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Mentoring for well-being, engagement and academic achievement in higher education students

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College students are recognized as a vulnerable population due to excessive academic demands, societal changes, and limited resources, leading to increased stress and burnout. Mentoring has been proposed as a strategy to enhance students skills and well-being. However, research on mentoring programs reveals a gap in addressing definitional, theoretical, and methodological issues. The aims of the present work were, therefore, to design and pilot a mentoring-based intervention to assist students transitioning to higher education, through an action-research and psychoeducational paradigm, and to address the aforementioned gaps. Two studies were conducted at a Portuguese public university's department, between August of an academic semester and the following March. Study 1 involved designing and testing a training program to equip mentors with tools to support 1st year students' well-being, engagement, and academic performance. A quasi-experimental one, and another inspired by a multiple-case experiment design, were implemented. The study included an experimental ($n = 20$) and control group ($n = 15$), through self-selection sampling, with pre- and post-test. The mentors' knowledge was measured through a purposely built questionnaire on vocational development, approaches to learning, self-regulated learning, sense of belonging, and socio-emotional skills. The experimental group's participants also provided feedback on the perceived impact of the training program through 10 additional items at post-test. Study 2 examined the impact of this training through the effects of its implementation on a convenience sample of four mentees (1st year students), assessing their knowledge and skill perception on similar variables at pre- and post-test. Additional items and an open-ended questionnaire to evaluate the intervention's perceived impact were also included. Quantitative data underwent statistical analysis (independent- and paired-samples t -test, except for "knowledge about approaches to learning," analyzed through Mann-Whitney U and Wilcoxon signed-rank tests), and a case-by-case analysis, while qualitative data were subjected to thematic analysis. Results indicated a statistically significant knowledge increase in Study 1's experimental group after training, contrasting with the control group, and a potentially positive impact on the development of Study 2's mentees. The perceived changes' analysis indicated that most participants experienced a moderate to satisfactory impact. The present work highlights the potential benefits of a mentoring intervention with a precedent mentors' training program.

KEYWORDS

academic achievement, academic engagement, academic performance, higher education, mentoring, training, well-being

1 Introduction

College students are recognized as a vulnerable population regarding their mental health. This phenomenon is due to the developmental challenges of emerging adulthood (Arnett, 2018) and the stressors linked to transitioning to higher education (Gallagher et al., 2019). These stressors include, among others, the need for autonomous deep learning (e.g., Biggs and Tang, 2022; Panadero, 2017) and for building new peer relationships (e.g., Strayhorn, 2018). Besides, such challenges can intensify during social crises, as seen during the COVID pandemic (Padrón et al., 2021). Additionally, young people's careers have become less stable and more unpredictable, marked by greater multidirectional mobility and the blending of various life roles (e.g., Lyons et al., 2015). Thus, implementing psychoeducational interventions like mentoring (e.g., Kachaturoff et al., 2020) is essential for enhancing the personal and academic well-being of this student cohort, considering the specific difficulties encountered during secondary education (Marques-Pinto et al., 2021) and those anticipated for post-tertiary education.

Excessive academic demands and inadequate resources increase students' risk of prolonged stress and burnout (Liu et al., 2023). Institutional support and individual coping mechanisms are essential factors that can protect and promote well-being, academic engagement, and performance among higher education students (e.g., Chaudhry et al., 2024; Liu et al., 2023; Martinez et al., 2019). Some proposed individual factors relate to self-regulated learning and autonomous goal regulation (Davis and Hadwin, 2021; Rodríguez et al., 2022), socio-emotional skills (Flores et al., 2021; Reinert, 2019), a deep approach to learning (Fuente et al., 2020; Tho et al., 2020) and a sense of belonging within the university's context (Strayhorn, 2018; Taff and Clifton, 2022). Furthermore, cultivating specific skills such as risk-taking, opportunity-seizing, persistence, curiosity, flexibility, and optimism in higher education can enhance the development of successful career trajectories (Callanan et al., 2017; Sidiropoulou-Dimakakou et al., 2016).

Specifically, self-regulated learning (SRL) and students' approaches to learning (SAL) come into consideration regarding the promotion of students' learning processes. SRL has been described as an autonomous process through which learners transform their cognitive capabilities into academic competencies, and encompasses skills in forethought, monitoring, and self-reflection (Panadero, 2017; Zimmerman, 2013), while SAL involves the combinations of motivation and learning strategies which result in deep or surface approaches to learning (Biggs and Tang, 2022). In terms of particular strategies, within the SRL framework, promoting interpersonal interaction through collaborative groups has been found to play a vital role in constructing shared knowledge and co-regulation (Hadwin et al., 2018; Isohätälä et al., 2017). On the other hand, within the SAL perspective, facilitating a deep approach to learning (i.e., the combination of intrinsic motivation and deep learning strategies) has been noted to positively affect academic well-being (Fuente et al., 2020) and quality of academic life (Tho et al., 2020).

Concurrently, socio-emotional skills (e.g., Reinert, 2019) and students' sense of belonging (e.g., Strayhorn, 2018) are significant for psychological and academic well-being. Cultivating skills like self-awareness and emotional self-regulation aids stress management and concentration, while social awareness fosters support networks and effective collaboration (Reinert, 2019). Also, fostering students'

responsible decision-making is essential to enhance problem-solving abilities and ethical perspectives (Huynh et al., 2023; Knight et al., 2015). In this regard, mindfulness practices emerge as an effective tool for socio-emotional learning while reducing anxiety and improving well-being (Dawson et al., 2019). Moreover, when students feel socially integrated, they demonstrate higher motivation, academic self-confidence, and engagement (Pedler et al., 2021; Rehman et al., 2023).

In terms of institutional support, then, mentoring has been empirically validated as a strategy to enhance students' well-being, engagement, learning process, and professional identity (Kachaturoff et al., 2020). Mentoring programs, based on the support provided by older peers to 1st year students within the same institution, facilitate student integration, enrich experiential learning, promote cognitive and psychological development, and ease transitions (Akinla et al., 2018; Torrejón-Ramos et al., 2023).

Specifically, the effectiveness of mentoring programs may be due to their alignment with participatory approaches within an action-research perspective. This allows individuals to express their viewpoint, to participate in decision-making, and to influence interventions that address their interests and needs (Levac et al., 2019). Such approaches—favoring creative methods like visual, artistic, narrative, and digital techniques—are linked to improved interventions and positive outcomes for young people (Mitra, 2018; Ozer et al., 2020).

Nonetheless, mentoring programs in higher education face a set of challenges, including lack of institutional support, excessive bureaucracy, time constraints, and difficulties in matching mentors and mentees (Barrett et al., 2017; Santos et al., 2020). Research on mentoring programs reveals a gap in addressing definitional, theoretical, and methodological issues, with many studies lacking information on program components or failing to use rigorous research designs and evidence-based strategies (Nuis et al., 2023; Pleschová and McAlpine, 2015). This underscores the need for thorough investigations of mentoring programs in academia. In this regard, a comprehensive approach has been proposed, by fostering a supportive organizational culture, providing adequate resources, training and orientation to mentors, and addressing students' specific needs related to academic, psychological and emotional support, goal setting, career choice, and behavioral modeling (Cornelius et al., 2016; Etzkorn and Braddock, 2020; Fountain and Newcomer, 2016; Santos et al., 2020).

Accordingly, the present work aimed to meet the above-mentioned research gap and suggestions, by developing and testing mentoring-based tools to assist students in their transition to higher education, grounded in action-research and psychoeducational approach. Specifically, such tools are both theoretically grounded and operationalized in detail, and its testing was conducted, within a supportive academic context, by using a rigorous research design and evidence-based strategies. Moreover, these tools contemplate both mentors and students, and consider the particular needs of individuals in a variety of dimensions.

In this sense, two interlinked studies were conducted. Study 1 aimed to develop and evaluate a mentors' training program in higher education, designed to equip mentors with skills to effectively support 1st year students. At first, this study aimed to assess the effects of the training program on the knowledge of a mentor group regarding the following topics: vocational development/career management, sense

of belonging, approaches to learning, self-regulated learning, and socio-emotional skills. These variables were chosen based on a prior study identifying the psychological needs of 1st year students and their mentors during the transition to higher education (Duarte et al., 2024b). On the other hand, Study 2 explored the training program's efficacy through its implementation in four 1st year students (mentees), measuring their well-being, academic engagement, academic performance, knowledge and skill perception in the specified topics. The perceived impact of the training program (mentors) and mentoring intervention (mentees) was also assessed.

Thus, Study 1 encompassed two research hypotheses. Hypothesis 1 (H1) posited that the mentors' training would lead to an increase in both partial (topic-specific) and global knowledge in the experimental group compared to the control group. Complementarily, Hypothesis 2 (H2) proposed that, despite the expected knowledge improvements postulated by H1, interindividual variability would be observed in the experimental group.

Likewise, Study 2 comprised two research hypotheses, with Hypothesis 1 (H1) proposing that the mentoring intervention would lead to an increase in the well-being, academic engagement, academic performance, knowledge and skill perception amongst mentees. Similarly to Study 1, Hypotheses 2 (H2) posited that, despite the anticipated changes, interindividual variability would be observed between participants.

2 Study 1

2.1 Method

2.1.1 Research design

To test hypothesis 1 (which concerns the modification of mentors' partial and global knowledge—the dependent variables 1), a quasi-experimental research design was selected. Accordingly, an experimental group (mentors who participated in the training

program described below—the independent variable) was assembled, through self-selection sampling, and assessed twice (pre- and post-test). The training program was composed of six 120-min sessions in non-school hours, at the start of the academic year (i.e., September and October). At the same time, a control group was recruited (a convenience sample of mentors who participated only in the same assessments).

To test hypothesis 2 (related to interindividual variability), a procedure inspired by a “multiple-case experiment design” was employed (Alqraini, 2017; Tanner, 2018). Consequently, the dependent variables were assessed in each participant of the experimental group (mentors) at the two specified assessment stages (i.e., a case-by-case comparison of the results between pre- and post-test). Perceptions of the intervention's overall impact were assessed at post-test.

2.1.2 Participants

The study sample comprised 35 students who served as mentors at a department of a Portuguese public university. The sample consisted of 28 females (80%), six (17.1%) males, and one (2.9%) non-binary person. The participants were between 18 and 22 years old ($M = 19.43$; $SD = 1.12$), with the majority in the 2nd year of a Bachelor's degree ($n = 24$; 68.6%).

The initial experimental group included mentors who attended at least four of the six training sessions central to this study. It consisted of 20 participants: 15 (75%) who identified as female, four (20%) as male, and one (5%) as non-binary, with a mean age of 19.75 years ($SD = 1.16$). Regarding their academic year, 12 (60%) participants were in their 2nd year and four (20%) in their 3rd year of a Bachelor's Degree, and four (20%) in their 1st year of a Master's Degree. The sociodemographic characteristics of the experimental group's participants at baseline per each session and regarding the totality of the training program is specified on Table 1.

The control group consisted of mentors who had not enrolled in the training program. This group comprised 15 students: 13 (86.7%)

TABLE 1 Knowledge, skill perception, well-being, academic engagement and performance of each mentee (average of items of each variable of the Adaptation Processes in Higher Education Inventory).

Baseline characteristic	Vocational development		Sense of belonging		Approaches to learning		Self-regulated learning		Socio-emotional skills ^a		All sessions ^b	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender												
Female	11	68.8	11	68.8	14	73.7	15	75	7	70	13	86.7
Male	4	25	4	25	4	21.1	4	20	3	30	2	13.3
Non-binary	1	6.3	1	6.3	1	5.3	1	5	—	—	—	—
Academic year												
Bachelor's (2 nd year)	10	62.5	9	56.3	11	57.9	12	60	9	90	13	86.7
Bachelor's (3 rd year)	4	25	4	25	4	21.1	4	20	1	10	2	13.3
Master's (1 st year)	2	12.5	3	18.8	4	21.1	4	20	—	—	—	—
Total	16	80 ^c	16	80 ^c	19	95 ^c	20	100 ^c	10	50 ^c	8	40 ^c
Age	19.63 ($SD = 1.03$)		19.75 ($SD = 1.24$)		19.84 ($SD = 1.12$)		19.75 ($SD = 1.16$)		19.20 ($SD = 0.789$)		19 ($SD = 0.93$)	

N = 20.

^aReflects the participants who attended a total of 3 sessions connected to the socio-emotional skills' theme (compared to the rest of the themes, which only encompassed 1 session).

^bThe training program encompassed a total of 7 sessions.

^cReflects a percentage in relation to the total number of participants of the experimental group.

participants identified as female and two (13.3%) as male, at the pre-test stage, with an average age of 19 years ($SD = 0.93$). Regarding their academic year, 13 (86.7%) participants were in the 2nd year and two (13.3%) in their 3rd year of the Bachelor's Degree.

The study was approved by an ethics institutional committee and participants gave their informed consent.

2.1.3 Measures

2.1.3.1 Knowledge questionnaire

To evaluate the knowledge gained from the training program, an online Knowledge Questionnaire was created. This inventory included 33 items across five knowledge areas, presented in the following order: (1) six items on vocational development (e.g., i3. "It is the contextual variables that determine the career path of individuals."), pertaining to "knowledge about vocational development" (VK); (2) six items on approaches to learning (e.g., i10: "A deep approach to learning is often associated with a high-quality learning product."), referring to "knowledge about approaches to learning" (ALK); (3) nine items on self-regulated learning (e.g., i16: "The self-regulatory process can be defined as a dynamic and open process, which implies a cyclical activity on the part of students"), pertaining to "knowledge about self-regulated learning" (SRLK); (4) five items on sense of belonging (e.g., i23. "A sense of social fit in college generally assumes greater importance for students with a high level of belonging in school contexts."), referring to "knowledge about sense of belonging" (SBK); and (5) seven items on socio-emotional skills (e.g., i30. "Self-care in the lives of higher education students does not influence their stress levels."), pertaining to "knowledge about socio-emotional skills" (SESK). The selection of these variables was informed by the findings of a preceding study, which aimed to assess the psychological needs of 1st year students and their mentors regarding the students' transition to higher education (Duarte et al., 2024b). The items were answered using a Likert scale from 1 (*I am totally confident that this is false*) to 5 (*I am totally confident that this is true*). To minimize potential carryover effects of learning, the item order was randomized between pre- and post-test for both groups.

In accordance with its stated aims, the study examined data from the five knowledge domains individually as "partial knowledge" (VK, ALK, SRLK, SBK and SESK) and globally as a "composite" variable representing participants' "global knowledge" (GK).

2.1.3.2 Perception of training's impact questionnaire

To assess the participants' perception of the training's impact, a 10 item-online questionnaire was created. This set contained two items for each knowledge domain in the aforementioned Knowledge Questionnaire (e.g., i9. "After my participation in this training, I learned strategies to self-regulate emotions"). These items were administered to the experimental group during the post-test stage using a 5-point Likert scale of 1 (*Not at all*) to 5 (*Totally*), considering their perceived changes.

2.1.4 Intervention procedure

The training program for the mentors' experimental group consisted of eight thematic 120-min sessions, which were conducted by the study's authors through an action-research approach. The sessions focused on the following themes: (1) integration into the institution (1 session); (2) vocational development—career

management (1 session); (3) sense of belonging (1 session); (4) approaches to learning (1 session); (5) self-regulated learning (1 session); and (6) socio-emotional skills (3 sessions).

The training program aimed to achieve two main objectives: (1) to enhance the understanding of the constructs and models related to each session's theme; and (2) to cultivate skills in recognizing and fostering behaviors that enhance academic engagement, performance, and well-being. These included promoting integration and a sense of fit within the institution, career adaptability, a deep approach to learning, self-regulated learning, self-care, and communication skills. Participants were encouraged to apply these skills in their personal lives and interactions with their mentees.

The training program's curriculum included: (1) an overview of relevant constructs and models, (2) desired outcomes for mentees, and (3) activities and evaluation tools to achieve and assess these outcomes. The training methodology was mainly practical, utilizing diverse strategies such as self-knowledge exercises, guided reflection, case studies, documented activities, art-based training, procedural modeling, and reading recommendations. The intervention was supported by a mentoring program's manual (Duarte et al., 2024a), purposefully developed to support mentors in the mentoring activities' application.

2.1.5 Data analysis

In the initial phase, the mentors' knowledge levels in the control and experimental groups were compared at the pre-test stage using an independent-samples *t*-test. Exceptionally, Mann-Whitney *U* test was employed to analyze the "knowledge about approaches to learning" (ALK). Mean, standard deviation, asymmetry and kurtosis values, normality and homogeneity tests and subsamples' sizes were analyzed to support these statistical decisions.

The Knowledge Questionnaire data were analyzed in two ways: (1) regarding five variables ("partial knowledge"); and (2) using a "composite" variable ("global knowledge"), derived from the average sum of the 33 items. To aid result interpretation due to varied response trends, items answered "False" were inverted. The Likert scale values were then interpreted as follows: 1—"Incorrect answer," 2—"Moderately incorrect answer," 3—"Unknown answer," 4—"Moderately correct answer" and 5—"Correct answer."

To assess the variables within the experimental group, only participants present during the relevant sessions were considered. For "knowledge about socio-emotional skills" (SESK), this included those who attended all three sessions regarding the topic. Considering "global knowledge" (GK), only participants who completed all six training sessions were included.

To test H1 (which predicted an increase in mentors' "partial knowledge" and "global knowledge" due to training), a paired-samples *t*-test was used, except for "knowledge about approaches to learning," which employed the Wilcoxon signed-rank test. These variables were assessed at both stages (pre- and post-test) in both groups (control and experimental) to analyze their evolution. To determine differences between groups after training (post-test), the independent-samples *t*-test was applied for the same variables, with the Mann-Whitney *U* test for "knowledge about approaches to learning."

To test H2 (which predicted inter-individual variability), the effectiveness of the training program was examined in each participant of the experimental group. This involved comparing their values in the dependent variables at two assessment points and assessing the

number of participants who showed an increase, decrease, or maintenance in each variable.

The impact of the training program was evaluated through the average sum of the following set of items designed for this purpose: (1) two items from each thematic area to assess the impact of individual sessions, and (2) the total of 10 items to assess the overall impact of the training program. Mean values for each participant and the total group were calculated for each variable.

2.2 Results

This section consists of three subsections. The first part analyzes metrological data concerning each knowledge indicator, justifying the present study's statistical choices. The second examines changes in the dependent variables—partial and global knowledge—before and after the training program. The third analyzes the participants' perceptions of the program's impact using a specific set of items.

2.2.1 Knowledge questionnaire's metrological analysis

The analysis of the mean, standard deviation, asymmetry and kurtosis values, normality and homogeneity tests, and of the size of the subsamples, as illustrated in Table 2, indicated a tendency towards a normal distribution in both groups at pre-test and post-test for: “knowledge about vocational development” [VK; $W_{EG}(16) = 0.902$, $p = 0.087$ and $W_{CG}(15) = 0.914$, $p = 0.154$ at pre-test; and $W_{EG}(16) = 0.962$, $p = 0.702$ and $W_{CG}(15) = 0.939$, $p = 0.366$ at post-test], “knowledge about self-regulated learning” [SRLK; $W_{EG}(20) = 0.975$, $p = 0.861$ and $W_{CG}(15) = 0.964$, $p = 0.756$ at pre-test; and $W_{EG}(20) = 0.947$, $p = 0.328$ and $W_{CG}(15) = 0.976$, $p = 0.931$ at post-test], “knowledge about sense of belonging” [SBK; $W_{EG}(16) = 0.973$, $p = 0.889$ and $W_{CG}(15) = 0.928$, $p = 0.255$ at pre-test; and $W_{EG}(16) = 0.894$, $p = 0.065$ and $W_{CG}(15) = 0.912$, $p = 0.145$ at post-test], “knowledge about socio-emotional skills” [SESK; $W_{EG}(10) = 0.945$, $p = 0.613$ and $W_{CG}(15) = 0.947$, $p = 0.476$ at pre-test; and $W_{EG}(10) = 0.886$, $p = 0.152$ and $W_{CG}(15) = 0.937$, $p = 0.345$ at post-test] and “global knowledge” [GK; $W_{EG}(8) = 0.931$, $p = 0.529$ and $W_{CG}(8) = 0.933$, $p = 0.545$ at pre-test; $W_{EG}(8) = 0.838$, $p = 0.071$ and $W_{CG}(8) = 0.992$, $p = 0.998$ at post-test].

Additionally, homogeneity of variances was found between the experimental and control groups at both assessment points for the same variables: $F_{VK}(1,29) = 0.978$, $p = 0.331$ at pre-test, and $F_{VK}(1,29) = 0.116$, $p = 0.736$ at post-test; $F_{SRLK}(1,33) = 0.873$, $p = 0.357$ at pre-test, and $F_{SRLK}(1,33) = 2.611$, $p = 0.116$ at post-test; $F_{SBK}(1,29) = 0.000$, $p = 0.988$ at pre-test, and $F_{SBK}(1,29) = 1.395$, $p = 0.247$ at post-test; $F_{SESK}(1,23) = 1.458$, $p = 0.240$ at pre-test, and $F_{SESK}(1,23) = 3.896$, $p = 0.061$ at post-test; $F_{GK}(1,14) = 0.000$, $p = 0.987$ at pre-test, and $F_{GK}(1,14) = 4.016$, $p = 0.065$ at post-test. These initial findings supported the use of parametric tests to assess these indicators' evolution.

The results concerning “knowledge about approaches to learning” (ALK) suggested a non-normal distribution in the two assessment points for both the control [$W(15) = 0.753$, $p = 0.001$ at pre-test; and $W(15) = 0.839$, $p = 0.012$ at post-test] and experimental group [$W(15) = 0.869$, $p = 0.033$, at pre-test; and $W(15) = 0.845$, $p = 0.015$ at post-test]. No homogeneity in variances was found between the two groups at post-test for this variable [$F(1,28) = 11.081$, $p = 0.002$].

Therefore, non-parametric tests were applied to assess this indicator's evolution.

Finally, the experimental and control groups showed no statistically significant differences in the pre-test phase regarding the five “partial knowledge” variables, indicating their statistical equivalence and comparability: $t_{VK}(29) = 0.335$, $p = 0.740$; $U_{ALK} = 91$, $z = -0.906$, $p = 0.382$; $t_{SRLK}(33) = 1.517$, $p = 0.139$; $t_{SBK}(29) = 1.301$, $p = 0.204$; $t_{SESK}(23) = 0.253$, $p = 0.802$. The exception was found in “global knowledge,” where the two groups showed statistically significant differences at the pre-test stage: $t_{GK}(14) = 2.204$, $p = 0.045$, with the experimental group presenting a higher initial mean value ($M = 3.87$, $SD = 0.187$) than the control group ($M = 3.67$, $SD = 0.177$). This finding suggested the use only of a case-by-case analysis for this variable, using a design inspired in the multiple-case experiment design.

2.2.2 Partial and global knowledge

With regard to the modification of “partial knowledges”—dependent variables—as a function of mentors' training (H1), as shown in Table 3, a statistically significant difference was observed in “knowledge about vocational development” [VK; $t(15) = 4.516$, $p < 0.001$, $r = 0.76$], in “knowledge about approaches to learning” [ALK; $Z = -2.906$, $p = 0.002$, $r = -0.53$], in the “knowledge about self-regulated learning” [SRLK; $t(19) = 2.797$, $p = 0.012$, $r = 0.31$] and in “knowledge about socio-emotional skills” [SESK; $t(9) = 3.769$, $p = 0.004$, $r = 0.78$] between pre- and post-test in the experimental group. Specifically, these four “partial knowledges” demonstrated a significant increase ($p < 0.05$) from pre- to post-test, with “knowledge about vocational development” (VK), “knowledge about approaches to learning” (ALK) and “knowledge about socio-emotional skills” (SESK) showing a large effect, and “knowledge about self-regulated learning” (SRLK) showing a moderate effect, in accordance with Cohen (1988) parameters. No statistically significant difference was observed in “knowledge about sense of belonging” (SBK) between pre- and post-test in the experimental group [$t(15) = 1.660$, $p = 0.118$].

In contrast, the control group did not demonstrate a statistically significant difference between pre- and post-test for the variables under consideration: $t_{VK}(14) = -0.307$, $p = 0.764$; $Z_{ALK} = -0.722$, $p = 0.486$; $t_{SRLK}(14) = 0.834$, $p = 0.418$; $t_{SBK}(14) = -0.151$, $p = 0.882$; $t_{SESK}(14) = -0.845$, $p = 0.413$.

Furthermore, a statistically significant difference was observed in “knowledge about vocational development” [VK; $t(29) = 4.225$, $p < 0.001$], “knowledge about self-regulated learning” [SRLK; $t(33) = 2.621$, $p = 0.013$], “knowledge about sense of belonging” [SBK; $t(29) = 2.087$, $p = 0.046$] and “knowledge about socio-emotional skills” [SESK; $t(23) = 3.041$, $p = 0.006$] between the control and experimental groups at post-test. No statistically significant difference was observed in “knowledge about approaches to learning” (ALK; $U = 67.50$, $z = -1.913$, $p = 0.056$) between the two groups at the same assessment point.

Interindividual variability of the experimental group (H2) was examined by comparing the results of each participant at pre- and post-test (using a procedure based on a “multiple-case experiment design”), as presented in Table 4.

With regard to the “knowledge about vocational development” (VK), 14 participants exhibited an increase, one participant a reduction, and one participant no change. Considering the “knowledge about approaches to learning” (ALK), out of a total of

TABLE 2 Metrological characteristics of the Knowledge Questionnaire, in both groups and assessment points (mean, standard deviation, skewness, kurtosis, Shapiro–Wilk normality test and Levene homogeneity test).

Variables	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	<i>W</i>	<i>df</i>	<i>F</i>	<i>df1</i>	<i>df2</i>
VK									
Pre-test									
Control group	3.60	0.361	−0.961	2.273	0.914	15	0.978	1	29
Experimental group	3.65	0.398	0.469	−0.453	0.902	16			
Post-test									
Control group	3.58	0.372	0.918	1.502	0.039	15	0.116	1	29
Experimental group	4.10	0.321	−0.281	−0.456	0.962	16			
ALK									
Pre-test									
Control group	4.47	0.501	−2.002	4.677	0.753**	15	0.157	1	28
Experimental group	4.41	0.367	0.191	−1.310	0.869*	15 ¹			
Post-test									
Control group	4.43	0.607	−1.442	2.182	0.839*	15	11.08*	1	28
Experimental group	4.81	0.208	−0.992	0.392	0.845*	15 ¹			
SRLK									
Pre-test									
Control group	3.48	0.251	−0.221	−0.440	0.964	15	0.873	1	33
Experimental group	3.63	0.321	0.362	−0.300	0.975	20			
Post-test									
Control group	3.53	0.315	0.343	0.414	0.976	15	2.611	1	33
Experimental group	3.87	0.419	−0.178	−1.024	0.947	20			
SBK									
Pre-test									
Control group	3.29	0.384	0.894	0.761	0.928	15	0.000	1	29
Experimental group	3.48	0.392	−0.301	0.618	0.973	16			
Post-test									
Control group	3.28	0.369	−0.133	−0.499	0.912	15	1.395	1	29
Experimental group	3.63	0.531	1.214	1.766	0.894	16			
SESK									
Pre-test									
Control group	4.20	0.361	−0.186	0.555	0.947	15	1.458	1	23
Experimental group	4.24	0.486	−0.378	−0.378	0.945	10			
Post-test									
Control group	4.09	0.576	−0.108	−0.733	0.937	15	3.896	1	23
Experimental group	4.69	0.284	−0.610	−0.157	0.886	10			

(Continued)

TABLE 2 (Continued)

Variables	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	<i>W</i>	<i>df</i>	<i>F</i>	<i>df1</i>	<i>df2</i>
GK									
Pre-test									
Control group	3.67	0.177	−0.634	0.943	0.933	8 ¹	0.000	1	14
Experimental group	3.87	0.187	0.936	2.020	0.931	8			
Post-test									
Control group	3.64	0.209	−0.007	−0.024	0.992	8 ¹	4.016	1	14
Experimental group	4.24	0.080	−0.177	−2.269	0.838	8			

* $p < 0.05$ ** $p < 0.01$. VK = Knowledge about vocational development; ALK = Knowledge about approaches to learning; SRLK = Knowledge about self-regulated learning; SSFK = Knowledge about sense of social fit; SESK = Knowledge about socio-emotional skills; GK = Global knowledge.
¹The initial analysis of samples for “knowledge about approaches to learning” (ALK) and “global knowledge” (GK) showed heterogeneity in variances [$F(1,32) = 14.370, p = 0.001$; $F(1,21) = 6.008, p = 0.023$]. Due to the differing sample sizes in the control and experimental groups (4 participants in ALK and 7 in GK), an equivalent-participant random sample was taken from the group with the most responses. The presented results reflect the second analysis conducted post-randomization. The transformed group is indicated.

TABLE 3 Partial and global knowledge of the experimental (EG) and control (CG) groups (mean/median¹ of each variable measured by the corresponding set of items).

Group	VK		ALK		SRLK		SBK		SESK	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
EG	3.65	4.10*	4.50	4.83*	3.63	3.87*	3.48	3.63	4.24	4.69*
CG	3.60	3.58	4.67	4.67	3.48	3.53	3.29	3.28	4.20	4.09

*Statistically different ($p < 0.05$) from pre-test.
¹The median was used to interpret the evaluation of “knowledge about approaches to learning” (ALK).

19 participants, there was an increase in 14, no change in four, and a decrease in one. With regard to “knowledge about self-regulated learning” (SRLK), out of a total of 20 participants, there was an increase in 12, no change in four, and a reduction in four. Regarding “knowledge about sense of belonging” (SBK), out of a total of 16 participants, there was an increase of 10, a decrease of five, and no change in one participant. With respect to “knowledge about socio-emotional skills” (SESK), out of a total of 10 participants who attended the three corresponding sessions, there was an increase in eight, a reduction in one, and no change in one participant. Considering the “global knowledge” (GK), all participants who attended all training sessions exhibited an increase.

2.2.3 Perception of the training program’s impact

The mentors’ experimental group perceived a moderate impact from the training program, as indicated by the mean score across items assessing the five thematic areas ($M_{\text{Vocational}} = 3.33, SD_{\text{Vocational}} = 0.939; M_{\text{Approaches}} = 2.85, SD_{\text{Approaches}} = 1.086; M_{\text{Self-Regulated Learning}} = 3.03, SD_{\text{Self-Regulated Learning}} = 0.977; M_{\text{Belonging}} = 3.27, SD_{\text{Belonging}} = 0.799; M_{\text{Socio-emotional}} = 3.39, SD_{\text{Socio-emotional}} = 0.486$), and the overall program ($M_{\text{Global}} = 3.05, SD_{\text{Global}} = 0.535$).

Among participants reporting an average impact equal to or greater than 4 (*Very much*), participants responses exhibited the following distribution: self-regulated learning ($N = 6; 33.3\%$), vocational development ($N = 4; 26.8\%$), sense of belonging ($N = 4; 26.8\%$), approaches to learning ($N = 4; 23.5\%$), and socio-emotional skills ($N = 2; 22.2\%$). No participant exhibited an average impact equal to or greater than 4 (*Very much*) for the overall program.

3 Study 2

3.1 Method

3.1.1 Research design

To test hypothesis 1 (which concerns the modification on knowledge, skill perception, well-being, academic engagement and performance of the mentees—dependent variables) and hypothesis 2 (related to interindividual variability), a procedure inspired by a “multiple-case experiment design” was employed (Alqraini, 2017; Tanner, 2018), similar to Study 1. The dependent variables were assessed in each participant at the two assessment stages, with a case-by-case comparison of their results.

Study 2 involved a convenience sample of 1st year students (mentees) and served to complement the evaluation of the mentor training program’s impact of Study 1. These students were mentored by trained mentors, with corresponding variables assessed at pre- and post-test. The intervention included six modules led by two mentor groups in non-school hours, at the end of the 1st academic semester (i.e., November and December). Perceptions of the intervention’s overall impact and valuation were assessed at post-test.

3.1.2 Participants

The study’s sample consisted of 1st year students who were mentored by individuals who had enrolled on the training program. The group was composed of four female students with a mean age of 18.75 years ($SD = 0.50$) at pre-test. With regard to their attendance at the mentoring intervention, three of the participants attended all of the modules, while one participant only attended modules focused on

TABLE 4 Partial and global knowledge of each participant in the experimental group (average of items of each variable of the Knowledge Questionnaire).

P.	VK		ALK		SRLK		SBK		SESK		GK	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	3.83	3.83 =	4.00	4.67 >	3.33	3.78 >	3.60	3.80 >	4.00	4.71 >	3.73	4.15 >
2	3.83	4.33 >	4.33	4.83 >	3.89	4.44 >	—	—	—	—	—	—
3	3.17	4.00 >	4.00	5.00 >	4.11	4.11 =	3.60	3.80 >	4.57	4.71 >	3.94	4.33 >
4	3.17	4.17 >	4.67	4.83 >	3.89	4.00 >	3.80	3.80 =	4.14	4.71 >	3.94	4.30 >
5	3.83	4.00 >	4.00	4.50 >	3.56	3.56 =	3.40	4.00 >	4.43	5.00 >	3.85	4.18 >
6	3.33	4.17 >	4.67	5.00 >	3.22	4.11 >	3.60	3.20 <	3.43	4.14 >	3.61	4.15 >
7	—	—	4.00	5.00 >	3.67	3.22 <	3.60	3.40 <	—	—	—	—
8	3.33	3.50 >	4.17	4.33 >	3.44	3.67 >	3.80	3.60 <	—	—	—	—
9	4.17	4.33 >	4.50	4.67 >	3.67	3.44 <	4.00	4.40 >	5.00	5.00 =	4.24	4.30 >
10	3.83	4.33 >	5.00	4.67 <	3.67	4.11 >	3.20	3.40 >	3.57	4.43 >	3.85	4.21 >
11	—	—	5.00	5.00 =	4.33	4.33 =	—	—	—	—	—	—
12	3.17	3.67 >	4.00	5.00 >	3.56	3.56 =	—	—	—	—	—	—
13	3.33	4.67 >	4.00	5.00 >	3.89	3.78 <	3.40	3.20 <	4.14	5.00 >	3.79	4.33 >
14	4.50	4.17 <	5.00	5.00 =	4.00	4.44 >	3.40	3.00 <	—	—	—	—
15	4.00	4.50 >	4.50	4.83 >	3.33	3.78 >	3.20	3.80 >	—	—	—	—
16	3.83	4.33 >	5.00	5.00 =	3.56	4.44 >	4.20	5.00 >	—	—	—	—
17	3.33	3.67 >	5.00	5.00 =	3.44	3.11 <	3.20	3.40 >	—	—	—	—
18	—	—	—	—	3.11	3.33 >	3.00	3.20 >	4.57	4.43 <	—	—
19	3.67	4.00 >	4.67	5.00 >	3.22	3.89 >	2.60	3.00 >	—	—	—	—
20	—	—	4.67	4.83 >	3.78	4.33 >	—	—	4.57	4.71 >	—	—
Δ	0.45		0.37		0.24		0.15		0.45		0.37	

P. = Participant; Δ = Mean difference. = equal to the pre-test value; > higher than the pre-test value; < lower than the pre-test value. The bold values represent participants and variables whose post-test values increased in relation to the pre-test.

“vocational development,” “sense of belonging” and “approaches to learning.” Additionally, three of the participants completed an open-ended questionnaire regarding their perceptions of the intervention’s impact and the value they placed on its activities.

The study was approved by an ethics institutional committee and participants gave their informed consent, in a similar manner to Study 1.

3.1.3 Measures

3.1.3.1 Adaptation processes in higher education inventory

To assess the dependent variables related to the pilot study’s mentees, an inventory of knowledge and perception of competence was developed, mirroring that used for mentors. Items were selected to assess academic performance, engagement, approaches to learning, sense of belonging, self-regulated learning, academic goals, socio-emotional skills, and well-being. The inventory comprised 80 items across 13 indicators, with specific origins and examples detailed in Table 5. This selection was guided by findings from a preceding study and aligned with themes from the mentors’ training program (Duarte et al., 2024b).

Participants completed the inventory online using a Likert scale of 5 (from 1—*Totally disagree* to 5—*Totally agree*, for “perception of

competency at vocational level,” “approaches to learning” and “sense of belonging”; from 1—*I’m nothing like that* to 5—*I’m totally like that* for “self-regulated learning” and “academic goals”; and from 1—*Never* to 5—*Always* for “socio-emotional skills” and “perception of influence of well-being on academic performance”), 6 (from 1—*Never* to 6—*Everyday* for “well-being” and “effect of well-being-focused activities”) or 7 points (from 0—*Totally disagree* to 6—*Totally agree* for two items of “academic performance”; and from 0—*Never* to 6—*Everyday* for “academic engagement”), except for: “knowledge about approaches to learning” (correct answer selection), “knowledge about self-regulated learning” (True/False system), and three items on “academic performance” (open-ended or closed with four options). The order of items was changed between pre- and post-test to mitigate potential carryover effects.

3.1.3.2 Perception of mentoring’s impact questionnaire

At post-test, the mentees answered an online questionnaire of nine closed- items and seven open questions. Both sets pertained to the perceived impact and value of the mentoring modules and activities, with the first nine items focusing on the participants’ perception of each thematic area (e.g., i5. “My participation in these activities increased my knowledge of the outcome of a deep approach to learning on my learning product.”). Participants responded to this set through a 5-point Likert scale of 1—*None* (i.e., no perceived

TABLE 5 Origin of the adaptation processes in higher education inventory –items and indicators.

Indicator	Origin	Dimensions	α	N. ° of items	Examples
Academic performance	“Academic variables” scale (Martinez and Pinto, 2005).	Academic average grade	—	1	i.1. “Average of college entry grade [pre-test]/of 1 st semester exams [post-test].”
		Perception of academic performance	—	1	i.2. “My school performance last year [pre-test]/semester [post-test] was: (1) Low, (2) Satisfactory, (3) Good, or 4) Excellent.”
		Estimated number of years to conclude the course	—	1	i.3. “How many years do you estimate it will take to fully complete your studies?”
		Propensity to drop out	—	2	i.4. “If I were offered a job, I would take it, even if it meant dropping out of college.”
Academic engagement	UWES: <i>Utrecht Work Engagement Scale</i> —brief version (Schaufeli et al., 2006) for Portuguese students (Marques-Pinto, 2013).	—	—	9	i.3. “When I get up in the morning, I feel like going to class to study.”
Perception of competency at the vocational level	5 items adapted from Barros (2018).	—	—	5	i.2. “I understand the differences between the 21 st century careers and traditional careers.”
Approaches to learning	IPA-u: Learning Processes Inventory—University (Duarte, 2007).	Surface approach to learning	0.71	2	i.1. “I feel like I study out of obligation.”
		Deep approach to learning	0.74	2	i.4. “I try to relate new learning material to what I have already learned.”
Knowledge about approaches to learning	Based on IPA-u: Learning Processes Inventory—University (Duarte, 2007).	—	—	2	i.2. “A <i>deep approach to learning tends to be associated with a learning product of</i> : (1) Low quality, (2) High quality, or (3) I do not know or I’m not sure.”
Sense of belonging	Sense of social fit scale (Walton and Cohen, 2007); Self-affirmation intervention (Cohen et al., 2006).	Sense of social fit	0.89	5	i.4. “I fit well in this Faculty.”
		Effect of social belonging-focused activities	—	3	i.7. “Some students face more difficulties in this transition than others.”
		Effect of value affirmation-focused activities	—	2	i.10. “I feel like my values can guide me towards the life I want to have.”
Self-regulated learning	SRLI-R: Self-regulation of Learning Inventory (Barros and Veiga Simão, 2016).	—	0.92	4	i.2. “I make a plan of the tasks that I have to tackle during my study session.”
Academic goals	SMLS: Self-regulation of Motivation in Learning Scale (Paulino et al., 2016).	Performance-avoidance goals	0.79	1	i.1. “What motivates me to study is the fear of having bad results.”
		Performance-approach goals	0.87	1	i.2. “It motivates me to think that I can get better grades than my colleagues.”
		Mastery goals	—	1	i.3. “I want to do my academic work better and better.”
Knowledge about self-regulated learning	Based on Zimmerman’s theoretical model (2013).	—	—	3	i.3. “The following sentence belongs to the self-reflection phase: <i>I felt responsible for finishing my task since its beginning</i> . This is: (1) True, (2) False, or (3) I do not know or I’m not sure.”

(Continued)

TABLE 5 (Continued)

Indicator	Origin	Dimensions	α	N. ° of items	Examples
Socio-emotional skills	5 items from the Social and Emotional Competence Assessment Battery for Adults (Oliveira et al., 2023).	Self-awareness	—	1	i.1. “I can understand what I’m feeling in different situations in my life.”
		Emotional self-regulation	—	1	i.3. “I can handle my emotions well to achieve my academic goals.”
		Social awareness	—	1	i.2. “When I talk to other people in college, I try to understand their point of view.”
		Social skills	—	1	i.4. “When faced with a conflict/problem, I try to collaborate with other people to solve it.”
		Responsible decision-making	—	1	i.5. “I can assess the consequences of the decisions I make about my life at University.”
Perception of influence of well-being on academic performance	Items written by the study’s collaborators, based on the Mental Health Continuum—Short Form—for youth, in a Portuguese teenagers’ sample (Matos et al., 2010) and literature on the psychology of well-being (e.g., Keyes et al., 2008).	—	—	5	i.1. “My well-being influences my ability to study for tests.”
Well-being	Mental Health Continuum—Short Form—for youth, in a Portuguese teenagers’ sample (Matos et al., 2010).	Emotional well-being	0.90	3	i.2. [How many times have you felt last month] “Satisfied with life.”
		Social well-being	0.85	5	i.6. [How many times have you felt last month] “That our society is becoming a better place for people like you.”
		Psychological well-being	0.89	6	i.11. [How many times have you felt last month] “That you had warm and trusting relationships with people of your age.”
		Global well-being	—	—	—
Effect of well-being-focused activities	Items written by the study’s authors, based on their professional experience and literature on the psychology of well-being and socio-emotional skills (e.g., Keyes et al., 2008).	Intrapersonal dimension	—	4	i.3. “I was aware of my body.”
		Interpersonal dimension	—	6	i.8. “I stated my needs in a respectful way.”

impact or value) to 5—*Totally* (i.e., perceived total impact or value). Two items were created to correspond to each thematic area, except for “vocational development,” which included three. Due to an oversight regarding the questionnaire’s insertion, the impact of the “socio-emotional skills” module was not assessed.

Moreover, the seven open questions were organized into two sections, and specifically addressed: (1) the individual impact of the participation, in terms of its possible positive, negative and neutral effects (4 items; e.g., i2. “In what aspect(s) do you feel that participating in the modules/activities has had a possible positive impact on you?”) and (2) the valorization of the modules and activities, in terms of their possible strong, weak or neutral aspects (3 items; e.g., i6. “What do you consider to be the negative/weak point(s) of the modules/activities in which you participated?”).

3.1.4 Intervention procedure

The intervention aimed to enhance mentees’ knowledge and skills related to topics analogous to Study 1’s training program’s sessions, support the development of key behaviors and attitudes, and facilitate the transfer of these insights to their personal lives. It consisted of six mentoring modules led by two groups of trained mentors, conducted during non-school hours, which focused on: (1) vocational development (1 module); (2) sense of belonging (1 module); (3) approaches to learning (1 module); (4) self-regulated learning (1 module); and (5) socio-emotional skills (2 modules). Mentors documented mentees’ attendance, activities, challenges, comments, and relevant notes for enhancing the mentoring intervention.

The intervention spanned three to 5 days, with sessions scheduled based on mentee availability, and utilizing a hybrid format, with a combination of in-person sessions at the department and online meetings via Zoom. During this period, two online meetings were conducted by two of the study’s researchers to monitor mentor interventions and address queries. Mentors were encouraged to reach out to training program trainers with questions about each module.

The mentors employed various methodologies, including self-knowledge exercises, guided reflection, practical activities with written records, and art- and play-based counseling techniques. Nonetheless, mentors reported that, given the motivation perceived in the mentees, the format of certain activities was modified, provided that the proposed objectives were achieved.

Finally, it should be noted that the two mentor groups promoted the intervention with seven mentees, but only four responded to the inventories at pre- and post-test.

3.1.5 Data analysis

To test both H1 (which predicted an increase in mentees’ knowledge, skill perception, well-being, academic engagement and performance from the mentoring intervention) and H2 (which predicted inter-individual variability), the effectiveness of the mentoring intervention was examined in each participant of the study, similarly to the adopted procedure in Study 1. This involved comparing their values in the dependent variables at two assessment points and assessing the number of participants who showed an increase, decrease, or maintenance in each variable.

The impact of the mentoring intervention was evaluated through the mean of the following set of items designed for this purpose: (1) two items from each thematic area to assess the impact of individual

modules (except for the impact of the vocational development module, which encompassed 3 items), and (2) nine items to assess the overall impact of the mentoring intervention. Mean values for each participant and the total group were calculated for each variable.

The participants’ responses to the seven open questions on the mentoring intervention’s impact and value were analyzed using a methodology based on the phenomenographic perspective (Kettunen and Tynjälä, 2018), specifically a thematic content analysis. Each response was segmented into units of meaning, defined as singular propositions, and then categorized inductively. The resulting category system was refined for internal logic and applied in a second categorization of all units. Validation of the system involved a second independent analyst who categorized 16.7% of the segments. Inter-analysts’ agreement was 100%. The occurrence of each category across participants was calculated.

The mentors’ notes on the modules with mentees and records of two monitoring meetings with the study’s researchers underwent an informal holistic analysis.

3.2 Results

This section consists of two subsections. The first examines changes in the dependent variables—knowledge, and skill perception, well-being, academic engagement and performance—before and after the mentoring interventions. The second part analyzes the participants’ perceptions of the interventions’ impact using a specific set of items and open questions.

3.2.1 Knowledge, skill perception, well-being, academic engagement and performance

The modification of the knowledge, skill perception, well-being, academic engagement and performance as a function of the mentoring intervention (H1) and the interindividual variability of its sample (H2) were examined by comparing the results of each participant at pre- and post-test (according to a procedure based on a “multiple-case experiment design”), as presented in Table 6.

With respect to the “academic average grade,” a decrease was observed in all four participants who benefited from the intervention. Even so, it was observed that two of these participants, even with a decrease in their average grade, maintained their classification (“Very Good”). The lowest classification, which was observed in the other participants, at post-test, was “Good.” Concerning the “perception of academic performance,” a decline was evident in three participants, while a rise was observed in the one remaining participant. Concerning the “estimated number of years to conclude the course” and “propensity to drop out,” a decrease was noted in two participants, while two others exhibited no change.

Regarding “academic engagement,” there was an increase in two participants and a decrease in two participants. Conversely, the “perception of competence at the vocational level” exhibited an increase among all four participants.

With respect to “approaches to learning,” it was observed: (1) a decrease in two and an increase in another two in the use of a “surface approach,” and (2) a decrease in three and the maintenance in one participant, regarding the use of a “deep approach” to learning. Regarding “knowledge about approaches to learning,” it was noted

TABLE 6 Knowledge, skill perception, well-being, academic engagement and performance of each mentee (average of items of each variable of the Adaptation Processes in Higher Education Inventory).

P.	Academic performance								Academic engagement		Perception of competency at the vocational level		Approaches to learning				Knowledge about approaches to learning	
	Academic average grade		Perception of academic performance		Estimated number of years to conclude course		Propensity to drop out		Pre	Post	Pre	Post	Surface approach		Deep approach		Pre	Post
	Pre	Post	Pre	Post	Pre	Post	Pre	Post					Pre	Post	Pre	Post		
1	17.20	16.80 <	4.00	3.00 <	5.00	5.00 =	1.00	1.00 =	6.00	5.89 <	3.40	3.80 >	1.00	1.50 >	4.00	3.50 <	3.00	3.00 =
2	17.40	15.67 <	4.00	3.00 <	6.00	6.00 =	4.50	3.50 <	3.22	3.67 >	2.60	2.80 >	3.50	3.00 <	3.00	2.00 <	2.50	3.00 >
3	18.10	15.15 <	4.00	2.00 <	7.00	5.00 <	5.00	5.00 =	6.78	6.56 <	3.40	4.40 >	1.00	1.50 >	4.50	4.50 =	3.00	3.00 =
4	18.60	14.00 <	1.00	2.00 >	5.00	4.00 <	3.00	1.50 <	3.44	4.67 >	2.80	3.60 >	3.50	1.50 <	4.50	4.00 <	3.00	3.00 =
Δ	−2.42		−0.75		−0.75		−0.63		0.33		0.60		−0.37		−0.50		0.12	

P.	Sense of social belonging		Effect of sense of belonging-focused activities				Self-regulated learning		Academic goals						Knowledge about self-regulated learning	
	Pre		Social belonging		Value affirmation		Pre	Post	Performance-avoidance goals		Performance-approach goals		Mastery goals		Pre	Post
			Pre	Post	Pre	Post			Pre	Post	Pre	Post	Pre	Post		
1	3.80	3.60 <	5.00	5.00 =	5.00	5.00 =	3.75	3.25 <	2.00	3.00 >	1.00	1.00 =	2.00	4.00 >	2.00	2.00 =
2	2.20	2.80 >	3.33	4.33 >	5.00	3.00 <	4.25	4.25 =	3.00	4.00 >	4.00	5.00 >	5.00	4.00 <	1.67	2.33 >
3	3.80	4.00 >	4.67	4.33 <	4.50	5.00 >	4.50	4.50 =	2.00	2.00 =	4.00	4.00 =	5.00	5.00 =	2.33	1.00 <
4	3.20	2.60 <	3.67	4.67 >	3.50	4.00 >	—	—	—	—	—	—	—	—	—	—
Δ	0		0.41		−0.25		−0.17		0.67		0.33		0.33		−0.22	

(Continued)

TABLE 6 (Continued)

P.	Socio-emotional skills										Perception of influence: well-being → academic performance	
	Self-awareness		Self-regulation		Social awareness		Social skills		Responsible decision making			
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	4.00	3.00 <	3.00	3.00 =	5.00	5.00 =	5.00	2.00 <	5.00	4.00 <	4.20	4.00 <
2	3.00	4.00 >	3.00	3.00 =	4.00	4.00 =	5.00	4.00 <	3.00	4.00 >	3.80	3.40 <
3	4.00	3.00 <	3.00	3.00 =	4.00	4.00 =	4.00	4.00 =	4.00	4.00 =	4.40	4.80 >
4	—	—	—	—	—	—	—	—	—	—	—	—
Δ	−0.34		0		0		−1.34		0		−0.06	

P.	Well-being								Effect of well-being-focused activities			
	Emotional		Social		Psychological		Global		Intrapersonal		Interpersonal	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	5.33	5.33 =	4.40	3.40 <	4.33	5.00 >	4.57	4.50 <	5.50	5.25 <	5.17	5.50 >
2	2.67	4.67 >	2.80	2.80 =	2.00	3.33 >	2.43	3.43 >	5.00	5.00 =	3.67	5.00 >
3	5.00	4.33 <	3.40	3.80 >	3.17	3.67 >	3.64	3.86 >	3.75	4.25 >	4.33	4.50 >
4	—	—	—	—	—	—	—	—	—	—	—	—
Δ	0.45		−0.20		0.88		0.38		0.08		0.61	

P = Participant; Δ = Mean difference. = equal to the pre-test value; > higher than the pre-test value; < lower than the pre-test value. The bold values represent participants and variables whose post-test values increased in relation to the pre-test.

that three of the participants exhibited no change, and one participant demonstrated an increase.

Regarding “sense of belonging,” there was an increase in two participants and a decrease in other two participants. As for the effects of both “social belonging” and “value affirmation” activities, an increase in two participants, maintenance in one and a decrease in one were noted.

In the context of “self-regulated learning,” two participants exhibited no change, while one participant demonstrated a decrease. In “knowledge about self-regulated learning,” there was an increase in one participant, maintenance in one participant, and a decrease in one participant.

Regarding “academic goals,” there was an increase in two participants and maintenance in one in terms of “performance-avoidance goals”; the maintenance in two and an increase in one participant in “performance-approach goals,” and an increase in one, the maintenance in one and a decrease in one participant in “mastery goals.”

In regard to “socio-emotional skills,” the following was observed: (1) a decline in two and an increase in one participant in terms of “self-awareness”; (2) the maintenance of “emotional self-regulation” and “social awareness” in all three participants; and (3) a decrease in two and the maintenance of one (33.3%) participant in “social skills”; and (4) an increase of one, maintenance of one and a decrease of one participant in the level of “responsible decision-making.”

As for “well-being,” there was an increase in one, maintenance in one and a decrease in one participant in terms of “emotional” and “social well-being,” and an increase in all three participants in terms of their “psychological well-being.” With regard to “global well-being,” there was an increase in two participants and a decrease in one participant. With respect to the “perception of influence of well-being on academic performance,” a decline was observed in two participants, while an increase was noted in one participant.

In relation to the “effects of well-being-focused activities – intrapersonal dimension,” there was an increase in one, maintenance in one, and a decrease in one participant. In “effects of well-being-focused activities – interpersonal dimension,” a notable increase in the perception of competence was observed among all three participants.

3.2.2 Perception of the mentoring intervention’s impact

The pilot study’s mentees perceived a satisfactory impact from the mentoring intervention, as indicated by the mean score across items assessing four thematic areas ($M_{\text{Vocational}} = 3.41$, $SD_{\text{Vocational}} = 1.708$; $M_{\text{Approaches}} = 4.00$, $SD_{\text{Approaches}} = 0.817$; $M_{\text{Self-Regulation}} = 3.83$, $SD_{\text{Self-Regulation}} = 0.764$; $M_{\text{Belonging}} = 3.63$, $SD_{\text{Belonging}} = 1.109$), and the overall intervention ($M_{\text{Global}} = 3.63$, $SD_{\text{Global}} = 1.346$).

Among participants reporting an average impact equal to or greater than 4 (*I agree* [with the item]), participants’ responses exhibited the following distribution: approaches to learning and sense of belonging ($n = 3$), and vocational development and self-regulated learning ($n = 2$). Two participants exhibited an average impact equal to or greater than 4 (*I agree* [with the item]) for the overall intervention.

In a complementary manner, analysis of three participants’ perceptions of the intervention activities, through the open questions, yielded two main categories, seven subcategories, and 13 sub-subcategories. The main categories observed corresponded to

“Perceived impact of the intervention” and “Valuation of the intervention activities,” detected in all participants ($N = 3$).

The first category comprised four subcategories: “Promotion of knowledge and skills” ($n = 3$), “Promotion of relationships and well-being” ($n = 2$), “Promotion of self-knowledge” ($n = 1$) and “Lack of impact” ($n = 1$). In “Promotion of knowledge and skills,” two sub-subcategories were noted: “Learning and academic performance” ($n = 3$) and “Vocational development” ($n = 2$). “Lack of impact” alluded to Already known topics” ($n = 1$).

Three subcategories emerged for the second category: “Strengths” ($n = 3$), “Challenges” ($n = 3$) and “Neutral” ($n = 2$). In “Strengths,” four sub-subcategories were noted: “Practical, playful or fun” ($n = 3$), “Mentors’ approach” ($n = 2$), “Organization/dynamics” ($n = 2$) and “Usefulness” ($n = 2$). In “Challenges,” four sub-subcategories emerged: “Moments of dialogue—partial” ($n = 1$), “Board game” ($n = 1$), “Time management difficulties” ($n = 1$) and “Extension” ($n = 1$). Finally, in “Neutral,” the emergence of two sub-subcategories were noted: “Presentation of theoretical concepts” ($n = 1$) and “Moments of lower participation” ($n = 1$).

Finally, the analysis of the mentors’ notes and the records of the monitoring meetings suggested that most pilot study’s mentees benefited from the intervention, though engagement varied depending on activity or module. Necessary modifications appointed by the mentors included changing some activities from tests to interactive dialogues, considering the mentees’ dispositions, and tailoring the intervention for specific groups (e.g., international and over-23 students).

4 Discussion

The present work aimed to develop and assess a set of mentoring-based tools and procedures to facilitate the transition of students entering higher education. To achieve this, two studies were conducted. Study 1 aimed to develop and evaluate a mentors’ training program. The program was designed to impart a set of skills and knowledge to mentors, with a particular focus on vocational development, sense of belonging, approaches to learning, self-regulated learning, and socio-emotional skills. These variables were chosen based on a prior study identifying students’ psychological needs during their transition into higher education (Duarte et al., 2024b). The primary goal of this training was to prepare these mentors to implement an intervention tailored to 1st year students, focusing on their well-being, academic engagement and performance. Study 2 was conducted to explore the efficacy of this mentoring intervention, through its implementation with four mentees.

Based on Study 1’s findings, Hypothesis 1 (H1) was partially confirmed. Post-test results showed a significant increase in overall knowledge and in partial knowledge concerning vocational development, self-regulated learning, and socio-emotional skills, in the experimental mentors’ group compared to the control group. Regarding the partial knowledge about sense of belonging, no significant increase was found between pre- and post-test, but the experimental group showed a significantly higher knowledge compared to the control group at post-test. Conversely, the experimental group showed a pre- to post-test increase in its knowledge about approaches to learning, but not a significant difference compared to the control group.

Likewise, Study 2's findings on the implementation of the corresponding mentoring intervention with 1st year students partially corroborated its Hypothesis 1 (H1). Significant effects were observed in perceived vocational competence, psychological well-being, and perceived interpersonal skills. Additional positive trends included reduced dropout propensity, shorter predictions for course completion, a decreased tendency for a surface approach to learning, and increased engagement, knowledge about approaches to learning, mastery goals, a sense of belonging, emotional self-regulation, and responsible decision-making. Furthermore, findings suggest that the intervention influenced the mentees' perceptions regarding the influence of well-being on academic performance and their intrapersonal skills. In this sense, the data suggests that the mentoring intervention effectively equipped 1st year students with tools for positive individual functioning, as well as a means to enhance their academic learning experience and to deal with present and future vocational challenges. This is especially relevant given the increasing unpredictability of young people's careers (Lyons et al., 2015) and the specific stressors and developmental challenges faced by higher education students (Arnett, 2018; Gallagher et al., 2019).

Likewise, mentees' comments about increased self-awareness, skill development, and relational impact, as assessed through the open questions at post-test, reinforce the impact and value of the mentoring experience. These findings are consistent with those of previous studies, which indicate that mentoring is an effective institutional strategy for enhancing students' well-being, integration, and psychological development (Akinla et al., 2018; Kachaturoff et al., 2020; Torrejón-Ramos et al., 2023). Moreover, these observations underscore the significance of promoting shared knowledge and co-regulation through focused collaborative groups, of which mentoring constitutes an example, to enhance motivation, metacognition, and emotional management (Channa et al., 2024; Järvenoja et al., 2019; Loes, 2022).

Conversely, the mentoring intervention showed unexpected ineffectiveness in improving a deep approach to learning, self-regulated learning, emotional self-awareness and social skills, and in reducing performance goals (performance-avoidance and -approach goals). Additionally, all groups perceived a decreased academic performance (in terms of their average grade and perception of performance), not supporting previous studies which highlighted institutional support, particularly mentoring programs, and individual coping mechanisms as ways to promote students' performance (e.g., Chaudhry et al., 2024; García et al., 2024; Martínez et al., 2019). Therefore, a consideration of possible external stressors or academic challenges unrelated to the program is needed to further understand these outcomes. In this sense, a possible contributing factor might relate to the timing of Study 2's assessment. The post-test moment coincided with the conclusion of the 1st semester evaluation period, which might have also represented the students' first contact with college evaluation procedures and corresponding challenges. Concurrently, an emphasis on the social dimensions of academia has been documented, with 1st year students frequently allocating less time to academic pursuits compared to socializing and cultivating a sense of belonging during their 1st semester (Al-Sheeb et al., 2018; Duarte et al., 2024b; Thibodeaux et al., 2017). This finding suggests that, while the current program may have imparted a diverse set of strategies to the mentees, a complementary reflection on its implementation within the specific evaluation context and thorough mentor follow-up should be considered.

Furthermore, Hypothesis 2 (H2) of both studies were supported. Mentor training correlated with increased knowledge in the experimental group, but significant inter-individual variability (i.e., increases, decreases, or no change) was observed across all participants, both within each session and across the entire program. A similar pattern of inter-variability was found in the mentees' sample, concerning its specific variables. Concurrently, analysis of the mentees' post-test open questions points to varying levels of engagement within the mentoring experience.

Additionally, the analysis of the perceived impact items revealed that the majority of mentors in the experimental group indicated a moderate impact of the training. This finding, in conjunction with the observation that all participants exhibited knowledge values above the midpoint value, suggests that this group may not have been the most likely candidate to derive significant benefits from the training. However, Study 1's results imply that the mentors' training program may have reinforced existing knowledge and clarified potential ambiguities. Positive mentees' feedback in Study 2, regarding the corresponding mentoring intervention, further indicates the training's value, at least in revising mentors' knowledge and skills and, consequently, in assisting mentee development.

5 Conclusion

This article hints at the efficacy and feasibility of a procedure composed of a mentoring intervention and a precedent mentors' training or orientation program, as suggested by previous studies (Cornelius et al., 2016; Santos et al., 2020), with a positive impact on 1st year students' well-being and academic engagement. It also highlights the importance of following recommendations for evidence-based activities and evaluating their key components (Nuis et al., 2023). Concurrently, the research work allowed an understanding and development of concrete means of facilitating students' transition to higher education through mentoring, from a psychoeducational perspective. This generated useful knowledge, procedures and resources, which were subsequently compiled into a comprehensive program encompassing both mentoring and mentors' training. Therefore, it is also feasible to infer the viability of a mentorship framework guided by this program, which is made available to the higher education community.

Nevertheless, the current research presents some limitations, alongside some difficulties concerning its implementation. Primarily, the assessment of different variables in each study, in conjunction with their limited sample size, initial high values in some variables and lack of validation indicators of the Knowledge Questionnaire, hinders the attribution of results to specific procedures. On the other hand, specifically to Study 2, logistical challenges particular to program initiation and mentor-mentees organization, paired with academic-like activities within some of the intervention's modules, might have undermined students' availability towards the presented mentoring. This compromised the size of the participating group.

Therefore, pertaining to future research, larger sample sizes, replicating the study across cohorts or institutions, and designing individual studies for specific modules are recommended. Additionally, within each study, it is crucial to consider factors influencing participants' outcomes, especially performance-related indicators (such as academic grades and students' perceptions of academic performance), and the extent to which the intervention needs adaptation, considering its specific sample. Some suggestions

include considering mentees' perceptions and mentors' characteristics into the design and organization of programs (Santos et al., 2020; Yusof et al., 2022), alongside the provision of specific tools for effective communication and support from mentors (Ismail et al., 2015). These suggestions are particularly salient in the context of long-term interventions. In addition, mentees' self-efficacy has been identified as a key element in the effectiveness of mentoring programs, particularly in relation to academic success and personal growth (Ismail et al., 2021; Mokhtar et al., 2023), suggesting the need to consider it in future versions of the program. Finally, analysis pertaining to the integration of AI and other technological tools into mentoring should be considered, as recent studies point towards a potential impact in supporting student's learning and engagement (Lo et al., 2025).

Data availability statement

The datasets presented in this article are not readily available because it is in accordance with the ethical consent provided by participants on the use of their confidential human data (i.e., data would be destroyed after analysis). The materials used can be found in the following three links: <https://www.psicologia.ulisboa.pt/wp-content/uploads/2024/11/Duarte-et-al.-Programa-de-Mentorado-2024.pdf> (programs' manual), <https://www.psicologia.ulisboa.pt/wp-content/uploads/2024/06/Relatorio-Projecto-DWBEAPTM-CICPSI-1.pdf> (programs' report) and <https://www.psicologia.ulisboa.pt/wp-content/uploads/2024/06/Anexos-ao-Relatorio-Projeto-DWBEAPTM-CICPSI.pdf> (programs' annexes). Requests to access the datasets should be directed to Joana Cordeiro Gonçalves, joanacordeirog@edu.ulisboa.pt.

Ethics statement

The studies involving humans were approved by Comissão de Ética e Deontologia da Faculdade de Psicologia da Universidade de Lisboa. 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

JG: Resources, Writing – original draft, Formal analysis, Methodology, Investigation, Data curation, Writing – review & editing. AD: Writing – original draft, Funding acquisition, Resources, Project administration, Conceptualization, Writing – review & editing. AM-P: Conceptualization, Resources, Writing – original draft, Writing – review & editing, Supervision. PP: Project administration, Supervision, Writing – original draft, Conceptualization, Resources, Writing – review & editing. CF: Writing – review & editing, Project administration, Supervision, Writing – original draft, Conceptualization, Resources. PF: Writing – original draft, Resources, Writing – review & editing, Supervision, Conceptualization, Project administration. SH: Writing – review &

editing, Writing – original draft, Resources, Project administration, Supervision, Conceptualization. AB: Writing – original draft, Resources, Conceptualization, Writing – review & editing. NP: Writing – review & editing, Writing – original draft, Conceptualization, Resources. RL: Writing – review & editing, Conceptualization, Writing – original draft, Resources. AA: Writing – original draft, Investigation, Writing – review & editing. FM: Writing – original draft, Writing – review & editing, Validation.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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