in the present semester, including additional information on course type and time, before answering the items on program coherence. We measured perceived coherence with eight items adapted from Lindner and Klusmann (2018) and Henning-Kahmann and Hellmann (2018). Students responded to a five-point Likert scale

TABLE 1 Descriptive statistics of sample characteristics per discipline.

Discipline	Gender		Highschool GPA		Age		Coherence		Number of courses attended		
	<i>n</i>	% female	M	SD	M	SD	M	SD	M	min	max
1. Teacher Education	49	65	1.931	0.589	19.776	2.257	3.270	0.567	10.388	6	15
2. Medicine	53	74	1.421	0.546	20.038	1.961	3.462	0.683	10.811	1	15
3. Psychology	47	89	1.551	0.535	20.383	2.524	3.758	0.528	9.872	2	13
4. Biology	50	66	1.822	0.506	20.400	2.587	3.474	0.534	9.100	2	13
5. Nutrition	39	90	1.759	0.551	20.154	3.022	3.474	0.529	12.103	6	14
6. Law	45	60	2.013	0.613	19.511	1.714	3.639	0.582	7.911	3	12
7. Economics	43	53	2.214	0.571	20.714	2.607	3.455	0.586	10.326	3	15

(1 = disagree, 5 = agree), with an example item: “There were content links between the courses in my degree.”

“I often think it would be better to try to find a different education”), were used (1 = doesn’t apply at all, 5 = fully applies).

2.2.2 Expectancy motivation

Expectancy motivation was operationalized as students’ general academic self-concept (Dickhäuser et al., 2002). Five items were assessed via seven-point scales with varying anchors for each item (e.g., “My study-related abilities are 1 = low/ 7 = high”).

2.2.3 Value motivation

An adapted version of Gaspard et al.’s (2015) instrument was used to assess intrinsic value (4 items, e.g., “My subject of study is fun to me”), attainment value (personal importance, 6 items, e.g., “My subject of study is very important to me personally”), utility value (general utility for future life, 5 items, e.g., “The contents of my subject of study will help me in my life”), emotional cost value (4 items, e.g., “Doing my subject of study makes me really nervous”), effort cost (4 items, e.g., “Doing my subject of study is exhausting to me”), and opportunity cost (3 items, e.g., “I have to give up other activities that I like to be successful at my subject of study”). All subscales were measured on four-point scales (1 = does not apply, 4 = fully applies). Participants in teacher education were asked to fill in positive and negative values for both subjects and educational studies separately, meaning they provided three scores for each task value item, one for each of these study subjects. We averaged teacher students’ scores across their three subjects to make the measurement comparable to the other participants, who studied only one subject (e.g., biology) and therefore rated task value items only once in regard to their major.

2.2.4 Personal identification

Personal identification was measured via an adapted version of the short form of the U-MICS (Schubach et al., 2017). Two subscales, commitment (5 items, e.g., “My education gives me security in life”) and reconsideration of commitment (3 items,

2.2.5 Social identification

Social identification was measured via an adapted version of the German translation (Roth and Mazziotta, 2015) of Leach et al.’s (2008) instrument. All subscales of social identity, i.e., centrality [3 items, e.g., “Being a (subject) student is an important part of how I see myself”], satisfaction [3 items, e.g., “I am glad to be a (subject) student”], individual self-stereotyping [3 items, e.g., “I am a typical (subject) student”], in-group homogeneity [e.g., “(Subject) students are very similar to each other”], and solidarity [3 items, e.g., “I feel a bond with (subject) students”] were used (1 = don’t agree at all, 5 = fully agree).

2.2.6 Demographic data

Students reported their age in years, gender (1 = female, 2 = male, 3 = non-binary), high school grade point average (GPA), field of study, study type (full-time, part-time, auditor), year of study (Fachsemester), self-evaluated pre-knowledge in their field of study, and prior vocational training. In this study, we used age, gender, and high school GPA as covariates when testing Hypotheses 2 and 3.

2.3 Data analysis

Data analysis was conducted using R 4.5.2 (R Core Team, 2025). Data were prepared using the packages tidyverse 2.0.0 (Wickham et al., 2019) and misty 0.7.3 (Yanagida, 2025). Primary analyses were carried out using the packages misty and lavaan 0.6–19 (Rosseel, 2012). Hypothesis 1 was tested using the manifest unstandardized scale means of program coherence as inputs to the analysis. Hypothesis 2 and 3 were examined with structural equation modeling using the raw scaled item scores as input variables. Data and R scripts are available in the online supplement (Appendix B, C).

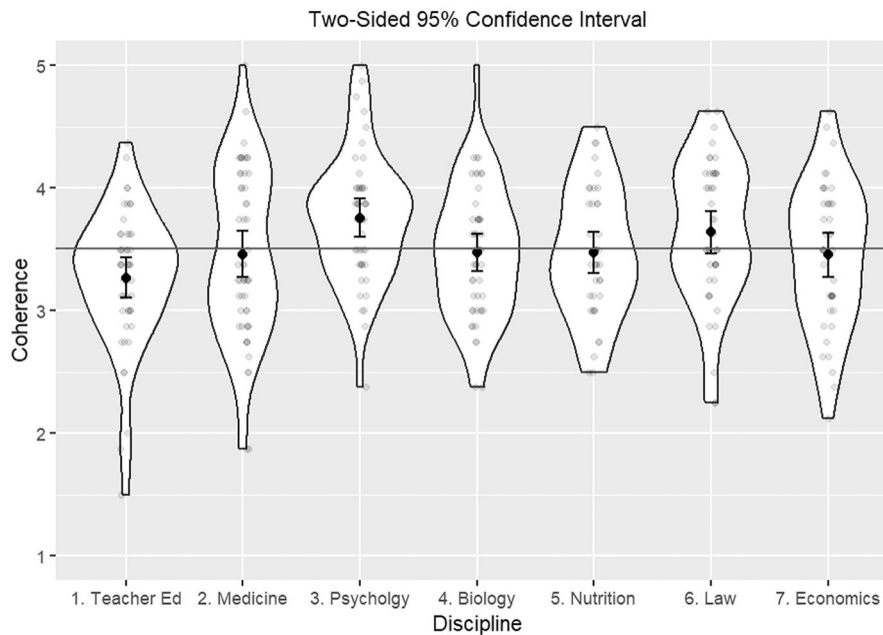


FIGURE 1
Perceived program coherence by discipline. Depicted are means and standard errors. The grey line indicates the grand mean.

3 Results

3.1 Subject differences in program coherence

Overall, as shown in Figure 1, the perceived coherence was descriptively above the theoretical mean in all programs, meaning that students partly or rather agreed to their studies being coherent. A one-way between subjects ANOVA was conducted to examine Hypothesis 1. There was a significant effect of subject on perceived program coherence, $F(6,317) = 3.392$, $p = 0.003$, $\eta^2 = 0.060$. In a planned contrast we compared program coherence in teacher education with the average of coherence across all other disciplines. As expected, teacher students perceived lower program coherence than the other students in our sample [$t(317) = -3.051$, $p = .002$]. Cohen's d effect size differences between teacher education and other programs ranged between .301 and .925 (Table 2).

Post hoc comparisons using Tukey's HSD test (Table 2) indicate that the perceived coherence in teacher education was only significantly different to the perceived coherence in psychology (large effect according to Cohen's d) and law (medium effect), while the other effects were small. In addition, Cohen's effect sizes for the mean differences suggest that program coherence in psychology was higher than in all other disciplines except law, as indicated by Cohen's d CIs not including zero.

3.2 Program coherence, motivation, and identification

For Hypotheses 2 and 3 we employed structural equation modeling. We estimated separate models for achievement

motivation and identification scales. Findings, shown in Table 3, depict latent regression coefficients. We first estimated models with program coherence as single predictor (Models 1a and 2a), before adding age, gender, and high school GPA as covariates (Models 1b and 2b). Program coherence was unrelated to the covariates: age (latent correlations: $r = .041$, $p = .502$), gender ($r = .008$, $p = .903$), high school grades ($r = .019$, $p = .755$). Overall, the results on program coherence remained unchanged when controlling for age, gender and high school grades.

Concerning achievement motivation, our results confirmed Hypothesis 2. Students who perceived their program as more coherent also reported a higher academic self-concept and higher intrinsic, attainment and utility value value (see Model 1a). Moreover, higher perceived coherence was associated with lower emotional cost value but was unrelated to effort cost or opportunity cost value. Achievement motivation—except for utility and opportunity cost value—was also associated with high school GPA, such that students with better high school grades were more motivated for their studies than students with lower grades (see Model 1b).

Our findings concerning student identification with their studies were in line with Hypothesis 3. For personal identity, results show that higher perceived coherence was positively related to stronger identity commitment and lower identity reconsideration (see Model 2a), meaning that students with more positive coherence perceptions were more committed to their studies and less likely to search for alternative study options. As expected, when students reported their program as more coherent, they reported a higher importance of being a teacher/law/medicine student for their sense of self (in-group centrality), and more positive feelings towards their student peer group (in-group satisfaction). In addition to these expected associations, we found that higher coherence positively related

TABLE 2 Post-hoc comparisons of perceived program coherence by discipline (tukey's HSD test).

Discipline		Mean difference	95%CI LL	95%CI UL	<i>p</i>	Cohen's <i>d</i>	95%CI LL	95%CI UL
1. Teaching	2. Medicine	0.192	-0.148	0.532	0.633	0.306	-0.085	0.697
1. Teaching	3. Psychology	0.488	0.138	0.838	0.001	0.890	0.469	1.309
1. Teaching	4. Biology	0.204	-0.142	0.550	0.584	0.371	-0.030	0.769
1. Teaching	5. Nutrition	0.204	-0.164	0.572	0.653	0.372	-0.052	0.797
1. Teaching	6. Law	0.368	0.015	0.722	0.035	0.641	0.224	1.055
1. Teaching	7. Economics	0.185	-0.176	0.545	0.731	0.321	-0.095	0.735
2. Medicine	3. Psychology	0.296	-0.048	0.639	0.144	0.484	0.088	0.886
2. Medicine	4. Biology	0.012	-0.328	0.352	1.000	0.020	-0.368	0.408
2. Medicine	5. Nutrition	0.012	-0.350	0.374	1.000	0.020	-0.393	0.434
2. Medicine	6. Law	0.177	-0.171	0.524	0.740	0.278	-0.120	0.679
2. Medicine	7. Economics	-0.007	-0.361	0.347	1.000	-0.011	-0.416	0.394
3. Psychology	4. Biology	-0.283	-0.633	0.067	0.200	-0.534	-0.940	-0.125
3. Psychology	5. Nutrition	-0.284	-0.655	0.088	0.264	-0.537	-0.968	-0.103
3. Psychology	6. Law	-0.119	-0.477	0.238	0.956	-0.214	-0.623	0.197
3. Psychology	7. Economics	-0.303	-0.667	0.061	0.175	-0.543	-0.964	-0.115
4. Biology	5. Nutrition	0.000	-0.368	0.368	1.000	0.000	-0.421	0.420
4. Biology	6. Law	0.164	-0.190	0.518	0.813	0.294	-0.114	0.700
4. Biology	7. Economics	-0.019	-0.380	0.341	1.000	-0.034	-0.446	0.378
5. Nutrition	6. Law	0.165	-0.211	0.540	0.851	0.296	-0.135	0.727
5. Nutrition	7. Economics	-0.019	-0.400	0.362	1.000	-0.034	-0.470	0.402
6. Law	7. Economics	-0.184	-0.551	0.184	0.756	-0.314	-0.737	0.110

N = 324. LL = lower limit, UL = upper limit. Differences where the CI of Cohen's *d* did not include zero are highlighted in bold.

to higher in-group solidarity, higher self-stereotyping and higher perceived in-group homogeneity. A more positive social identity was also associated with better high school grades (see Model 2b).

4 Discussion

The present study investigated coherence perceptions of students in seven different study programs. Analyzing the role of coherence in student motivation and student identification with their studies, this study is the first that has comprehensively assessed these outcomes with multiple facets derived from theories on achievement motivation (Eccles and Wigfield, 2020), personal identity development (Crocetti et al., 2008), and social identity (Leach et al., 2008).

4.1 Coherence in different study programs

Although many authors have described establishing coherence as a challenge to educators, our results show that students' generally viewed their program's coherence positive: the majority of students in this study agreed that different learning contents and opportunities were coordinated and connected. This aligns with other quantitative studies considering students' perspective on program coherence (e.g., Canrinus et al. 2019; Leijen et al., 2025). However, students did not fully agree with

the statements on program coherence, suggesting that there is still room for improvement. It would be informative to examine coherence perceptions longitudinally to test whether these perceptions improve as students develop greater awareness of how course contents and activities fit together and how they may be useful for their future profession. Effects have been shown in a short-term intervention during the first semester at university (Biberman-Shalev, et al., 2024), but there is a paucity of knowledge on how coherence develops throughout students' academic progression.

Results concerning Hypothesis 1 show differences between students from different programs. As expected, teacher students reported the lowest coherence, particularly compared to students of psychology or law. In turn, psychology students reported higher coherence than most other students. At present, we might only speculate about the reasons for this latter finding. For example, the teacher students in this study mainly attended courses in their two main subjects. These are typically not designed for teacher students but for students studying the respective major. Moreover, courses on pedagogical content knowledge, that could potentially bridge content knowledge and pedagogical knowledge, were largely missing. This shows how teacher students are confronted with various disciplines and thus also with different scientific perspectives (e.g., empirical, humanities), which might be more difficult to integrate than contents in law or psychology. Law students took courses in law history, academic work in law, public law or in addition to an

TABLE 3 Latent regression models predicting achievement motivation (model 1) and identification (model 2) by perceived program coherence and covariates.

Predicting achievement motivation										
Predictors	Model 1a				Model 1b					
	Program coherence		Program coherence		Age		Gender		GPA	
Dependent variables	β	p	β	p	β	p	β	p	β	p
Academic self-concept	.329	>.001	.330	>.001	.050	.427	.011	.864	-.133	.032
Intrinsic value	.326	>.001	.326	>.001	.136	.005	-.064	.241	-.282	>.001
Attainment value	.396	>.001	.398	>.001	.076	.235	-.086	.130	-.229	>.001
Utility value	.423	>.001	.423	>.001	.058	.277	-.078	.176	-.097	.112
Effort cost value	-.094	.204	-.091	.213	-.143	.018	-.098	.096	.162	.008
Emotional cost value	-.317	>.001	-.316	>.001	-.106	.078	-.060	.292	.173	.003
Opportunity cost value	-.073	.294	-.076	.270	.042	.451	-.062	.314	.092	.157

Predicting personal/social identification										
Predictors	Model 2a				Model 2b					
	β	p	β	p	β	p	β	p	β	p
Identity commitment	.390	>.001	.387	.000	.096	.063	.026	.672	-.015	.790
Identity reconsideration	-.245	.009	-.243	.009	-.085	.174	.016	.793	.017	.779
In-group centrality	.277	>.001	.276	.001	.083	.208	-.020	.744	-.125	.047
In-group satisfaction	.352	>.001	.353	.000	.108	.037	-.061	.301	-.205	.001
In-group solidarity	.272	>.001	.275	.000	.055	.435	-.131	.027	-.221	.000
Self-stereotyping	.293	>.001	.296	.000	-.020	.740	.039	.497	-.174	.008
In-group homogeneity	.196	.003	.194	.004	.082	.316	.026	.668	-.149	.028

N = 326. Model fits were for Model 1a: Chi-sq (674) = 1,142.048, CFI = 0.916, TLI = 0.907, RMSEA = 0.046 [90%CI: 0.042–0.051], SRMR = 0.067. Model 1b: Chi-sq (767) = 1,275.642, CFI = 0.911, TLI = 0.900, RMSEA = 0.045 [90%CI: 0.041–0.052], SRMR = 0.065. Model 2a: Chi-sq (406) = 665.498, CFI = 0.928, TLI = 0.917, RMSEA = 0.044 [90%CI: 0.038–0.050], SRMR = 0.062. Model 2b: Chi-sq (475) = 789.798, CFI = 0.917, TLI = 0.902, RMSEA = 0.045 [90%CI: 0.040–0.050], SRMR = 0.060. Significant effects are highlighted in bold.

introduction to law studies. Psychology students took courses of general, developmental, social, biological and personality psychology as well as empirical methods of psychology. It is also possible that the courses offered in the first semester of the teacher education program were less coordinated than in psychology or law.

4.2 Potential benefits of coherence

Our findings on coherence, motivation and identification largely confirmed our expectations. Overall, coherence was a stronger predictor of motivation and identification than age, gender or prior school achievement. Confirming Hypothesis 2, students who perceived higher program coherence also reported a more positive academic self-concept and stronger value beliefs. This is consistent with some prior studies reporting beneficial effects of coherence on student outcomes which are similar to the motivation constructs examined in the present study (e.g., Goh and Canrinus, 2019; Lorentzen et al., 2018 Seidel et al., 2005).

Our findings support the assumption that links across courses foster conceptual understanding and integrated knowledge which in turn strengthens ability-related beliefs, i.e., a person’s academic self-concept (Newman et al., 2001). The strongest associations were found with utility and attainment value. This might reflect that when coherence is high, students more easily recognize how

their different courses are relevant to their professional development and understand what it means to become a doctor, a lawyer or a biologist (see also the study by Biberman-Shalev et al., 2024). Beyond that, we found that students who perceived higher coherence also said that they liked their studies more (i.e., higher intrinsic value) and felt less emotional strain (i.e., emotional cost), which is in line with the sense-of-coherence concept (Antonovsky and Sagy, 1986) and some prior studies (Born et al., 2008; Hellweg, 2019). While sense of coherence reflects a person’s global orientation toward the world, the narrower concept of program coherence may ultimately affect motivation through the same mechanisms. Finally, regarding negative value, only one cost component—experiencing negative emotions—was associated with lower program coherence. Neither the belief that studying requires too much effort nor the belief that one misses out on other activities was related to program coherence. This may be due to the timing of data collection, which coincided with end-of-semester exams, resulting in generally high levels of perceived effort and opportunity costs.

The results further corroborated our assumption that in coherent study programs, students identify more strongly with their studies and with their fellow students (Hypothesis 3). On the one hand, program coherence implies high program quality, and our findings suggest that it is associated with greater

satisfaction in being part of the program (Holmström and Stjärnhagen, 2024). This also corresponds with the other indicators of social identification, showing that students in more coherent programs hold more positive beliefs about their fellow students studying the same subject. On the other hand, the higher personal meaning that students create when coherence is high, could lead to feeling more committed to their choice and to a lower tendency to explore alternative career options. This interpretation is also supported by qualitative research findings (Biberman-Shalev et al., 2024).

4.3 Limitations and future directions

The present study has several limitations, including its cross-sectional one-site design, limiting causal interpretations and representativeness. Moreover, our study included first-semester students, and the timing of our data collection was scheduled at the end of the semester term where students wrote exams and had deadlines for essays. Both factors may have impacted their perceptions and beliefs. Another limitation is the low comparability between the study programs (Holmström and Stjärnhagen, 2024), because programs differ in duration, structure, and program objectives. Therefore, it cannot be ruled out that the different performance requirements and subject orientations in the various degree programs may lead to differences in the development of coherence, motivation and identification.

Also, it is possible that the relationships among coherence, motivation, identification and other outcomes are more complex than we examined in this study. For example, students with higher motivation might be more motivated to understand how the various courses hang together and to find links between them. Similarly, students who strongly identify and feel highly committed to their studies might have a tendency to perceive such coherent connections. Future work could aim at more systematic theory development on the possible benefits of coherence on students and the mechanisms through which these come about.

5 Conclusion

This study extends the previously limited quantitative evidence on the role of program coherence in student motivation and identification with their studies, covering a range of subjects from biology to law. The findings support previous assertions from teacher education research regarding the importance of coherence for students' professional development. Notably, higher coherence went along with a more positive academic self-concept and stronger value beliefs, indicating a deeper sense of purpose and meaning in students' academic pursuits. Furthermore, higher coherence was associated with stronger identification, highlighting the potential of coordinated learning experiences to foster a sense of community and shared identity. We therefore suggest that higher education instructors in any discipline may benefit from investing in coordinated learning opportunities from the very first semester.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: <https://osf.io/s2c9h/>.

Ethics statement

The institutional review board at the Faculty of Social and Behavioural Sciences, Friedrich-Schiller-University Jena. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JD: Formal analysis, Writing – original draft, Funding acquisition, Conceptualization. V-DB: Writing – original draft. MJ: Writing – review & editing, Conceptualization, Investigation. AO: Investigation, Conceptualization, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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