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Lithuanian Military Academy Cadets' Self-Regulation in the Physical Training Process

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Annotation. Self-regulation is essential for effective performance under complex and extreme conditions, including military operations. This study examined self-regulation during physical training and its relationship with physical fitness among 134 cadets from the Lithuanian Military Academy. The findings provided insight into the key self-regulation processes employed by cadets used during physical training, particularly those related to structuring, monitoring, and reflecting on their physical preparation.

Keywords: *self-regulated learning, psychological processes, physical education, professional training, physical fitness, students.*

Introduction

Self-regulation processes have long been a focus of research aimed at understanding the mechanisms underlying the mobilization and recovery of physical and psychological resources, as well as how the regulation of individuals' thoughts, emotions, and cognitive processes contributes to behavioral change. Well-developed self-regulation enables individuals to make more effective use of their potential and increases the likelihood of success in academic and professional contexts (Wibrowski et al., 2016). Self-regulation is associated not only with individual effectiveness (Kinnunen et al., 2012; Jørgensen

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Olsen & Mehus, 2022; Zimmerman et al., 2017) but also with psychological well-being (Robson et al., 2020; Rodríguez et al., 2022; Sanchez-Sanchez et al., 2025).

Well-developed self-regulation is associated with higher levels of psychological well-being and emotional stability, which may reduce negative reactions to unforeseen situations (Baumeister & Vohs, 2004), and is therefore particularly important for effective performance in complex or extreme conditions that require exceptional human abilities and effort, including military contexts. Military personnel often perform demanding physical and cognitive tasks under high levels of stress (Flood & Keegan, 2022) and face a variety of environmental stressors that may affect cognitive processes (Martin et al., 2020). Nassif et al. (2023) note that mental skills such as concentration and emotion regulation are essential for optimal performance in high-stress professions, including the military. It is crucial that military personnel are prepared to make independent decisions and act under unforeseen circumstances, which require both physical and psychological capacities (Farina & Johnson, 2021; Flood & Keegan, 2022). Therefore, psychological preparation and the strengthening of self-regulation, as well as the identification of strategies and methods to enhance self-regulation and psychological well-being in military contexts, have received increasing attention in scientific research.

Self-regulation is defined as self-generated thoughts, feelings, and actions that are strategically planned and adapted to achieve personal goals (Zimmerman, 2006, p. 705). Self-regulation is fundamentally a feedback mechanism whereby an individual monitors their current state (e.g., behavior, well-being) and makes self-corrective adjustments to reduce the discrepancy between the current state and the desired state or goal (Bandura, 1991). In this article, we adopt Zimmerman's (2013) conceptualization of self-regulation as a set of metacognitive, motivational, and behavioral processes that interact to facilitate learners' proactive engagement in the learning process. Thus, self-regulation reflects the extent to which learners actively engage in and regulate their own learning to improve performance and achieve mastery of a specific task.

Self-regulated learning (SRL) is considered a key conceptual framework for understanding the cognitive, motivational, and emotional aspects of learning. A meta-analysis by Bao et al. (2024) indicates that SRL is one of the most effective learning strategies in physical education contexts. SRL is not a mental ability; rather, it is a self-regulatory process through which learners transform their mental abilities into academic skills (Zimmerman, 1998). Zimmerman (1990) highlights two essential characteristics of self-regulated academic learning: the use of learning strategies and perceived self-efficacy. According to Zimmerman's social-cognitive model (2006), effective learners pursue their goals by regulating their thoughts and emotions, behaviors, and environmental factors through various metacognitive and motivational processes. Zimmerman (2006, 2013) distinguishes three phases of the self-regulation process – forethought, performance, and self-reflection. The first phase (forethought)

encompasses processes that occur prior to task performance, during which learners analyze the task, set goals, and plan how to achieve them. In the forethought phase, students' motivational beliefs facilitate engagement in the process and influence the selection and use of learning strategies. The performance phase occurs during task execution and involves controlling and monitoring one's performance and efforts during the task. The self-reflection phase involves self-evaluation and adaptive inferences regarding subsequent actions following task completion (Zimmerman, 2006, 2013; Wilson et al., 2021). In this self-reflection phase, students assess their performance and make causal attributions regarding their success or failure. These attributions generate self-reactions that can positively or negatively influence how students approach similar tasks in subsequent performance situations (Panadero, 2017). The self-regulation phases occur cyclically; rather than following a linear sequence, the three phases and their subprocesses are interrelated and mutually influential. Self-regulation processes are associated with self-efficacy beliefs, attributions, and self-satisfaction reactions (Panadero, 2017). Research suggests that self-regulating learners tend to be more actively engaged in their intellectual, emotional, and psychological development and may be more likely to successfully pursue professional careers across various fields (Wibrowski et al., 2016). Self-regulation is associated with learning and academic achievement (Li et al., 2018; Zimmerman & Schunk, 2011), as well as with the acquisition and development of motor skills (Kolovelonis et al., 2013; Zimmerman, 2000). A study conducted in Finland among men completing military service showed that self-control was positively associated with aerobic fitness and muscular fitness and predicted both outcomes (Kinnunen et al., 2012).

SRL may contribute to improved performance in professional contexts (Pereles et al., 2024). However, few studies have examined higher education students' self-regulation during physical training. Previous research has predominantly examined self-regulation in school-based academic and physical education contexts, providing evidence (Duivenvoorden et al., 2021; Kolovelonis et al., 2013; Li et al., 2023; Jørgensen Olsen & Mehus, 2022) that students who engage in SRL tend to achieve better outcomes in physical education. Researchers have long focused on the analysis of self-regulation processes in sports contexts, examining the strategies, skills, and characteristics that enable athletes to optimize their performance and achieve successful competitive outcomes (Young et al., 2023). Well-developed self-regulation is consistently associated with high levels of sports performance (Kitsantas et al., 2018). It is important to note that, in recent years, research has increasingly recognized commonalities between military and sports contexts, particularly with regard to leadership, psychological skills development, and mental health issues (Bencker et al., 2024), as both settings require individuals to adapt and operate under complex and changing conditions. In this study, when analyzing cadets' self-regulation during physical training, we draw on research highlighting the importance of self-regulated sport practice (McCardle

et al., 2019; Wilson et al., 2021; Young et al., 2023), which may contribute to athletes' psychological readiness and their ability to realize their potential in sport. In their analysis of psychological aspects of athlete development, Young et al. (2023) emphasize that athletes may enhance their performance by deliberately attending to how they self-regulate their learning during training and practice. Self-regulated sport practice, encompassing metacognitive and motivational processes, reflects athletes' ability to engage deliberately and systematically in training in order to optimize skill acquisition (Young et al., 2023). Self-regulated sport practice is grounded in SRL theory, which suggests that training activities can be enhanced through the strategic and cyclical integration of processes related to planning, self-monitoring, self-evaluation, and self-reflection during training. These self-regulatory processes enable athletes to exercise agency by becoming more self-organizing, proactive, and self-reflective (Young et al., 2023). Based on the arguments presented above, it can be assumed that higher levels of self-regulation among cadets during physical training may contribute to enhanced professional performance and a greater capacity to manage the demands associated with their professional roles.

Physical fitness is an important component of cadets' professional training; however, it remains unclear how cadets' physical fitness is related to self-regulation during physical training. Analyzing self-regulation processes in the context of previous research on academic and sports performance may provide a better understanding of how cadets' self-regulation can be strengthened during their studies, thereby supporting more effective learning and enabling them to make better use of their potential in future professional practice.

The aim of this study was to examine cadets' self-regulation during physical training by identifying differences in self-regulation according to sex, year of study, and cadets' physical fitness, and examining the associations between individual self-regulation variables and the cadets' physical fitness indicators.

Method

Participants

A purposive sampling method was employed in this study. The inclusion criteria for study participants were as follows: enrolment at the Lithuanian Military Academy (LMA), being in the first or second year of study, and willingness to participate in the study. According to data provided by the LMA administration, a total of 153 cadets were enrolled in the first and second years of study during the study period. A total of 136 cadets participated in the initial study; however, two questionnaires were excluded due to missing data, resulting in a final sample of 134 cadets. The study sample consisted of 88 (65.7 percent) first-year and 46 (34.3 percent) second-year cadets,

whose ages ranged from 18 to 28 years (M = 19.72, SD = 1.39 years). Of the participants, 115 (85.8%) were men and 19 (14.2%) were women. Prior to entering the LMA, 47% of the participants had acquired some military experience (16.9% had completed 9 months of compulsory initial military service, 1.5% had served in professional military service, 9.6% in the National Defence Volunteer Forces, and 22.8% belonged to the Lithuanian Riflemen's Union), while 53% had no such experience. Based on their total length of participation in their chosen sport, the study participants were distributed as follows: 12.1 percent had no prior athletic experience; 34.1 percent of the cadets had been participating in sports for up to 3 years; 28.8 percent of cadets had between 4 and 6 years of experience, 15.2 percent had between 7 and 10 years, and 9.8 percent had more than 10 years. Additionally, 87.4% of the students engaged in sports activities outside their studies: 47.8% exercised an additional 1–2 hours per week, and 39.5% exercised 3 or more hours per week.

Procedures and Measures

The research was conducted in accordance with the principles of professionalism and research ethics approved by Resolution No. SEN-N-17 of the Senate of Vytautas Magnus University on 24 March 2021. The study was conducted in accordance with applicable local legislation and institutional requirements. Before the study began, the first author contacted the leadership of the LMA to obtain permission to conduct the research with LMA cadets, presented the study aims, and explained organizational and ethical aspects. Data were collected using paper questionnaires administered in classrooms. To ensure anonymity, each questionnaire was coded: K1 and K2 denoted the academic year (1st and 2nd year), the second number denoted the cadet's number on the list, and the third number indicated the study platoon (e.g., K1-1-322). Prior to the survey, a list of cadets without names or surnames but with assigned codes was obtained, and these codes were written on the questionnaires. The list containing the cadets' last names and assigned codes was accessible only to the sports instructors who facilitated the questionnaire survey; based on the assigned codes, they distributed the questionnaires to the cadets. The study was conducted in accordance with basic ethical principles: the purpose of the study and the possibility to refuse to participate in the study were explained. Participation in the study was entirely voluntary and based on the principles of anonymity and confidentiality. Participants were also informed that only summarized research results would be used and only for the purposes of the research. With permission from the LMA leadership, the first author received the coded cadets' physical fitness test protocols (the codes were assigned in the same way as in the questionnaires), on the basis of which the cadets were divided into groups of sufficient and insufficient physical fitness. This ensured confidentiality and did not reveal the identities of the cadets. All procedures complied with the European Code of Conduct for Research Integrity and the general requirements for scientific research (ALLEA, 2023).

To assess cadets' self-regulation in the physical training process. The Self-Regulation of Sport Practice Survey (SRSP) (Wilson et al., 2021; Young et al., 2023) was used. Written permission was obtained from the authors to use the SRSP in this study. The questionnaire was translated from English into Lithuanian and back-translated by two independent translators. Any discrepancies were discussed with the translators and later with two experts in sport and psychology, who reviewed and evaluated the semantic and conceptual equivalence of the translated versions with the original. The translated questionnaire was piloted with four third- and fourth- year LMA cadets, who were asked to explain what each block of questions meant and identify any unclear items. The SRSP is designed to assess psychological processes related to sport practice and consists of 31 statements grouped into five subscales adapted for physical education and sport practice: Planning, Checking, Evaluating/Reflecting, Self-efficacy for Challenge, and Effort. Three of these subscales (Planning, Checking, Evaluating/Reflecting) are metacognitive, as they assess athletes' thinking about their thinking during training. Planning relates to considerations before performing an activity, goal setting, deciding how to approach the task, and task analysis. Checking relates to self-monitoring while performing practice tasks. Evaluating/Reflecting involves post-practice reflection when practice outcomes are evaluated to identify strengths and weaknesses and generate insights for future improvement. The remaining two subscales are motivational: Effort relates to beliefs about one's capabilities in sport practice and persistence in dealing with hard tasks; Self-efficacy for Challenge relates to beliefs about one's capability to successfully perform practice tasks in non-standard, unforeseen, or difficult situations. Cadets rated each statement using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Higher scores indicate higher levels of cadets' self-regulation.

To classify cadets into groups according to their physical fitness, a secondary data analysis method was applied (Cohen et al., 2018). The LMA provided anonymized military physical fitness test protocols in which personal data were replaced with the same codes used in the questionnaire survey. Primary data collection, i.e., cadets' physical fitness testing, was conducted during the study period (August–September 2024) by LMA physical training instructors. All cadets who were able to perform the test participated. The primary data were grouped according to cadets' organizational structure (study platoon and year). Physical training instructors followed the procedures established by the Order of the Minister of National Defence of the Republic of Lithuania (5 August 2024, No. V-723) and the Order of the Commander of the Lithuanian Armed Forces (29 August 2022, No. V-1144), approving the Military Physical Training Manual. This study was based on the evaluation criteria for the physical fitness test for soldiers set forth in the aforementioned orders. The physical fitness evaluation criteria for cadets vary by gender and age and are specified in the documents mentioned earlier. The military physical fitness test consists of three parts: push-ups, sit-ups, and a 3 km run. Each part is scored on a scale from 1 to 100 according to military

regulations. Cadets' physical fitness is evaluated as satisfactory if at least 60 points are obtained in each part. Overall physical fitness is considered satisfactory if the total score of the three test components is at least 180 points. If at least one component is evaluated negatively (fewer than 60 points), the test is considered not passed. Based on the protocols, cadets were divided into two groups according to military physical fitness results: sufficient physical fitness (passed the test) and insufficient physical fitness (did not pass the test). The primary data were used as provided and were not further aggregated. In the physical fitness test reports received from the institution of higher education, the physical fitness scores of three cadets were not recorded, therefore, when classifying the cadets into groups with sufficient and insufficient physical fitness, these cadets were not included in the sample; that is, the data analysis was performed using data from 131 cadets.

Data analysis

Statistical analyses were performed using SPSS 30.0. Cronbach's alpha coefficient was calculated to assess the internal consistency of the SRSP scale dimensions. The values obtained were acceptable: Planning α = .900, Checking α = .817, Evaluating/Reflecting α = .731, Self-efficacy for Challenge α = .790, Effort α = .699, and the overall internal consistency of the SRSP was α = 0886. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were applied to summarise the data. To examine the normality of distribution, Shapiro–Wilk tests were conducted. The data were found to be close to a normal distribution, as the skewness and kurtosis indices fell between −1 and +1 (Cohen et al., 2018); therefore, parametric statistical methods were applied. Additionally, the homogeneity of variance assumption was verified using Levene's test, and equal variances were assumed for all analyzed variables ($p > .05$). To determine the differences between groups according to sex, year of studies, physical fitness, and military experience prior to studies, independent-samples *t*-tests were used. Independent samples t-tests were used to determine differences between groups according to sex, year of studies, physical fitness, and military experience prior to studies. One-way analyses of variance (ANOVA) were used to determine differences between groups according to their sports experience. Statistical significance was established at the level of $p < .05$. To compare the magnitude of differences, standardized effect sizes were calculated using Cohen's *d* or Hedges' *g* (when samples were unequal, e.g., comparing gender groups). The effect size was interpreted as follows: small (.20–.49), medium (.50–.79), and large (≥ .80) (Cohen et al., 2018). Pearson's *(r)* correlation coefficient was used to examine the relationships between cadets' self-regulation variables and physical fitness (total physical fitness test scores).

Results

Table 1 presents the data on cadets' self-regulation in the physical training process in the function of sex, i.e. males and females. The highest average score among men was found on evaluating/reflecting (M = 5.72, SD = .89), while among women, the highest average was found on effort (M = 5.67, SD = .85). Male and female cadets gave the lowest score to planning (5.04 points). There were no statistically significant differences between males and females in the planning variable ($t(132) = .03$, $p = .98$), checking ($t(132) = .53$ $p = .60$), evaluating/reflecting ($t(132) = 1.09$, $p = .28$), self-efficacy for challenge ($t(132) = 1.72$, $p = .08$), and effort ($t(132) = .12$, $p = .90$); the effect size was small (g = .01-.43).

Table 1
Indicators of Self-Regulation in the Physical Training Process of Male and Female Cadets

Variables	Sex	Number of participants	Mean	Standard Deviation	*Student's t*	*p*-value	Hedges' *g*
Planning	Male	115	5.04	1.11	.03	.98	.01
	Female	19	5.04	1.16			
Checking	Male	115	5.50	1.25	.53	.60	.12
	Female	19	5.35	1.25			
Evaluating/ Reflecting	Male	115	5.72	.89	1.09	.28	.27
	Female	19	5.48	.91			
Self-efficacy for Challenge	Male	115	5.48	.86	1.72	.08	.43
	Female	19	5.10	1.00			
Effort	Male	115	5.69	.83	.12	.90	.02
	Female	19	5.67	.85			

Table 2 presents indicators of cadets' self-regulation in the physical training process by year of study. First-year cadets rated evaluating/reflecting highest (M = 5.74; SD = .91), while second-year cadets rated effort highest (M = 5.65, SD = .81). The lowest scores for both first- and second-year cadets were in planning (4.91 and 5.31 points, respectively). There was a statistically significant difference in planning between first- and second-year cadets ($t(132) = 1.99$, $p = .049$, $d = .38$): second-year students scored higher compared to first-year students, but the estimated effect size was small (d = .38). There were no statistically significant differences between first- and second-year cadets in checking ($t(132) = .70$, $p = .48$, $d = .20$), evaluating/reflecting ($t(132) = .77$, $p = .44$, $d = .15$), self-efficacy for challenges ($t(132) = .10$, $p = .92$, $d = .01$), and effort ($t(132) = .44$, $p = .66$, $d = .07$).

Table 2

Indicators of Self-Regulation in the Physical Training Process of Cadets by the Year of Studies

Variables	Year of studies	Number of participants	Mean	Standard Deviation	*Student's t*	*p*-value	Cohen's *d*
Planning	1st	88	4.91	1.20	-1.99	.049	.38
	2nd	46	5.31	.88			
Checking	1st	88	5.53	1.18	.70	.48	.20
	2nd	46	5.38	1.18			
Evaluating/ Reflecting	1st	88	5.74	.91	.77	.44	.15
	2nd	46	5.61	.86			
Self-efficacy for Challenge	1st	88	5.44	.88	.10	.92	.01
	2nd	46	5.42	.90			
Effort	1st	88	5.72	.85	.44	.66	.07
	2nd	46	5.65	.81			

Table 3 shows the indicators of cadets' self-regulation according to cadets' physical fitness groups. Statistically significant differences were observed across different fitness groups regarding cadets' self-efficacy for challenge ($t(129) = 2.96$, $p = .004$): cadets in the sufficient physical fitness group reported higher self-efficacy than those in the insufficient physical fitness group. The effect size of this difference was medium ($d = .51$). When assessing other self-regulation variable according to cadets' physical fitness groups, no statistically significant differences between the groups were found: planning ($t(129) = 1.84$, $p = .07$, $d = .33$), checking ($t(129) = .16$, $p = .90$, $d = .03$), evaluating/reflecting ($t(129) = .35$, $p = .73$, $d = .07$), and effort ($t(129) = .10$, $p = .92$, $d = .02$).

Table 3

Indicators of Self-Regulation in the Physical Training Process According to Cadets' Physical Fitness Groups

Variables	Physical fitness	Number of participants	Mean	Standard Deviation	*Student's t*	*p*-value	Cohen's *d*
Planning	Insufficient	54	4.82	1.04	-1.84	.07	.33
	Sufficient	77	5.18	1.15			
Checking	Insufficient	54	5.46	1.09	-.16	.90	.03
	Sufficient	77	5.49	1.24			
Evaluating/ Reflecting	Insufficient	54	5.66	.83	-.35	.73	.07
	Sufficient	77	5.72	.94			
Self-efficacy for Challenge	Insufficient	54	5.16	.93	-2.96	.004	.51
	Sufficient	77	5.61	.82			
Effort	Insufficient	54	5.67	.83	-.10	.92	.02
	Sufficient	77	5.69	.85			

Table 4 shows the Pearson's correlations *(r)* between cadets' self-regulation variables and physical fitness (total test points). The correlations between self-efficacy for challenge and cadets' physical fitness were statistically significant, with a weak (*r* = .268) correlation.

Table 4

Pearson's Correlation Coefficients (r) Between Indicators of Cadets' Self-Regulation and Physical Fitness

Variables	Physical fitness
Planning	.109
Checking	.014
Evaluating/Reflecting	.010
Self-efficacy for Challenge	.268**
Effort	.093

Note. $^{**}p < .01$

The study showed that cadets' self-regulation according to individual dimensions did not differ significantly between groups of cadets who had different lengths of sport experience and those who did not: planning ($F(3, 130) = 1.37$, $p = .254$), checking ($F(3, 130) = .28$, $p = .840$), evaluating/reflecting ($F(3, 130) = .10$, $p = .961$), self-efficacy for challenge ($F(3, 130) = 1.91$, $p = .131$), and effort ($F(3, 130) = 2.03$, $p = .113$). No significant differences were found between groups of cadets who had military experience prior to entering higher education and those who did not: planning ($t(132) = 1.40$, $p = .889$), checking ($t(132) = .98$, $p = .329$), evaluating/reflecting ($t(132) = .71$, $p = .481$), self-efficacy for challenge ($t(132) = 1.58$, $p = .116$), and effort ($t(132) = 1.27$, $p = .185$).

Discussion

The military profession requires substantial physical and psychological resources; therefore, physical and psychological preparation is an integral part of cadets' training at military academies (Navickienė & Vasiliauskas, 2024; Boe et al., 2018). This study aimed to explore the self-regulation processes of LMA cadets during physical training and to examine how self-regulation is related to cadets' physical fitness. The results provide a better understanding of the extent to which cadets deliberately and intensively engage in physical training in order to optimize their physical preparedness. Moreover, the acquisition of motor skills is grounded not only in intensive practice that is independently planned, initiated, and sustained, but also in social support. Thus, appropriately supported self-regulated physical training may help cadets develop self-awareness and strengthen their beliefs that they can actively engage in and consciously manage their own learning.

The SRL process is cyclical, consisting of three interrelated phases that are not linear but closely connected as learners move from one phase to another (Zimmerman, 2006, 2013). In our study, cadets gave the lowest ratings to self-regulation related to planning processes, which belong to the metacognitive component of self-regulation. According to Zimmerman's (2006, 2013) cyclical model, planning belongs to the forethought phase, which includes task analysis and self-motivation beliefs that facilitate preparation and motivation for independent learning. Elite athletes and coaches consider the forethought phase before task engagement particularly important (Kitsantas et al., 2018). Learners with well-developed self-regulation are able to analyze upcoming tasks, break complex tasks into manageable components, set goals, and identify strategies required for successful performance (Toering et al., 2012; Zimmerman, 2013). The results of the study revealed that second-year cadets' planning indicators are statistically significantly higher than those of first-year cadets; however, the observed difference has a small effect size, and the significance level is close to the critical threshold. This suggests that although upperclassmen may show a certain tendency to set specific physical fitness goals more frequently, this advantage is not dominant. However, other studies (Guillermo, 2024) analyzing students' self-regulation in physical training across different years of study did not find significant differences between study-year groups. According to Panadero and Alonso-Tapia (2014), experts differ from novices in the time they dedicate to planning goals and actions. Research by Mickwitz et al. (2024) indicates that first-year students often struggle to apply self-regulation strategies such as planning, monitoring, and self-reflection because they are still learning to manage time and select effective learning strategies. Thus, the difference in planning indicators we identified – albeit a small one – could cautiously be attributed to second-year students' greater overall experience with academic studies and physical education at the institution. However, given the small effect size, the year of study does not unequivocally explain the changes in planning abilities, and the observed difference should be viewed more as a trend that should be tested in future studies with larger samples.

Our results showed that cadets rated effort and evaluating/reflecting the highest, which represent motivational aspects of self-regulation. This may indicate adaptive self-reactions, whereby learners attribute their results to personal control rather than uncontrollable causes. At this stage, learners evaluate outcomes and attribute their causes based on prior self-monitoring. According to Zimmerman (2013), when self-evaluative judgments are closely linked to causal attributions about learning outcomes, learners tend to attribute failure to ineffective strategies (controllable causes) and experience greater self-satisfaction, which in turn supports continued effort. This phase completes the SRL cycle and influences future learning behaviors, such as goal adjustment and strategy selection. However, researchers note that educational context and learner age may influence which SRL phases most strongly affect academic achievement (Li et al., 2018). Li et al. (2018) found that performance and self-reflection

phases were particularly important for academic achievement among Chinese primary and secondary school students. Similarly, research with Norwegian upper secondary students showed that goal setting and engagement in the full SRL cycle positively influenced physical education outcomes (Jørgensen Olsen & Mehus, 2022).

We did not find gender differences in cadets' self-regulation during physical training. However, given the significant imbalance in the sample between men and women, the statistical power of this comparison is limited. For this reason, the lack of gender-based differences in cadets' self-regulation during the physical training process identified in our study cannot be interpreted as actual evidence of the absence of gender differences. Although research specifically analyzing self-regulation among cadets is limited, studies with young athletes (Sabaliauskas et al., 2023) and athletes of different skill levels (Siekanska et al., 2023) also reported no significant gender differences in self-regulation. However, some studies conducted in non-sport higher education contexts have found higher self-regulation among female students (Liu et al., 2021; Özsoy-Güneş et al., 2014; Sezgin, 2022; Senler & Sungur-Vural, 2014). For example, Özsoy-Güneş et al. (2014) found that female engineering students demonstrated higher overall self-regulation and higher planning and goal-setting scores than male students. Similarly, Liu et al. (2021) reported higher female self-regulation across preparatory, performance, and appraisal phases during COVID-19 remote learning.

Researchers have also identified gender differences in physical fitness among military academy cadets. Men and women differ in somatic and motor development, and men often perform better in practical military tasks (Dada et al., 2017; Jarmo et al., 2021; Zurek et al., 2022). A study of Norwegian cadets found that gender differences in physical fitness persisted throughout three years of study (Aandstad et al., 2020). Additionally, women may experience greater physiological strain when performing the same operational tasks as men (Epstein et al., 2012). Men tend to demonstrate higher strength and endurance performance (Jarmo et al., 2021; Zurek et al., 2022). Consequently, female cadets may be subject to greater physical demands in order to reach the same level as men or perform tasks at a similar level to men. This could influence their self-regulation processes and strategies when preparing physically, which should be further explored despite the fact that our study did not reveal any gender differences in self-regulation.

Our findings indicate that cadets with sufficient physical fitness demonstrated higher self-efficacy for challenge. Although multivariate predictive models were not used in this study, the significant effect size estimates obtained confirm that the identified differences in self-regulation between cadets with sufficient and insufficient physical fitness are empirically robust and have practical value in the development of physical training programs. The study revealed a weak but statistically significant correlation between self-efficacy in overcoming challenges and the participants' physical fitness. Based on the correlation data obtained, the calculated coefficient of determination

indicates that self-efficacy explains only about seven percent of the variance in physical fitness scores. Therefore, it cannot be concluded that self-efficacy directly improves physical fitness indicators; additional experimental observations are needed to better understand this relationship. Our results align with findings from sport research showing that athletes with higher fitness levels demonstrate stronger self-regulation processes such as planning, self-control, effort, and self-efficacy (Bartulovic et al., 2017; Lochbaum et al., 2019; McCardle et al., 2017; Cleary & Zimmerman, 2001). Research also indicates that higher-performing athletes display stronger self-regulation skills (Siekanska et al., 2023), particularly in evaluation and reflection and when dealing with challenges (Wilson et al., 2021; Young et al., 2023).

We expected that prior sports or military experience would be associated with stronger self-regulation, but this was not confirmed. Many participants had prior sports experience and nearly half had military experience, which may have influenced self-regulation already in the first year of the study. Previous sports experience has been linked to improved cognitive skill acquisition during gross motor tasks such as running, push-ups, and sit-ups (Adler et al., 2015). Research with basic combat training soldiers showed that mental skills training produced stronger results among those with prior sports experience.

Modern warfare and military technology require high-quality professional military training, which necessitates the development of cadets' motor and military practical skills to a high level. Research in sport and physical education demonstrates that effective self-regulation is associated with higher skill development, endurance, emotional regulation, and performance under pressure (Bartulovic et al., 2017, 2018; Jørgensen Olsen & Mehus, 2022; Kolovelonis et al., 2012; Kitsantas et al., 2018; Li et al., 2023; Robazza et al., 2025; Siekanska et al., 2023; McCormick et al., 2019). Furthermore, military literature notes that self-regulation can contribute to improving the resilience of military personnel (McLarnon et al., 2021) and help strengthen cadets' physical and mental preparedness, which promotes the body's general adaptive processes for military service and combat operations (Prontenko et al., 2024; Sergijenko & Andreianov, 2013). Since SRL is a complex phenomenon influenced by both learner and learning context (Li et al., 2018; Ben-Eliyahu & Bernacki, 2015), this study did not aim to directly measure the aforementioned indicators of operational performance or resilience. Nevertheless, recognizing that SRL is a process of cognition and action in which learners pursue their goals by interacting with their environment (Schunk & Zimmerman, 2013), the results of our study have important educational implications. They allow for the theoretical development of strategies and methods to promote self-regulation among future officers during the physical training process, which may serve as a broader foundation for their professional preparedness in the future.

Limitations and directions for future research

Despite the important findings of this study, several limitations should be acknowledged. First, a cross-sectional design was used; therefore, cadets' self-regulation in the physical training process was examined without establishing causal relationships between self-regulation variables. Future research should include longitudinal and qualitative studies to explore cause–effect relationships. Since SRL is sensitive to contextual changes, qualitative research could provide deeper insight into self-regulation processes specific to the professional training of future officers and support the development of tools for assessing cadets' self-regulation in the physical training process. Another limitation is that the scale used to measure cadets' self-regulation in physical training was originally developed for athletes. Due to the relatively small sample size of this study, it was not methodologically feasible to conduct a reliable confirmatory factor analysis (CFA). Although the high internal consistency indices obtained for the scales confirm the reliability of the data, it would be advisable in future studies involving a larger sample of cadets to empirically test and standardize the factor structure of this instrument in a military population. Furthermore, as stated by Young et al. (2023), the numerical scales used reflect the subjective assessment of the research participant and show the extent to which they agree with the statements on the application of self-regulation processes, but it cannot be assumed that higher agreement on use is equivalent to "better" self-regulated practice. Therefore, to achieve a more accurate assessment of cadets' self-regulation in physical training, future studies could include observational methods and triangulate cadets' self-reports with evaluations from other participants in the process, such as sports instructors. It would also be valuable to investigate how self-regulation in physical training relates to cadets' perceived sport competence, as research indicates positive links between self-regulation skills and perceived competence (Sabaliauskas et al., 2023). Although the importance of self-regulation is widely recognized, we identified only a limited number of publications analyzing SRL in preparation for professional activity and found no publications specifically examining cadets' self-regulation in the physical training process. This limited the opportunity for deeper insights into the self-regulation processes of students preparing for military careers.

Conclusion

SRL, which emphasizes learners' ability to manage their own learning processes, has become not only relevant but also an important factor for educational success. Although research on the SRL of future officers in the context of physical training is limited, studies in the sport domain show that deliberate practice is important for athletes of different levels, as it motivates them to invest effort in purposeful training, benefit from practice, and maintain motivation and attention to aspects of performance that

require improvement. Therefore, strengthening cadets' self-regulation in the physical training process may help them prepare physically more effectively and make better use of their potential in professional activity. The present study allowed us to evaluate the main self-regulation processes applied by cadets in physical training practice, helping them to structure and reflect on their physical preparation. The findings contribute to the understanding of SRL in the context of cadets' professional training and are important for military education practice. Assessing students' self-regulation in practical physical training provides a basis for developing strategies and methods to strengthen self-regulation and for designing interventions that help students develop skills for self-regulated physical training.

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Lietuvos karo akademijos kariūnų savireguliacija fizinio rengimosi procese

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Santrauka

Karinės studijos turėtų padėti studentams išsiugdyti išskirtinius fizinius ir psichologinius būsimų karininkų gebėjimus, kad būtų pasirengę veikti, vadovauti bei priimti sprendimus iššūkių reikalaujančiose situacijose ir aplinkoje. Savireguliacinis mokymasis sudaro sąlygas sąmoningiau mokytis bei siekti geresnių rezultatų profesinėje veikloje. Tyrimu buvo siekiama atskleisti kariūnų savireguliaciją fizinio rengimo(si) procese, išryškinant skirtumus lyties, studijų kurso ir fizinio parengtumo aspektu. Tyrimo imtį sudarė 134 Lietuvos karo akademijos pirmo ir antro kursų kariūnai. Studentų savireguliacijai fizinio ugdymo(si) procese tirti taikytas Savireguliacinio mokymosi sporto praktikoje (angl. SRSP) klausimynas. Kariūnai į pakankamo ir nepakankamo fizinio parengtumo grupes buvo suskirstyti remiantis karinio fizinio parengtumo testavimo, vykdyto pagal Lietuvos karo akademijos tvarkas, protokolų rezultatais. Tyrimas parodė, kad kariūnų vyrų ir moterų savireguliacija fizinio rengimosi procese reikšmingai nesiskyrė. Nustatyta, kad antro kurso studentų planavimo savireguliacijos rodikliai yra aukštesni negu pirmo kurso studentų ($t(132) = 1{,}99$, $p = .049$, $d = .38$), o geresnio fizinio parengtumo kariūnai pasižymi aukštesniais savireguliacijos saviveiksmingumo sprendžiant iššūkius rodikliais ($t(129) = 2{,}96$, $p = .004$, $d = .51$). Šio tyrimo rezultatai gali padėti geriau suprasti, kaip studijų procese stiprinti kariūnų savireguliaciją, padėti jiems veiksmingiau rengtis fiziškai ir geriau išnaudoti savo potencialą profesinėje veikloje.

Esminiai žodžiai: *savireguliacinis mokymasis, psichologiniai procesai, fizinis ugdymas, profesinis rengimas, fizinis parengtumas, studentai.*

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