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Promoting students' autonomous motivation for the ongoing curriculum using a 'Societal Impact Project' with basic psychological needs characteristics

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ABSTRACT

Purpose: Autonomous motivation is important for university students, but it remains a challenge to stimulate their autonomous motivation for their curricula. We developed an extracurricular intervention (Societal Impact Project) with basic psychological needs supportive characteristics such as learning with self-defined problems relevant to curriculum and society, collaborative group work, and coaching by a teacher. This study aims at evaluating the intervention in fostering students' autonomous motivation for their regular curricula.

Methods: We conducted a quasi-experimental study, using between-group pre- and post-test design. Participants from the intervention and control group completed a survey before and after the intervention, which measured the satisfaction of three basic psychological needs, autonomous motivation, controlled motivation, enjoyment, value, and well-being within their regular curricula. We compared the post-test differences between the two groups while controlling for pre-test scores.

Results: Students in the intervention group had greater enjoyment in their regular curricula and perceived their regular curricula to have more value compared to students in the control group. The other variables did not differ significantly between the two groups in the post-test.

Conclusion: The intervention is effective for improving students' enjoyment and perceived value in their regular curricula. The variables with non-significant differences indicate the difficulty to alter students' basic psychological needs and motivation in their regular curricula, even after participating in a long-term intervention.

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educational intervention;
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Introduction

Developing autonomous motivation at university is important for students since it is related to enhanced well-being [1], perceived enjoyment [2–4], and appreciation of their education [4–6]. However, students may encounter obstacles that undermine their autonomous motivation in their curricula such as not understanding the relevance of content, having inaccessible teachers, and attending fact-based examinations [7]. Many studies have examined students' autonomous motivation [8, 9], but limited research used interventions aimed at fostering autonomous motivation or explored their impact [10, 11]. Facilitating students' autonomous motivation for their curricula, especially through the implementation of interventions, remains a challenge.

To stimulate students' autonomous motivation, a curriculum needs to support their three basic psychological needs (need for autonomy, relatedness, and competence). According to Self-determination Theory (SDT), when learning environments support the three needs, students tend to be more autonomously motivated [12] as these needs

Practice points

- Integrating basic psychological needs supportive elements, such as freedom in choosing a self-defined socially relevant problem, working closely in small groups, having supportive coaches in an extracurricular course was effective in improving students' enjoyment and perceived value of their regular curriculum.
- Curriculum designers can consider integrating and adapting elements supportive of basic psychological needs to their existing and new curricula to help students to enjoy more of their ongoing curricula which is known to enhance their engagement.
- When designing curriculum interventions to foster students' autonomous motivation for their ongoing curricula, it is important to take the format of the intervention (e.g. extracurricular or integrated within the curriculum) into account given the format might influence the intervention's impact.

are the essential nutrients for optimal functioning across cultures and across individual differences [13]. The need for autonomy implies the experience of a sense of choice, willingness, and volition [14]. The need for relatedness reflects a feeling of belongingness and acceptance [5, 15]. It encompasses a sense of belonging not only to individuals but also to a significant community [16] such as a curriculum where students pursue the same study. The need for competence denotes a feeling of being effective in the actions one pursues and performs [16]. Previous studies have elaborated how to support the three needs in a curriculum [9, 17–20].

The satisfaction of the three needs in students' curricula predicts their autonomous motivation, the most self-determined type of motivation based on SDT. Students with autonomous motivation act out of a sense of volition and choice [21]. They perform a task because they accept the underlying values of the task (identified regulation), integrate the values with other aspects of the self (integrated regulation) [21], or genuinely find the task interesting and satisfying (intrinsic motivation) [1]. In addition to autonomous motivation, SDT distinguishes controlled motivation, a less self-determined form of motivation, and amotivation, which is a state of lacking any motivation. Students with controlled motivation perform a task to satisfy external demands such as to obtain a reward (external regulation) [16] or out of guilt and shame (introjected regulation) [21]. Amotivation indicates the absence of any intention to perform [21]. We did not study amotivation because we were interested in understanding factors that promote motivation rather than a lack of it.

Although the three needs play an important role in facilitating students' autonomous motivation, several challenges remain. Existing university curricula may entail characteristics that do not support the three basic psychological needs or autonomous motivation. The mere presence of assessments and grades in a curriculum, especially summative assessments, is an external motivator for learning since it might lead students to develop a sense of competition, fear of failure, or poor performance [22]. A curriculum that is teacher-centered, with little concern for content overload, or failure to explain the relevance of scientific concepts might as well lead to a decreased intrinsic motivation (one of the types of autonomous motivation) [23]. These curriculum characteristics can prevent students from experiencing the satisfaction of competence, autonomy, and relatedness. In medical education, students' motivation has been undervalued in curriculum development [24]. A curriculum may enhance students' autonomous motivation for learning and application when it provides students with options, opportunities to connect with others, and helps students to recognize their levels of competence [25].

Immediate focus is needed to enhance students' basic psychological needs satisfaction and autonomous motivation in their curricula because of their close connections with students' perceived enjoyment [4] and value of their studies [4, 8, 26], as well as their subjective well-being [27]. Enjoyment in a curriculum is important, because in its absence students can become disengaged and demotivating for teachers and peers [16]. Understanding the value and relevance of their studies is vital, because it helps

students to align learning with their personal interests and to become more autonomous in their learning [28]. Subjective well-being indicates people's overall evaluations of their lives and emotional experiences [29, 30]. Experiencing positive emotions is associated with social engagement and resilience [31–33].

Interventions to foster students' motivation in their regular curricula are needed to address students' basic psychological needs holistically [15]. The bulk of research has examined students' basic psychological needs satisfaction and motivation in their regular curricula [7, 34, 35] or in an intervention [10, 36], but few [37–39] endeavored to stimulate students' autonomous motivation in their regular curricula *via* interventions. Among studies focusing on students' needs satisfaction, the majority have utilized cross-sectional designs or short-term longitudinal approaches [40]. There were few intervention-based studies in the field of Health Professions Education (HPE), and none had followed the students for a longer period to investigate the long-term effects [11]. Lastly, research on supporting students' feelings of relatedness is required, especially in terms of identifying relatedness to their curricula. Fulfilling students' need for relatedness to their curricula is important given that students may struggle to understand the relevance of their curricular content [41] and might not have a common understanding of the nature and purpose of their studies [42, 43]. In academic settings, research has focused primarily on students' relatedness to teachers [44, 45]. In HPE studies, there is empirical support for the importance of fulfilling the needs for autonomy and competence, whereas the available quantitative evidence regarding relatedness is limited [11].

The present study

To stimulate students' motivational experience in their regular curricula, we designed an intervention called Societal Impact Project (SIP) with characteristics supportive of students' basic psychological needs. These characteristics include students defining curriculum- and socially relevant problems, self-paced small group work with peers, and coaching by a teacher. This study investigated to what extent students' motivational experiences in their regular curricula might differ between students participating in an extracurricular SIP and that of students who did not participate in the SIP. Our research question was "Are there any differences in satisfaction of basic psychological needs, level of motivation, enjoyment, value, and well-being in their regular curricula between students who participated in the SIP and those who did not?" Based on the SDT literature, we expected students who participated in the SIP to have higher scores on all the included variables regarding their experiences in their regular curricula.

Methods

We conducted a quasi-experimental study [46], using between-group pre-test and post-test design. We administered a survey measuring the satisfaction of autonomy, relatedness, competence, autonomous motivation, controlled motivation, enjoyment, value, and well-being in their regular curricula eight weeks after students started

their regular curricula (pre-test) and at the end of the academic year (post-test).

Participants

This study took place at Maastricht University. SIP was offered each year for two consecutive years/two rounds (Figure 2) for first-year Bachelor’s students in the Biomedical Sciences programme. In the second round, students from the Health Sciences programme were invited. Students signed up voluntarily for SIP after an information lecture. Participants in control groups were from the same study programmes of the same year and were recruited by flyers and emails from their course coordinators. Students in the intervention group participated in the SIP next to their regular curricula. The control group participants followed only the regular curricula. In the regular curricula, students followed the problem-based learning approach, which involved learning in small tutorial groups (ten to fifteen students) with the support of a tutor around problems [47].

Intervention

Each SIP lasted 8 months from November to June. In SIP, students worked in small groups of four to six students and a coach. Students attended the kick-off event (Figure 1), in which they were offered the freedom to choose a self-defined curriculum- and society-relevant problem (Appendix A). During the project, students followed the four phases of Creative Problem Solving (CPS) approach, which aims to boost the creativity of students and to develop ideas and solutions applying divergent and convergent thinking [48]. Students attended four training sessions on each of the four phases, namely problem definition, idea generation, idea evaluation, and implementation [49, 50]. In these training sessions, they were introduced supportive tools to define the problem, generate and evaluate ideas, and develop prototyping before implementation. They were encouraged to use scientific literature and involve stakeholders while applying the CPS approach. Between the training sessions students planned their own group meetings based on their work pace. All groups

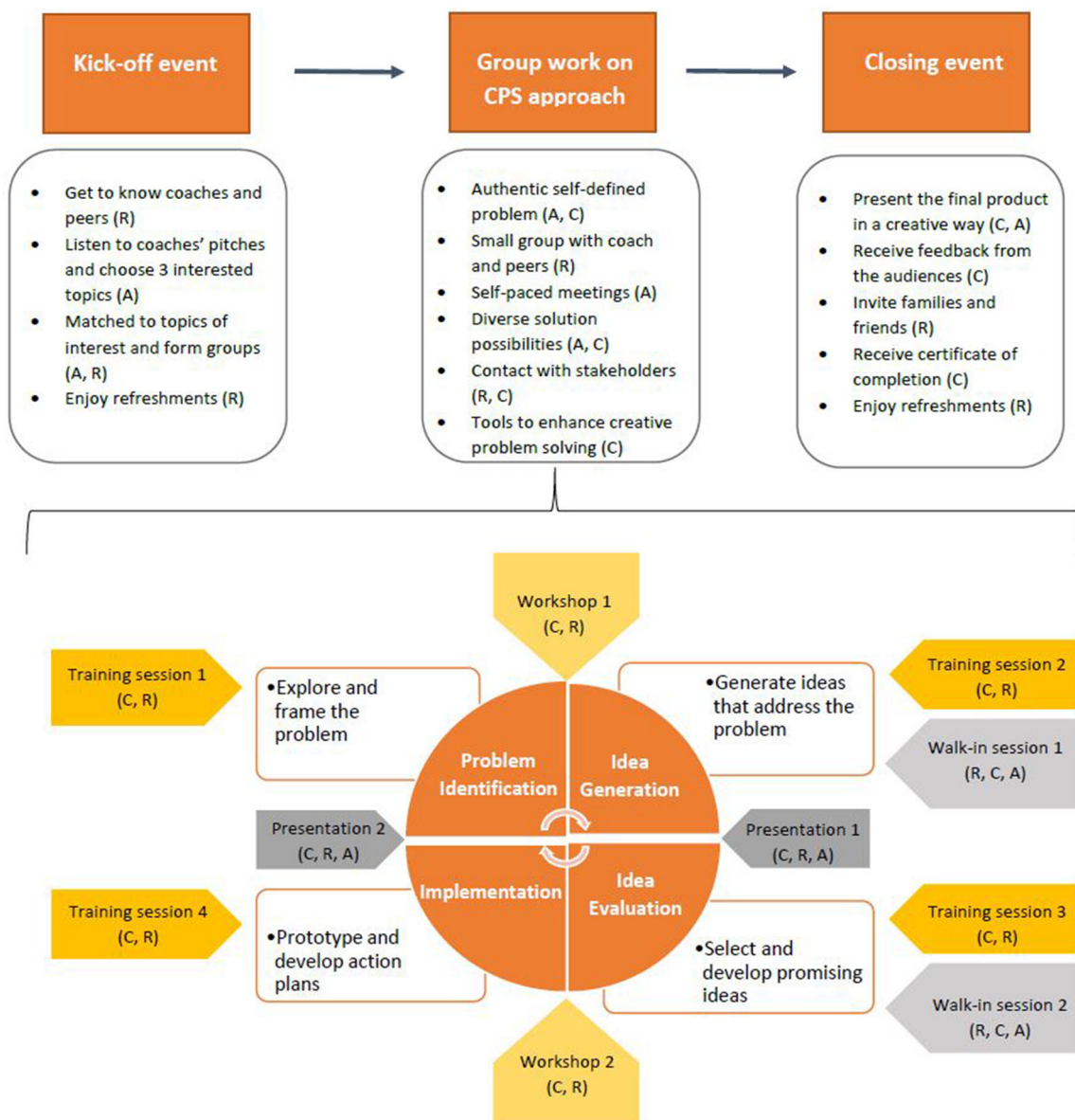


Figure 1. The intervention, its characteristics, and their associated basic psychological need(s). A: autonomy; R: relatedness; C: competence. Note: Workshops and walk-in sessions were implemented only in the second year/round of the SIP. The creative problem solving model in the Middle of the figure was adapted from Lim & Han, 2020 [48]; Amabile, 1997 [49]; and Belfi et al. 2016 [50].

presented their work twice in a format of their choice (e.g. role play, video, and talk show with music). Students in the second round attended two additional walk-in sessions and two additional workshops on a voluntary basis. The walk-in sessions provided an informal space for students to ask questions and receive feedback from participants and coaches in other groups. The two extra workshops focused on information searching and creativity in presentations, respectively. There was no summative assessment; all participants who completed the project received a certificate in which it was stated that they participated in the SIP. SIP aimed to foster students' autonomous motivation through its characteristics supportive of basic psychological needs such as freedom in identifying curriculum-relevant societal problems, collaborative work in small groups, self-planned group meetings, support by a coach, the use of the four-phase CPS approach, freedom in developing the solution, and presentations in preferred formats.

Measures

We adopted the Basic Psychological Needs Satisfaction and Frustration Scale [13] (Appendix B) to measure perceived satisfaction of autonomy, relatedness, and competence. For autonomous and controlled motivation, we used the Academic Motivation Scale [51]. Autonomous motivation was calculated as the mean score of the intrinsic and identified regulations, and controlled motivation as the mean of external and introjected regulations. We used two subscales of enjoyment and value from the Intrinsic Motivation Inventory [52]. The Enjoyment subscale is the primary self-report measure of intrinsic motivation. The WHO (Five) Well-being Questionnaire [53] measures respondents' subjective well-being. These scales and number of items are listed in Table 1.

Analysis

We calculated reliability scores for the pre- and post-test scales and subscales separately for both the intervention and control groups. Cronbach's α greater than 0.50 was considered acceptable, given the short scales with fewer than ten items [54]. We first used Hotelling's T^2 to check whether we could combine the data of the two rounds to

avoid the occurrence of chance and to receive a more comprehensive understanding of the differences between intervention and control groups. If there were no significant differences, we would merge the data points of the two control groups and the two intervention groups into one group of each.

We applied one-way ANCOVA to determine whether there were differences in the post-test scores between the intervention and control groups while controlling for their pre-test scores, with adjusted p value to avoid the multiple testing problem [55]. The Bonferroni post hoc test examined the differences. All analyses were performed in IBM SPSS Statistics 26.

Ethical approval and consent to participate

The study was approved by the Research Ethics Committee Faculty of Health, Medicine, and Life Sciences of Maastricht University (FHML-REC/2021/091/Addendum01_22). Electronic informed consent was obtained from all participants before they were included in the study.

Results

In both SIP rounds, some students left the project (Figure 2). The dropout percentage in both rounds varied between 14% and 22%. Respondents who completed less than half of the surveys were excluded from the analyses. In the first round, female respondents were 88% ($N=15$) and 70% ($N=19$) in the intervention and control groups, respectively. In the second round, the ratio was 81% ($N=26$) and 62% ($N=24$) in the two groups, respectively. Only two students from the Health Sciences programme participated. Participants ranged in age from 17 to 24 in the intervention group and 17 to 23 in the control group. The average age of the students in both groups and both rounds was 19. Scales and subscales demonstrated acceptable internal consistency (α ranging from 0.566 to 0.902, Appendix C), except for the subscale for identified regulation for the intervention group in the pre-test ($\alpha=0.438$).

Table 1. Scores for variables in students' regular curricula: Means and SD in pre- and post-tests, adjusted means and SE in the post-test.

Measure	Scale	Variables	Test	Intervention unadjusted Mean (SD)	Intervention adjusted Mean (SE)	Control unadjusted Mean (SD)	Control adjusted Mean (SE)	p value
Basic psychological needs satisfaction and frustration scale (4 items each need)	1-Not true	Autonomy	Pre	3.88 (0.56)	3.55 (0.09)	3.58 (0.63)	3.55 (0.08)	.999
			Post	3.61 (0.54)		3.50 (0.68)		
		Relatedness	Pre	3.86 (0.62)	3.94 (0.11)	3.73 (0.68)	3.68 (0.09)	
			Post	3.95 (0.63)		3.67 (0.84)		
	5-Completely true	Competence	Pre	3.80 (0.60)	3.48 (0.12)	3.58 (0.76)	3.57 (0.10)	
			Post	3.53 (0.88)		3.54 (0.80)		
Academic motivation scale (24 items)	1-Does not correspond at all	Autonomous motivation	Pre	5.69 (0.75)	5.36 (0.11)	5.23 (0.75)	5.07 (0.10)	.059
			Post	5.43 (0.73)		5.02 (0.82)		
	7-Correspond exactly	Controlled motivation	Pre	4.72 (1.35)	4.67 (0.16)	4.60 (1.18)	4.57 (0.14)	
			Post	4.69 (1.22)		4.55 (1.14)		
Intrinsic motivation inventory (14 items)	1-Not true at all	Enjoyment	Pre	5.67 (0.75)	5.61 (0.13)	5.41 (0.76)	5.13 (0.11)	.006
			Post	5.65 (0.79)		5.10 (0.10)		
	7-Very true	Value	Pre	5.92 (0.76)	5.92 (0.12)	5.59 (0.77)	5.58 (0.10)	
			Post	5.97 (0.77)		5.54 (0.92)		
WHO well-being 5 Index (5 items)	0-At no time 5-All the time	Well-being	Pre	3.07 (0.64)	0.10 (2.84)	2.87 (0.83)	2.78 (0.09)	.641
			Post	2.90 (0.80)		2.73 (0.80)		

SD: Standard Deviation; SE: Standard Error.

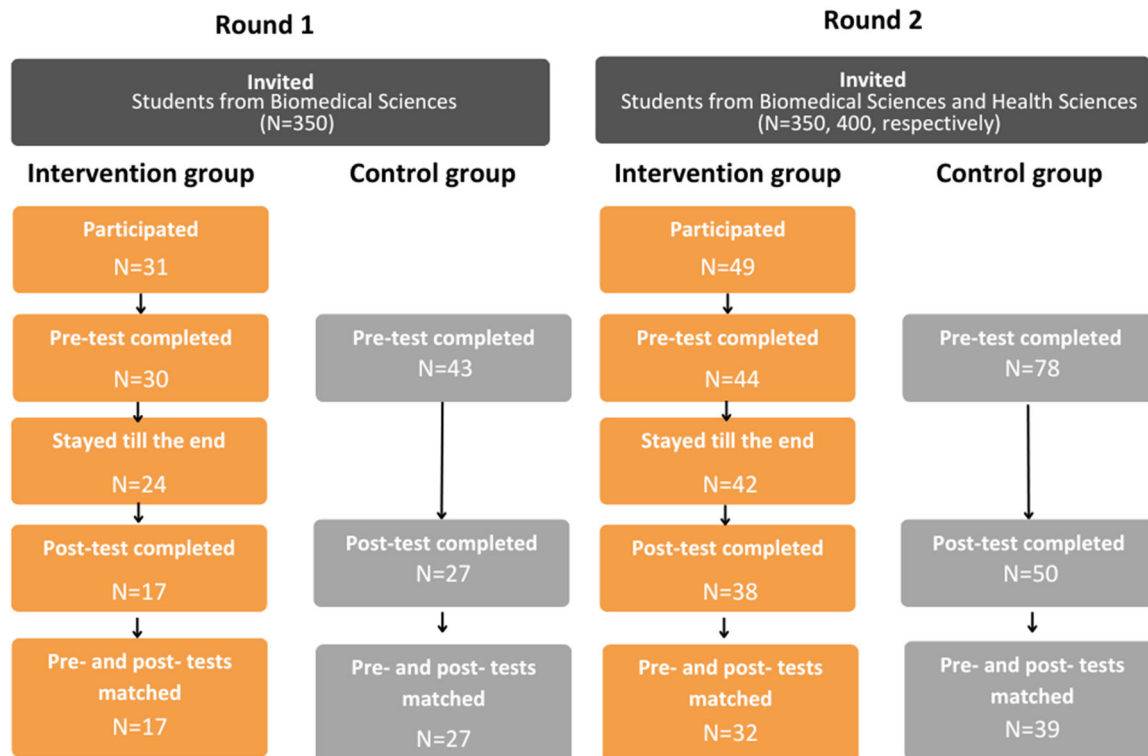


Figure 2. Participants and survey respondents in the two rounds.

Baseline differences between the two rounds

Assumptions for Hotelling's T^2 were supported. Hotelling's T^2 test showed there was no difference between rounds 1 and 2 on the combined dependent variables in neither the control group [$F(8, 56) = 1.236, p = 0.296$; Pillai's Trace = 0.150; partial $\eta^2 = .150$] nor the intervention group [$F(8, 40) = 1.301, p = 0.271$; Pillai's Trace = 0.207; partial $\eta^2 = 0.207$]. Therefore, combining the two control and intervention groups from the two rounds into one control and one intervention group was deemed plausible.

Between-group differences at post-test

All assumptions for the one-way ANCOVA were supported with the exception of the homogeneity of autonomy satisfaction. Given ANCOVA's robustness, we carried out the analysis with the data. Readers should interpret the results with caution since a Type I error might occur.

We found a significant difference in the post-test score of enjoyment between the two groups [$F(1, 112) = 7.831, p = 0.006$, partial $\eta^2 = 0.065$, Table 1] and in the perceived value of the study [$F(1, 112) = 4.470, p = 0.037$, partial $\eta^2 = 0.038$]. Students in the intervention group had higher enjoyment score for their regular curricula (5.61 ± 0.13) than those in the control group (5.13 ± 0.11). Students in the intervention group perceived their regular curricula to have more value (5.92 ± 0.12) than those in the control group (5.58 ± 0.10). Post-test scores of other variables did not differ between the two groups.

Discussion

This study demonstrates that students who participated in the extracurricular intervention exhibited greater enjoyment in their regular curricula and perceived their curricula

to have more value compared to their non-participating counterparts. The study illuminates the design, implementations, and considerations of a needs-supportive intervention to foster students' autonomous motivation.

Students who participated in the extracurricular intervention reported their regular curricula to be more enjoyable compared to students who did not participate. This result is in line with our expectation since the enjoyment scale is the self-reported measure of intrinsic motivation, one of the types of autonomous motivation. We postulated the needs-supportive elements in the intervention enhanced students' enjoyment in their regular curricula. These elements included encouraging students to take ownership of their projects, offering real-life socially and curriculum-related problems, working in small groups and coaching by a teacher [56, 57]. High enjoyment is associated with better learning and enhanced levels of well-being in their study programme [16]. Students who participated in the extracurricular intervention perceived their curriculum to have more value than those who did not participate. This finding is consistent with a previous study where students perceived their studies to have more value after participating in an intervention where they tried to connect their studies to their lives [28].

Although we also expected these elements to support students' basic psychological needs satisfaction and autonomous motivation for their regular curricula, we did not find significant differences in other variables beyond enjoyment and perceived value in the post-test between the intervention and control groups. The non-significant differences demonstrated that the extracurricular intervention might not be effective in transferring students' basic psychological needs-related experiences in the intervention into their regular curricula. The results could be impacted by various factors such as the organizing format [6]. Firstly, we speculate the non-significant differences to be a result

of the extracurricular format. Such a format faces challenges to engage students because it entails an extra investment in time by students on top of their regular curricular activities. It is reasonable to assume that students prioritized their regular curricula, especially in the periods with heavy workload and limited time and during exam periods. For example, students might have more controlled motivation during exam periods in their regular curricula because of the presence of assessments and the resulting time and performance pressure [23]. Secondly, although the extracurricular intervention lasted eight months, it had a smaller scale compared to participants' regular curricula in terms of students' invested time, contact hours, and workload [58, 59]. This might have limited the transfer of the intervention experiences to their regular curricula. Since students had a higher score in enjoyment and perceived value of their studies after participating in the intervention, we argue that the intervention had the potential to improve students' experiences in their regular curricula.

Implications

Integrating the supportive elements of the basic psychological needs into an intervention helps students to enjoy and identify the value of their regular curriculum. Curriculum designers can consider developing interventions or curricula that entail similar characteristics as in our intervention by providing students opportunities to work on curriculum- and society-relevant topics, take ownership of their learning, make meaningful choices, collaborate in small groups, and receive coaching from a teacher.

To optimize the potential impact of an intervention, we encourage curriculum designers to consider not only the general organizational challenges such as students' workload and time constraints, but also the format given that an extracurricular activity might pose extra workload and challenges for students on top of their regular curricula. It is also important to consider the scale of the intervention compared to students' regular curricula to be able to change students' perceptions of their experiences in regular curricula. We call for educators' efforts to integrate needs supportive characteristics such as self-defined and curriculum-related socially relevant problems, collaborative group work, and coaching by a teacher into curricula and conduct further studies on using interventions to foster students' autonomous motivation.

Strengths, limitations and further research

The study has several strengths and limitations. First, it addresses the challenge of using an intervention to facilitate students' basic psychological needs and autonomous motivation. The downside of such an intervention is that participants exclusively consisted of students from the same university. While having participants from the same university could help avoid variations on the university level, the narrow participant pool might limit the generalizability of the findings. Second, although our sample size was relatively small due to the extracurricular and voluntary nature of the intervention, nevertheless we deem that the use of this quasi-experimental design enhanced the robustness of the study when examining the impact of the

intervention. Third, quantitative data was effective at displaying aggregated variable changes, but might not have revealed the intricacies of students' experiences and changes during the intervention.

Future quantitative studies should consider using larger sample sizes in different settings and curricula by integrating the intervention as part of a curriculum. We recommend collecting relevant data on participants' backgrounds, as this information can provide valuable insights for interpreting the results and enhance the transferability of the findings. We also recommend collecting quantitative data at multiple points. Future studies should collect qualitative data related to participants' experiences in the intervention, which might provide valuable insights into how the characteristics of an autonomy supportive intervention impact students' autonomous motivation.

Conclusion

Students who participated in an extracurricular intervention with elements supporting the basic psychological needs perceived their regular curricula as more enjoyable and having more value compared to students not involved in the intervention. The variables with non-significant differences indicate the difficulty to alter students' basic psychological needs and motivation in their regular curricula, even after participating in a long-term intervention. Further research is needed to explore how integrating societal relevant challenges within curricula might enhance students' autonomous motivation.

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Authors' contributions

YZ, DD, HS, SEK, and RAK conceptualized the study. YZ collected and analyzed the data, and drafted the manuscript. All authors revised and approved the manuscript.

Disclosure statement

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Availability of data and materials

The datasets are available from the corresponding author on reasonable request.

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