

The Development of Self-Determined Motivation towards Physical Activity: From Police Student to Police Professional

Thomas Dillern¹, Line Dverseth Tjærandsen², Stine Pedersen², Arne Martin Jakobsen² and Ole Ragnar Jenssen¹

¹The Norwegian Police University College, Bodø, Norway, ²Nord University, Faculty of Education and Arts, Bodø Norway.

Corresponding author: Thomas Dillern

E-mail: thomas.dillern@phs.no

The Norwegian Police University College
Bodø, Norway

Abstract

Physical readiness is essential for police officers. Despite this, physical activity and fitness decline throughout police officers' occupational career. To better understand this development, it is important to explore the motivation for physical activity among police students/officers. In a Self-determination theory (SDT) framework, this study aimed to explore what determines the police students/officers' motivational regulation to physical activity at the beginning of their education (N=130), at graduation (N=113) and after four years of service in the police (N=103). The study also examined the development of motivational regulation over this period. Based on a longitudinal survey design, data were collected using the Motivation to Physical Activity Measure – Revised (MPAM-R) at the three time points over a span of seven years. Across all time points, 'fitness' was the most influential motivational regulation to physical activity. At the beginning and end of police education 'interest enjoyment' and 'competence' were particularly determining regulations, while after four years of service 'competence' and 'appearance' became more prominent. From the beginning of education to graduation, there was a declining trend in motivation related to 'appearance' and 'social' and a positive tendency for 'fitness'. After four years in service, motivation related to 'competence' and 'social' declined whereas 'appearance' increased. These findings were discussed within the SDT perspective. Based on knowledge about motivational development, the study suggests that more targeted and effective strategies can be implemented to promote a healthy and active lifestyle among police students and officers.

Keywords: Police occupation, Physical demands, Police officers' preparedness, Life span perspective, Student formation

Adopting a life span perspective, this study investigates the development of motivation for physical activity among Norwegian police students/officers. The scope of the paper is to explore how motivation evolves from the beginning of the students/officers' education, through graduation and, finally after four years of active police service. In this period, the students/officers' motives for physical activity may change. Several plausible factors may contribute to these changes. Admission to the Norwegian police education program requires applicants to pass physical fitness tests (NUPC, 2017; 2019a). Furthermore, at the end of the program, students must pass additional physical tests in order to graduate (NUPC, 2019b). For many applicants and students, these tests likely require focused preparations and physical effort and ultimately may affect their underlying motives for physical activity/training. In contrast, once students begin their careers as police officers, all physical demands, except for the few officers that work in the emergency unit, cease (NUPC, 2019c). This shift in physical expectations may

contribute to changes in their motivation to remain physically active.

Physical activity and police profession

Policing is a physically demanding occupation. Officers are frequently exposed to critical situations such as arrests, assaults, traffic accidents, and public disturbances—often in hazardous environments (Reichard & Jackson, 2010; Korre et al., 2019). Additionally, the nature of police work—including long hours, shift work, and high stress levels—contributes to increased health risks among law enforcement personnel (Reichard & Jackson, 2010; Korre et al., 2019; Zimmerman, 2012). Exercise and good physical fitness serve as a counterbalance, as a resource to withstand the physical demands and stress of the policing profession. Thus, to perform their duties safely and maintain long-term health, police officers must remain physically fit throughout their careers (Tomes et al., 2020).

Consequently, police authorities must ensure that incoming officers possess an adequate level of physical

preparedness and the resilience to maintain it over time (Tomes et al., 2020). Physical fitness tests are therefore commonly used in the selection process for police education, as well as during and after education. As mentioned, regarding the police education in Norway, applicants must pass entrance tests assessing various physical abilities, including strength, endurance, and swimming (NUPC, 2019a). During the three-year education program, students must complete courses including basic theory of training and occupational health, and undergo several physical assessments, such as lifesaving in water, baton use, arrest techniques, and general fitness tests.

Despite this emphasis, research indicates that both physical fitness and activity levels tend to decline over the course of a police career (Lagestad et al., 2014; Lagestad & Tillar, 2014; Sørensen et al., 2000). This suggests that current efforts by authorities and educational institutions may not be enough to sustain long-term behavioural change. To better understand this decline, we need deeper insight into the underlying determinative aspects of this behaviour: we need more knowledge about police students/officers' motives for being physically active and how these motives eventually change in a life-time perspective.

Motivation and the police profession in a Self-determination theory perspective

There is substantial evidence linking motivational regulation to physical activity patterns and adherence (Brunet & Sabiston, 2011; Friederichs et al., 2015). Understanding the motivation behind police students' and officers' lifestyle choices is therefore essential. Self-Determination Theory (SDT) has been widely applied to examine the relationship between motivation and physical activity (Deci & Ryan, 1985; Edmunds et al., 2006; Hagger & Chatzisarantis, 2008). Within SDT, mini-theories such as Cognitive Evaluation Theory (CET), Organismic Integration Theory (OIT), and Basic Psychological Needs Theory (BNT) each explain different aspects of self-determined motivation (Ryan & Deci, 2019). These theories can also help explain activity behaviour and participation, as well as the decline in activity throughout a police career.

According to BNT, intrinsic motivation arises when three basic psychological needs are fulfilled: autonomy, competence, and relatedness (Ryan & Deci, 2007; Standage et al., 2019). Autonomy refers to the sense of control over one's actions, competence involves feeling effective and capable, and relatedness is the need to feel connected both to the activities performed and other people involved. When these needs are satisfied, individuals are more likely to experience sustained motivation and well-being. Understanding how these needs are met in the police context can provide valuable insights into the motivational dynamics at play (Edmunds et al., 2007; Ryan & Deci, 2019).

Overall, literature consistently supports the relevance of SDT in explaining physical activity behavior, where more self-determined forms of motivational regulation are positively related with physical activity (Teixeira, 2012). There is a trend that identified regulation predicts short-term adoption to activity, while intrinsic motivation is more strongly linked to long-term activity adherence (Teixeira, 2012). However, intrinsic motivation alone may not be sufficient to sustain long-term regular engagement in exercise, given the organization and commitment required. Identified regulation, where individuals value the outcomes of the activity, may for this matter play a more critical role (Brunet & Sabiston, 2011).

Nonetheless, according to SDT, motivation for physical activity can be both internal and external. This is

explained in the cognitive evaluation theory (CET). An individual may be internally motivated for some activities, where others may not. It is also the case that in some situations an individual is internally motivated for an activity, while in others (s)he is externally motivated (Markland & Inglede, 2007; Ryan et al., 2009). When an individual is internally motivated, (s)he would feel a kind of inner interaction with the activity and situation. An externally motivated individual would, on the other hand, participate in activities to achieve a gain outside of the activity itself - this can be better health, to look better or to be fit to perform other activities. In practice, most physical activity behaviour is influenced by a combination of both (Ericsson, 2003; Ericsson, 2009; Ryan et al., 2009).

Organismic integration theory (OIT) explains various types of motivation and motivational regulation on a continuum from low to high self-determination (Ryan et al., 2009; Ryan & Deci, 2007; Ryan & Deci, 2019). The continuum describes motivational regulation from amotivation, through varies types of extrinsic motivational regulation to intrinsic regulation.

At one end of the continuum lies amotivation, a state characterized by a lack of personal causation and intentionality (Ryan & Deci, 2007; Standage et al., 2019). Moving one step up in the continuum we find external regulation, the most controlling regulation of extrinsic motivation. Here, individuals engage in an activity for external reinforcement like gaining rewards or to avoid punishment (Ryan & Deci, 2007). The next level is introjected regulation, where an individual is motivated by gaining external referenced approval (Ryan & Deci, 2007). An even more self-determined form of extrinsic motivation is identified regulation, in which individuals engage in an activity because they personally value its outcome - such as acquiring new skills. The most self-determined regulation in extrinsic motivation is integrated regulation. This occurs when individuals are motivated to engage in physical activity because it aligns with their core values and beliefs (Lonsdale et al., 2009). At the opposite end of the continuum from amotivation is intrinsic motivation. At this stage the individual does whatever activity (s)he does solely for enjoyment and fun and where there is no exterior reinforcement or reward (Pelletier et al., 1995).

Study aims

Given the nature and the demands of the police profession, the documented decline in physical activity and physical fitness throughout the police career, and the relation between motivation and physical activity, we, in this study sought to explore the development of motivational regulation among police students/officers from the beginning of their education, at the point of graduation and after four years of service in the police. In specific, the primary aim of the study was to explore what determines the police students'/officers' motivational regulation to physical activity at the beginning of their education, at the point of graduation and after four years of service in the police. Secondly, we aimed to explore the development in the students'/officers' motivational regulation through the same period.

Methods

Design

As this study aimed to explore motivational regulation for physical activity among police students during their actual course of study, a descriptive design seemed compulsory. Using a repeated survey approach, we measured participants' motivation for physical activity at

three time points using the Motivation for Physical Activity Measure – Revised (MPAM-R) questionnaire. The first data collection (Time 1) was conducted at the beginning of the students' three-year police education (autumn 2016), the second (Time 2) near the time of graduation (spring 2019), and the third (Time 3) four years after graduation (spring 2023). The study is part of a larger research project, which was reported to and approved by the Norwegian Centre for Research Data (Project ID: 48728).

Participants and sampling

At the first time point, 144 students from The Norwegian Police University College (NPUC) were invited to take part in the study, of whom 130 agreed (90 %). Throughout the study, there however were some dropouts, with the consequence that the participation dropped to 113 students at the second time point and 103 participants at the third. Their mean age, measured at the first time of sampling, was 22.3 years (SD 2.3), ranging from 19 to 32 years. The sample consisted of 78 males (60 %) and 52 females (40 %), reflecting the overall gender distribution among NPUC students. Participants were informed, both orally during an information meeting and in a written declaration of consent, that participation was voluntary and unrelated to their academic performance and bachelor's degree.

Questionnaires and their Validity and Reliability

The Motivation to Physical Activity Measures-Revised (MPAM-R) questionnaire consists of 30 items designed to assess motivational factors for participation in sport and exercise activities. Responses are rated on a seven-point scale ranging from 1 (not at all true for me) to 7 (very true to me). The items are grouped into five subscales, structured into a three-factorial order: amotivation, extrinsic and intrinsic motivation. Specifically, the subscales interest/enjoyment, competence and social reflect intrinsic motivation and regulation, while fitness and appearance represent varying levels of extrinsic motivation and regulation (Jakobsen, 2014; Ryan et al., 1997).

There are methodical limitations associated with the use of self-reported data, and the validity of the MPAM-R has been discussed in previous research. For instance, Chmielewski et. al. (2016) found that the interest/enjoyment subscale contained redundant items, which reduced its construct validity. They also reported that this subscale could not be empirically distinguished from the competence subscale. Furthermore, in the Brazilian-Portuguese translation and validation of the MPAM-R, Albuquerque et. al. (2017) had to reduce the number of items in both the competence and fitness subscales in order to achieve acceptable values. Another concern relates to the validation process itself. Specifically, the use of Cronbach's alpha as a measure of internal consistency has been criticized (i.e. see Sjitsma, 2009). Despite these concerns, the MPAM-R has demonstrated high practical feasibility and cost-effectiveness, and it has been widely used in research over the past decades. Its validity and reliability have been documented across numerous studies. For instance, Cronbach's alpha scores for the subscales ranged from .78 to .92 in Beauchemin et al. (2019), exceeded .87 in Ryan et al. (1997), and varied between .84 and .89 in Withall et al. (2011). The questionnaire has also been translated in several languages, including Italian (Battistelli et. al. 2016) and Norwegian (Jakobsen 2014 and Jakobsen & Evjen 2018). In the Norwegian context, the validation of the subscales revealed Chronbach's alpha scores exceeding .70 in the first study, and ranging from .86 - .95 in the second. In our own analyses (see details

below), conducted across the three data collection periods, Cronbach's alpha scores ranged from .81 to .94 for all five subscales.

Statistics and preliminary analyses

Data were analyzed using SPSS, version 28.

Assessing assumptions of normality and sphericity

Several variables (9 out of 15) did not meet the assumption of normality according to Kolmogorov-Smirnov test, which is a common occurrence in large samples. However, upon examining Normal Q-Q plot, as well as skewness and kurtosis, all variables were deemed acceptable for analyses. Furthermore, in five of the eight repeated measures ANOVA (RMA) analyses (see below), the assumption of sphericity was violated, as indicated by a significant Mauchly's test ($p < .05$). In repeated measures designs involving more than two measurements, such violations are common and the effect is increased risk of type-1 errors in the F-statistics. To correct this bias, F-tests can be adjusted using various corrections such as the Greenhouse-Geisser adjustment. An alternative approach when sphericity is violated is to apply multivariate test statistics, such as Wilks' Lambda. In the present study, we adopted this multivariate approach and, for the sake of consistency, applied it across all eight analyses, even in cases where the assumption of sphericity was met. For additional control of type-1 errors we also chose to do a Bonferroni adjustment for all pairwise comparisons.

MPAM-R subscale reliability

Sampling time one – First year of study. The number of items in each of the five MPAM-R subscales, the respective Cronbach's alpha scores and correlations were for sampling time one as follows: Interest/Enjoyment (7, $\alpha=.90$ and $r = .39-.75$); Competence (7, $\alpha=.89$ and $r = .28-.71$); Appearance (6, $\alpha=.92$ and $r = .52-.82$); Fitness (5, $\alpha=.81$ and $r = .27-.69$); and Social (5, $\alpha=.82$ and $r = .20-.73$).

Sampling time two – Third year of study. The number of items in each of the five MPAM-R subscales, the respective Cronbach's alpha scores and correlations were as follows for sampling time two: Interest/Enjoyment (7, $\alpha=.90$ and $r = .32-.86$); Competence (7, $\alpha=.88$ and $r = .29-.76$); Appearance (6, $\alpha=.94$ and $r = .57-.91$); Fitness (5, $\alpha=.82$ and $r = .26-.73$); and Social (5, $\alpha=.86$ and $r = .25-.75$).

Sampling time three – four years into the profession. The number of items in each of the five MPAM-R subscales, the respective Cronbach's alpha scores and correlations were as follows for sampling time three: Interest/Enjoyment (7, $\alpha=.88$ and $r = .22-.83$); Competence (7, $\alpha=.88$ and $r = .26-.76$); Appearance (6, $\alpha=.94$ and $r = .62-.89$); Fitness (5, $\alpha=.81$ and $r = .33-.73$); and Social (5, $\alpha=.82$ and $r = .22-.74$).

Main analyses and results

The most determining motivation at each sampling time

To explore which types of motivational regulations that were most determining at each of the sampling times, we conducted a one-way repeated measures ANOVA using the five subscales MPAM-R for each time point (tables 2-4). Given the violation of the sphericity assumption, as outlined above, we opted to interpret the multivariate statistics generated (Wilks' Lambda). The means and standard deviations for each sampling time are presented in table 1.

Table 1: Descriptive data on motivational regulation

	Sample time 1 ^a	Sample time 2 ^b	Sample time 3 ^c
Interest/enjoyment (SD)	5.23 (1.02)	5.07 (1.13)	5.03 (1.10)
Competence (SD)	5.40 (.96)	5.46 (.89)	5.17 (1.08)
Fitness (SD)	5.96 (.74)	6.12 (.70)	5.95 (.87)
Appearance (SD)	4.67 (1.34)	4.35 (1.46)	5.28 (2.02)
Social (SD)	3.70 (1.14)	3.26 (1.18)	3.05 (1.23)

a: N=125, b: N=111, c: N=100

Sampling time one – First year of study. At the first sampling time, the analysis revealed a significant difference between the five types of motivational regulation, Wilks' Lambda = .21, F (4, 121) = 108.69, p < .001, with a multivariate partial eta squared = .78,

indicating a large effect size. Pairwise comparison further disclosed that all subscales differed significantly from one another (table 2). Examination of the mean values for each subscale (table 1) shows that fitness, competence and interest/enjoyment were especially determining.

Table 2: Pairwise comparison for motivational regulation measured at sample time one

Factor	Factor	Mean Difference	Std. Error	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
1	2	-,76 ^a	,074	-,95	-,52
	3	-,17 ^b	,053	-,32	-,02
	4	,56 ^a	,137	,170	,95
	5	1,53 ^a	,101	1,24	1,82
2	1	,74 ^a	,074	,52	,95
	3	,57 ^a	,065	,38	,75
	4	1,30 ^a	,128	,93	1,66
	5	2,26 ^a	,109	1,95	2,58
3	1	,17 ^b	,053	,02	,32
	2	-,57 ^a	,065	-,75	-,38
	4	,73 ^a	,138	,34	1,13
	5	1,70 ^a	,104	1,40	1,99
4	1	-,56 ^a	,137	-,95	-,170
	2	-1,30 ^a	,128	-1,66	-,93
	3	-,73 ^a	,138	-1,13	-,34
	5	,97 ^a	,14	,57	1,37

a: p<.001, b: p<.05; Adjustment for multiple comparisons: Bonferroni; Factor 1: Interest/enjoyment; Factor 2: Fitness; Factor 3: Competence; Factor 4: Appearance; Factor 5: Social

Sampling time two - Third year of study. At the second time point, the analysis revealed a significant difference between the five types of motivational regulation, Wilks' Lambda = .15, F (4, 107) = 152.29, p < .001, with a multivariate partial eta squared = .85, indicating a large effect size. Pairwise comparison further

showed that all the subscales differed significantly from one another (table 3), and when exploring the mean values for each subscale (table 1), fitness, competence and interest/enjoyment emerged as especially determining.

Table 3: Pairwise comparison for motivational regulation measured at sample time two

Factor	Factor	Mean Difference	Std. Error	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
1	2	-1,05 ^a	,10	-1,34	-,77
	3	-,40 ^a	,06	-,57	-,23
	4	,72 ^a	,17	,24	1,19
	5	1,81 ^a	,11	1,50	2,12
2	1	1,05 ^a	,10	,77	1,34
	3	,65 ^a	,07	,45	,86
	4	1,77 ^a	,15	1,35	2,19
	5	2,86 ^a	,12	2,51	3,21
3	1	,40 ^a	,06	,23	,57
	2	-,65 ^a	,07	-,86	-,45
	4	1,12 ^a	,17	,64	1,59
	5	2,21 ^a	,11	1,90	2,52
4	1	-,72 ^a	,17	-1,19	-,24
	2	-1,77 ^a	,15	-2,19	-1,35
	3	-1,12 ^a	,17	-1,59	-,64
	5	1,09 ^a	,17	,60	1,59

a: p<.001; Adjustment for multiple comparisons: Bonferroni; Factor 1: Interest/enjoyment; Factor 2: Fitness; Factor 3: Competence; Factor 4: Appearance; Factor 5: Social

Sampling time three - four years into the profession. For the third sampling time, the analysis also revealed a significant difference between the five types of motivational regulation, Wilks' Lambda = .15, F (4, 96) = 138.74, p < .001, with multivariate partial eta squared = .85, indicating a large effect size. Pairwise comparison

further disclosed that most, but not all, subscales differed significantly from one another (table 4). Examination of the mean values for each subscale (table 1) revealed that fitness, appearance and competence were particularly determining.

Table 4: Pairwise comparison for motivational regulation measured at sample time three

Factor	Factor	Mean Difference	Std. Error	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
1	2	-,92 ^a	,10	-,120	-,64
	3	-,14	,077	-,35	,08
	4	-,24	,22	-,87	,39
	5	1,99 ^a	,11	1,68	2,30
2	1	,92 ^a	,10	,64	1,20
	3	,78 ^a	,09	,54	1,03
	4	,68 ^b	,21	,08	1,27
	5	2,91 ^a	,12	2,55	3,27
3	1	,14	,08	-,08	,35
	2	-,78 ^a	,09	-1,03	-,54
	4	-,11	,23	-,77	,55
	5	2,12 ^a	,12	1,79	2,46
4	1	,24	,22	-,39	,87
	2	-,68 ^b	,21	-1,27	-,08
	3	,11	,23	-,55	,77
	5	2,23 ^a	,21	1,63	2,84

a: p<,001, b: p<,05; Adjustment for multiple comparisons: Bonferroni; Factor 1: Interest/enjoyment; Factor 2: Fitness; Factor 3: Competence; Factor 4: Appearance; Factor 5: Social

Development over time – changes in motivational regulation over time

To explore the development of motivational regulation over time (across time 1, time 2 and time 3), we conducted a one-way repeated measures ANOVA for each of the five MPAM-R subscales (table 5). As in previous analyses, we also chose to interpret the multivariate statistics (Wilks' Lambda) due to violations of the sphericity assumption.

Table 5: Pairwise comparison for motivational regulation between three sample times

Regulation	Factor	Factor	Mean Difference	Std. Error	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Interest/Enjo	1	2	,08	,09	-,15	,31
		3	,21	,10	-,04	,46
	2	1	-,08	,09	-,31	,15
		3	,13	,11	-,13	,40
	1	2	-,09	,08	-,29	,10
		3	,27 ^b	,09	,05	,49
		2	,09	,08	-,10	,29
Competence	2	1	,36 ^a	,10	,13	,60
		3	,36 ^a	,10	,13	,60
		1	-,09	,08	-,29	,10
	1	2	-,22 ^c	,07	-,38	-,06
		3	-,00	,09	-,21	,20
		2	,22 ^c	,07	,06	,38
Fitness	2	1	,22 ^b	,08	,02	,42
		3	,22 ^b	,08	,02	,42
		1	-,22 ^c	,07	-,38	-,06
	1	2	-,00	,09	-,21	,20
		3	,22 ^c	,07	,06	,38
		2	-,00	,09	-,21	,20
Social	1	2	,51 ^a	,13	,21	,82
		3	,74 ^a	,12	,44	1,05
		2	-,51 ^a	,13	-,82	-,21
	2	1	,23	,12	-,07	,53
		3	-,51 ^a	,13	-,82	-,21
		1	,23	,12	-,07	,53
Apperance	1	2	,45 ^c	,13	,15	,76
		3	-,45 ^c	,13	-,92	-,14
		2	,45 ^c	,13	,15	,76
	2	1	-,53 ^c	,16	-,92	-,14
		3	,45 ^c	,13	,15	,76
		1	-,53 ^c	,16	-,92	-,14

a: p<.001, b: p<.05; c: p<.01; Adjustment for multiple comparisons: Bonferroni; Factor 1: sample time 1; Factor 2: sample time 2; Factor 3: sample time 3; N=88-90

Interest/enjoyment. For the Interest/enjoyment subscale, the analysis revealed no significant differences between the sample times.

Competence. For the Competence subscale, the analysis revealed a significant difference across the sampling times, Wilks' Lambda = .86, F (2, 87) = 7.18, p < .001, with a multivariate partial eta squared of .13,

implying a medium effect size. Pairwise comparisons further indicated that the students/officers exhibited significantly lower competence-regulated at the third sampling time compared to the first two.

Fitness. For the fitness subscale, the analysis revealed a significant difference between the sample times, Wilks' Lambda = .86, F (2, 88) = 7.16, p < .001, with a multivariate partial eta squared = .14, indicating a large effect size. However, pairwise comparisons showed that the only difference between the sampling times was found between the first and second sampling times.

Appearance. For the Appearance subscale, the analysis revealed a significant difference across the time points, Wilks' Lambda = .67, F (2, 88) = 21.87, p < .001, with a multivariate partial eta squared of .33, indicating a large effect size. Pairwise comparison further disclosed differences between all three time points, with this motivational-related motivation being most pronounced at the third sampling time.

Social. For the Social subscale, the analysis revealed a significant difference between the three measurement times, Wilks' Lambda = .70, F (2, 87) = 18.29, p < .001, with a multivariate partial eta squared = .30, indicating a large effect size. Pairwise comparison further disclosed that students/officers reported significantly higher social regulation at the first sampling time compared to the two subsequent times.

Discussion

In the present study we aimed to investigate the development of self-determined motivation for physical activity among Norwegian police students/officers from a life-span perspective. The primary objective was to explore what determines police students'/officers' motivational regulation to physical activity at three time points: the beginning of education, at graduation and after four years of service in the police. Our findings revealed that among the five included motivational subscales - interest/enjoyment, competence, social, fitness and appearance - the most determining motivational regulations to physical activity at both the beginning and end of the educational period were 'interest/enjoyment,' 'competence' and 'fitness'. There was thus minimal change in the motivational subscales that remained especially influential at these two time points. After four years of service, 'competence', 'fitness' and 'appearance' emerged as the most determining motivational regulations, although with 'interest/enjoyment' still being highly influential. Across all three time points, 'fitness' appeared as the most dominant motivational factor for engaging in physical activity.

The secondary aim of the study was to examine how students'/officers' motivational regulation for physical activity developed through the same period. From the beginning of the education to the point of graduation, we found a negative trend in 'interest/enjoyment' (not significant), 'appearance' (p < .01) and 'social' (p < .001), and a positive trend in 'competence' (not significant) and 'fitness' (p < .01). From graduation to four years into active service, all motivational regulations, except 'appearance' (with a positive change), declined. The changes in 'competence' (p < .001), 'fitness' (p < .05) and 'appearance' (p < .001) were statistically significant.

Motivational regulation at the point of admission and the point of graduation

Extrinsic motivation

In this study, 'fitness' emerged as a key motivator for physical activity across all three sample times, with significantly higher levels reported at graduation compared to the beginning of the education. This suggests that the motivational regulation related to fitness shifted from being associated with gaining admission to the police education program to passing the physical examination required for graduation. The 'fitness' subscale is typically interpreted as a form of introjected (extrinsic) regulation, referring to "the sense of being strong, healthy and able" (Ryan et al., 1997, p. 350). However, there is an ongoing debate about whether fitness should be associated with intrinsic motivation, due to its positive correlation with exercise attendance (Ryan et al., 1997; Ryan and Deci, 2000; Teixeira et al., 2012; Vanstreenkiste et al., 2007; Wang & Hagger, 2023). In contrast to extrinsic motives, (such as appearance) intrinsic motivation tends to foster persistence, well-being, and improved performance. Non-internalized forms of regulation (external and introject) have been linked to less adaptive outcomes, including dropout from sport, athlete burnout, negative self-talk and ill-being (Standage, 2023). Therefore, classifying 'fitness' purely as an extrinsic motivation may be overly simplistic. Most physical activities and sports involve a combination of both intrinsic and extrinsic motives (Ryan et al., 2009). In the present context, 'fitness' may be more accurately conceptualized as a form of identified regulation, defined as "behaviour regulated via the conscious valuing of an activity as being important to one's aims/goals" (Standage, 2023, p. 703). Engaging in physical activity to achieve health and fitness is inherently an intrinsic objective (Ryan et al., 2009). Even when individuals are externally motivated, they may still harbour intrinsic aspirations. This said, extrinsic goals, such as seeking approval or recognition, may be particularly relevant for prospective police students. Throughout their educational journey, from admission to graduation, students may seek external validation based on their physical capabilities. However, it is essential not to confuse this with pride, which is more aligned with intrinsic motivation (Weinberg & Gould, 2024, p. 140).

In Norway, the police profession is held in high regard and enjoys considerable societal respect. Admission to the police education program is highly competitive; in 2022, only 500 students were accepted out of 3,340 applicants (NUPC, 2022, p. 5). Moreover, the limited availability of job positions contributes to a highly competitive employment landscape. The percentage of graduates securing positions has declined over the years, reaching an all-time low of just 9.9% in permanent positions for the graduating class of 2023 (National Police Directorate, 2024). Consequently, being police students require more than basic competence: many strive to excel and distinguish themselves from their peers wherever possible. This mirrors the mindset of elite athletes, who not only aim to perform well but also to outperform their competitors. Mallet and Hanrahan (2004) reported that successful elite athletes are often driven by intrinsic motives related to personal goals and achievement, even though outperforming others remains central objective. This motivational pattern aligns with the concept of introjected regulation.

The individual student's motivation for pursuing police education and service may offer insight into whether 'fitness' should be interpreted as an intrinsic or extrinsic form of motivation. Gavin et al. (2014) emphasized the role of autonomy in intrinsic motivation and argued that being 'toned and fit' could indeed reflect intrinsic motivation,

aligning with OIT (Organismic Integration Theory). It is reasonable to assume that students applying to physically demanding educational programs are generally more active and either identify themselves as active individuals or integrate physical activity into their lifestyle. Research shows that students in sports-related fields, such as police education, exhibit higher levels of PA (physical activity) than their peers in other academic disciplines (Kljajevic et al., 2022). In contrast, students in non-sports fields tend to experience a decline in both identified and integrated regulation of motivation for PA, as well as in PA levels, while police students appear to buck this trend (Jenssen & Dillern, 2024; Kljajevic et al., 2022; Snedden et al., 2019; Thomas et al., 2019). Considering these factors, 'fitness' motivation may be interpreted as extrinsic in nature, but also internal, either through identified or integrated regulation. Regardless of its classification, we recommend 'fitness' to be treated as a key consideration in the design of training programs and recruitment strategies for police students.

Intrinsic motivation

Although 'fitness' emerged as the most prominent motivational regulation during the students' educational period, the findings also indicate a high level of intrinsic motivation. Both interest/enjoyment and competence received relatively high scores at both measurement points, reflecting intrinsic motivation and contributing to the fulfilment of the three basic psychological needs: autonomy, competence, and relatedness (Jakobsen, 2014; Ryan et al., 1997). However, the students did not appear to be strongly motivated by the third intrinsic subscale, 'social'.

In summary, our findings suggest that the police students exhibit a stronger inclination toward intrinsic motivation at the point of admission compared to at graduation, as both 'interest/enjoyment' and "social" (social being significant, $p < .001$) drops at the latter time point.

Despite 'fitness' typically being considered an extrinsic motivator, the overall pattern across all subscales does not fully support the assumption that extrinsic motivation dominates physical activity motivation among police students at the start of their education. Rather, the presence of strong intrinsic motives in the younger population align with previous research. Burnet and Sabiston (2011) found that young adults (aged 18-24) reported higher levels of intrinsic and introjected regulation compared to middle-aged adults (aged 45-64). It is reasonable to assume that young adults who demonstrate intrinsic and introjected motivation for physical activity (PA) are also the ones choosing physically demanding educational programs and that are willing to commit to the workload required to qualify.

In their study, Gavin et al. (2014) observed a decline in intrinsic motivation for PA among younger adults. Although motives categorized as 'fun and friends' were most prominent among 18- and 20-year-olds, these motives tended to decrease over time. Interestingly, the social aspect did not significantly outweigh other motives for PA across all age groups. Notably, the desire to be 'toned and fit' remained the strongest motivator throughout. The researchers also reported a lifespan-related decline in motivation associated with enhancing 'mental toughness,' which encompasses self-esteem, the acquisition of new life skills (i.e., competence), and resilience. They argued that concerns related to physical appearance become less relevant as individuals establish well-founded self-esteem. Although the context of Gavin et al. (2014) differs from ours, our findings similarly highlight

strong motivation related to competence and fitness. It is however important to recognize that police students/officers may diverge from the general population. Studies by Madrigal (2009) and Connaughton et al. (2010) emphasize mental toughness as a key motivator among athletes. Considering the competitive nature of police students, this factor warrants further attention.

Motivational regulation four years into service

Extrinsic and intrinsic motivation

Between graduation and four years into professional service, a notable shift occurred in the students/officers' motivation for PA, where the subscales 'fitness', 'appearance', 'competence' and 'interest/enjoyment' all played key roles at the latter point. Among the extrinsic motivators, 'fitness' remained relatively stable, while 'appearance' increased substantially. On the other side, all intrinsic motivation variables declined during this period. Overall, this pattern indicates a shift toward greater reliance on extrinsic motivation over intrinsic. Notably, the influence of 'appearance' varied significantly across the three measurement points. It was initially strong at admission, declined during the course of education, and then rebounded—reaching its highest level after four years in active police service. Studies have demonstrated a positive correlation between intrinsic motivation for PA and actual PA levels (e.g. Esmaeilzadeh et al., 2022; Jenssen & Dillern, 2021; Teixeira et al., 2012; Wang & Hagger, 2023). However, other studies suggest that well-internalized extrinsic motives can also play a role in behavioural regulation. In particular, Jenssen and Dillern (2021) found that motivation related to fitness and appearance significantly predicted physical activity levels.

While perceived competence can foster intrinsic motivation, the combination of extrinsic and intrinsic motivation does not necessarily yield greater overall motivation. In fact, rewards may sometimes undermine intrinsic motivation, leaving individuals less inclined to engage in physical activity afterwards (Deci et al., 1999; Standage, 2023). On the other hand, achievement can enhance perceived competence and, in turn, strengthen motivation (Nicholls, 1984). Moller and Sheldon (2020) explored long-term motivation among young athletes. In their study they found support for previous research indicating that external rewards can reduce athletes' intrinsic motivation for sport participation (Medic et al., 2007; Moller & Sheldon, 2020; Wagner et al., 1989). Interestingly, this reduction in intrinsic motivation may persist even decades after the initial experience – in this case, long after completing college (Moller & Sheldon, 2020). These findings highlight the importance of fostering integrated, self-determined forms of motivation to promote sustained PA. This is particularly relevant in professions that require a specific physical state. In such contexts, self-determined approaches are more likely to support high levels of intrinsic motivation and long-term engagement in physical activity (Fortier et al., 2012; Jenssen & Dillern, 2024).

Nevertheless, whether motivation is intrinsic or extrinsic may not be crucial for predicting physical activity among adults and middle-aged individuals. In a study by Brunet and Sabiston (2011), this became visible as no significant correlation was found between motivational models predicting physical activity behaviour for individuals aged 25–64. Instead, the overall development of motivation, regardless of its source, appears to be more relevant. During the course of the present study, a slight decline in overall motivation was observed. Initially, police students/officers were highly motivated upon entrance into the police education, but their motivation waned by the end

of the education. Although students reported increased motivation related to 'fitness', they also experienced decreased motivation related to 'interest/enjoyment', 'social' and 'appearance', resulting in an overall reduction in motivation throughout their education. Four years into their professional careers, all motivation subscales had declined, except for 'appearance', which had a quite substantial positive development. In a previous study by Lagestad and van den Tillar's (2014), a significant decline in physical activity among police officers three years after completing their education was revealed. Our results similarly indicate a shift in motivation for physical activity from the study's outset to four years post-graduation. Thus, police officers appear to share similarities with the general population, experiencing decreased physical activity and potentially lower levels of physical fitness, a significant public health concern, according to the World Health Organization (2019). A key difference, however, between the police population and the general population is that being a police officer implies having responsibility for emergency preparedness.

Practical implications

To our knowledge, this is the first study to explore the development of motivational regulation for physical activity over the life span among police students and officers. Understanding whether these individuals are more intrinsically or extrinsically motivated for PA is useful for several reasons. First, such insight sheds light on the underlying drivers that govern their behaviour related to physical activity. Intrinsic motivation, driven by internal enjoyment for the activity itself, may indicate a deeper and more sustainable engagement in physical activity over time (Wang & Hagger, 2023). On the other hand, extrinsic motivation, driven by external rewards or pressures, such as praise, recognition, or expectations from others, may lead to a more superficial and less enduring commitment to physical activity (Standage, 2023).

Second, this knowledge can help develop more effective strategies and interventions to promote physical

activity among police students and officers. For instance, training programs that enhance perceived competence and foster interest/enjoyment can help sustain high levels of intrinsic motivation and integrated regulation, both of which are crucial for long-term engagement in physical activity. Furthermore, recognizing the importance of 'fitness' as both an extrinsic and intrinsic motivational factor can help develop initiatives that appeal to police students/officers' desire to be strong and healthy. This might include targeted workout programs and health-promoting activities that support both physical fitness and overall well-being. Third, understanding motivational types can influence the design of training programs and recruitment strategies for police students. Tailoring programs to align with individual motivational profiles may increase participation and help maintain engagement over time. Fourth, the study reveals that motivation for physical activity changes over time, with a tendency toward increased extrinsic motivation after four years of service. This highlights the need for continuous support and encouragement, not only through external incentives but also by fostering intrinsic motivators such as interest and enjoyment in physical activity.

Overall, a deeper understanding of whether police students and officers are more intrinsically or extrinsically motivated for physical activity should be of interest to both educational institutions and police authorities. Such knowledge about motivational development can contribute to the design of more targeted and effective actions aimed at promoting a healthy and active lifestyle in this professional group.

References

Albuquerque, M. R., Lopes, M. C., de Paula, J. J., Faria, L. O., Pereira, E. T., & da Costa, V. T. (2017). Cross-Cultural Adaptation and Validation of the MPAM-R to Brazilian Portuguese and Proposal of a New Method to Calculate Factor Scores [Original Research]. *Frontiers in Psychology, Volume 8* - 2017. <https://doi.org/10.3389/fpsyg.2017.00261>

Battistelli, A., Montani, F., Guicciardi, M., & Bertinato, L. (2016). Regulation of exercise behaviour and motives for physical activities: The Italian validation of BREQ and MPAM-R questionnaires. *Psychologie Française*, 61(4), 333-348. <https://doi.org/https://doi.org/10.1016/j.psfr.2014.10.003>

Beauchemin, J. D., Gibbs, T. A., Granello, P. F., & Gabana, N. T. (2019). Motivation for movement: Influences for walking event participation. *Health Education Journal*, 78(2), 111-123. <https://doi.org/10.1177/0017896918787216>

Brunet, J., & Sabiston, C., M. (2011). Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport and exercise*, 12, 99-105.

<https://doi.org/10.1016/j.psychsport.2010.09.006>

Chmielewski, M., Sala, M., Tang, R., & Baldwin, A. (2016). Examining the Construct Validity of Affective Judgments of Physical Activity Measures. *Psychological Assessment*, 28, 1128-1141. <https://doi.org/10.1037/pas0000322>

Connaughton, D., Hanton, S., & Jones, G. (2010). The development and maintenance of mental toughness in the world's best performers. *The sport psychologist*, 24(2), 168-193. <https://doi.org/10.1123/tsp.24.2.168>

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Nature*. Plenum Press.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological bulletin*, 125(6), 627.

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology*, 36(9), 2240-

2265. <https://doi.org/10.1111/j.0021-9029.2006.00102.x>

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2007). Perceived Autonomy Support and Psychological Need Satisfaction in Exercise. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-Determination in Exercise and Sport* (pp. 35-51). Human Kinetics.

Ericsson, K., A. (2003). Expert Performance in Sport: Current Perspectives and Critical issues. In J. Starkes, L. & K. Ericsson, A. (Eds.), *Expert performance in sports. Advances in Research on Sport Expertise* (pp. 19-49). Human Kinetics.

Ericsson, K., A. (2009). Enhancing the Development of Professional Performance: Implications from the Study of Deliberate Practice. In K. Ericsson, A. (Ed.), *Development of Professional Expertise. Toward Measurement of Expert Performance and Design of Optimal Learning Environments* (pp. 425-431). Cambridge University Press.

Esmaeilzadeh, S., Rodriguez-Negro, J., & Pesola, A. J. (2022). A Greater Intrinsic, but Not External, Motivation Toward Physical Activity Is Associated With a Lower Sitting Time. *Front. Psychol.* 13. <https://doi.org/10.3389/fpsyg.2022.888758>

Fortier, M. S., Duda, J. L., Guerin, E., & Teixeira, P. J. (2012). Promoting physical activity: development and testing of self-determination theory-based interventions. *International Journal of Behavioral Nutrition and Physical Activity*, 9, 1-14. <https://doi.org/10.1186/1479-5868-9-20>

Friederichs, S. A., Bolman, C., Oenema, A., & Lechner, L. (2015). Profiling physical activity motivation based on self-determination theory: a cluster analysis approach. *BMC psychology*, 3(1), 1. <https://doi.org/10.1186/s40359-015-0059-2>

Gavin, J., Keough, M., Abravanel, M., Moudrakovski, T., & McBrearty, M. (2014). Motivations for participation in physical activity across the lifespan. *International Journal of Wellbeing*, 4(1), 46-61. <https://doi:10.5502/ijw.v4i1.3>

Hagger, M. S., & Chatzisarantis, N. L. D. (2008). Self-Determination Theory and the psychology of exercise. *International Review of Sport and Exercise Psychology*, 1(1), 79-103. <https://doi.org/10.1080/17509840701827437>

Jakobsen, A. M. (2014). Are there differences in motives between participants in individual sports compared to team sports? *LASE Journal of Sport Science*, 5(2), 30-40. <https://doi.org/10.1515/liss-2016-0030>

Jakobsen, A. M., & Evjen, E. (2018). Gender differences in motives for participation in sports and exercise among Norwegian adolescents. *Baltic Journal of Health and Physical Activity*, 10(2), 10. <https://doi:10.29359/BJHPA.10.2.10>

Jenssen, O. R. N., & Dillern, T. (2021). Does motivational regulation affect physical activity patterns among Norwegian Police University College students? *International Journal of Police Science & Management*, 23(4), 406-416. <https://doi.org/10.1177/14613557211027189>

Jenssen, O. R. N., & Dillern, T. (2024). Development in Police Students' Motivational Regulation to Physical Activity - Exploring Self-Determination Theory in an Academic Learning Context. *Uniped*, 47(2), 101-114. <https://doi.org/10.18261/uniped.47.2.3>

Kljajević, V., Stanković, M., Đorđević, D., Trkulja-Petković, D., Jovanović, R., Plazibat, K., Oršolić, M., Čurić, M., Sporiš, G. (2022). Physical Activity and Physical Fitness among University Students—A Systematic Review. *Int. J. Environ. Res. Public Health*, 19, 158. <https://doi.org/10.3390/ijerph19010158>

Korre, M., Loh, K., Eshleman, E. J., Lessa, F. S., Porto, L. G., Christophi, C. A., & Kales, S. N. (2019). Recruit fitness and police academy performance: a prospective validation study. *Occupational Medicine*, 69(8-9), 541-548. <https://doi.org/10.1093/occmed/kqz110>

Lagestad, P., Jenssen, O. R., & Dillern, T. (2014). Changes in police officers' physical performance after 16 years of work. *International Journal of Police Science & Management*, 16(4), 308-317. <https://hdl.handle.net/11250/3030666>

Lagestad, P., & van den Tillaar, R. (2014). Longitudinal Changes in the Physical Activity Patterns of Police Officers. *International Journal of Police Science & Management*, 16(1), 76-86. <https://doi.org/10.1350/ijps.2014.16.1.329>

Lonsdale, C., Sabiston, C. M., Raedeke, T. D., Ha, A. S., & Sum, R. K. (2009). Self-determined motivation and students' physical activity during structured physical education lessons and free choice periods. *Preventive medicine*, 48(1), 69-73. <https://doi.org/10.1016/j.ypmed.2008.09.013>

Madrigal, L., Hamill, S., & Gill, D. L. (2013). Mind over matter: The development of the Mental Toughness Scale (MTS). *The sport psychologist*, 27(1), 62-77. <https://doi.org/10.1123/tsp.27.1.62>

Mallett, C., Hanrahan, S., (2004). Elite athletes: why does the fire burn so brightly? *Psychology of Sport and Exercise*, 5, 183-200. [https://doi.org/10.1016/S1469-0292\(02\)00043-2](https://doi.org/10.1016/S1469-0292(02)00043-2)

Markland, D., & Ingledeew, D., K. (2007). Exercise Participation Motives. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-Determination in Exercise and Sport* (pp. 21-35). Human Kinetics.

Medic, N., Mack, D., Wilson, P., & Starkes, J. (2007). The effects of athletic scholarships on motivation in sport. *ECU Publications*, 30.

Moller, A. C., & Sheldon, K. M. (2020). Athletic scholarships are negatively associated with intrinsic motivation for sports, even decades later: Evidence for long-term undermining. *Motivation Science*, 6(1), 43-48.

National Police Directorate. (2024, June 12). Bemanningsstatistik. [Staffing statistics]. <https://www.politiet.no/om-politiet/tall-og-fakta/bemanninger/#naar-kommer-statistikken-ut>

Nicholls, J. G. (1984). Achievement motivation: conceptions of ability, subjective experience, task choice, and performance. *Psychological review*, 91(3), 328.

NUPC - Norwegian Police University College. (2017). *Bachelor. Oppaktskrav*. Retrieved from <https://www.politihogskolen.no/bachelor-politiutdanning/oppaktskrav/>

NUPC - Norwegian Police University College. (2019a). Bestå fysiske tester [Pass physical tests]. Retrieved from Fysiske tester - Politihøgskolen (politihogskolen.no)

NUPC - Norwegian Police University College. (2019b). *Programplan- Bachelor*. Retrieved from <https://www.politihogskolen.no/globalassets/for-studenter/regelverk-og-innholdet-i-bachelor/rammeplan-og->

[programplaner/programplan-bachelor-politiutdanning-tredje-studieår-2021-2024-polithogskolen.pdf](https://www.polithogskolen.no/etter-videreutdanning/operativt-politiarbeid/grunnutdanning-innsatspersonell-kategori-3/)

NUPC - Norwegian Police University College. (2019c). *Innsatspersonell til politiets uthyrkningsenheter*. Retrieved from <https://www.polithogskolen.no/etter-videreutdanning/operativt-politiarbeid/grunnutdanning-innsatspersonell-kategori-3/>

NUPC - Norwegian Police University College. (2022). *Opptaksrapporten*. [Admission Report]. <https://www.polithogskolen.no/globalassets/om-oss/fakta-og-tall/opptakstall/opptaksrapport-2022.pdf>

Pelletier, L. G., Tuson, K. M., Fortier, M. S., Vallerand, R. J., Briere, N. M., & Blais, M. R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). *Journal of sport and Exercise Psychology*, 17(1), 35-53. <https://doi.org/10.1123/jsep.17.1.35>

Reichard, A. A., & Jackson, L. L. (2010). Occupational injuries among emergency responders. *American journal of industrial medicine*, 53(1), 1-11. <https://doi.org/10.1002/ajim.20772>

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American psychologist*, 55(1), 68.

Ryan, R. M., & Deci, E. L. (2007). Active Human Nature. In M. Hagger, S. & N. Chatzisarantis, L.,D. (Eds.), *Intrinsic Motivation and Self-Determination in Exercise and Sport*. Human Kinetics.

Ryan, R. M., & Deci, E. L. (2019). Brick by brick: The origins, development, and future of self-determination theory. In A. Elliot (Ed.), *Advances in motivation science* (1 ed., Vol. 6, pp. 111-156). Academic Press. <https://doi.org/10.1016/bs.adms.2019.01.001>

Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology*, 28(4), 335-354.

Ryan, R. M., Williams, G., C., Patrick, H., & Deci, E. L. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, 6, 107-124.

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, 74(1), 107-120. <https://doi.org/10.1007/s11336-008-9101-0>

Snedden, T. R., Scerpella, J., Kliethermes, S. A., Norman, R. S., Blyholder, L., Sanfilippo, J., McGuine, T. A., Heiderscheit, B. (2019). Sport and Physical Activity Level Impacts Health-Related Quality of Life Among Collegiate Students. *American Journal of Health Promotion*, 33(5), 675-682. <https://doi.org/10.1177/0890117118817715>

Standage, M. (2023). *Self-Determination Theory Applied to Sport*. In R. M. Ryan (Ed.), *The Oxford Handbook of Self-Determination Theory* (pp.701-723). Oxford University Press.

Standage, M., Curran, T., & Rouse, P. C. (2019). Self-Determination-Based Theories of Sport, Exercise, and Physical Activity Motivation. In T. Horn & A. L. Smith (Eds.), *Advances in Sport and Exercise Psychology* (4 ed., pp. 289-313). Human Kinetics.

Sörensen, L., Smolander, J., Louhevaara, V., Korhonen, O., & Oja, P. (2000). Physical activity, fitness and body composition of Finnish police officers: a 15-year follow-up study. *Occupational Medicine*, 50(1), 3-10. <https://doi.org/10.1093/occmed/50.1.3>

Teixeira, P.J., Carraça, E.V., Markland, D. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *Int J Behav Nutr Phys Act* 9(78). <https://doi.org/10.1186/1479-5868-9-78>

Thomas, A. M., Beaudry, K. M., Gammie, K. L., Klentrou, P., & Josse, A. R. (2019). Physical activity, sport participation, and perceived barriers to engagement in first-year Canadian university students. *Journal of Physical Activity and Health*, 16(6), 437-446. <https://doi.org/10.1123/jpah.2018-0198>

Tomes, C., Schram, B., Pope, R., & Orr, R. (2020). What is the impact of fitness on injury risk during police academy training? A retrospective cohort study. *BMC sports science, medicine and rehabilitation*, 12, 1-8. <https://doi.org/10.1186/s13102-020-00188-7>

Vansteenkiste, M., Soenens, B., & Lens, W. (2007). Intrinsic Versus Extrinsic 'Goal Promotion in Exercise and Sport, Understanding the Differential Impacts on Performance and Persistence. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport*. Human Kinetics.

Wagner, S. L., Lounsbury, J. W., & Fitzgerald, L. G. (1989). Attribute factors associated with work/leisure perceptions. *Journal of Leisure Research*, 21(2), 155-166.

Wang, J. C K. & Hagger M. S. (2023). *Self-Determination Theory in Physical Activity Context*. In R. M. Ryan (Ed.), *The Oxford Handbook of Self-Determination Theory* (pp.740-759). Oxford University Press.

Weinberg, R. S., & Gould, D. (2024). *Foundations of sport and exercise psychology*. Human kinetics.

Withall, J., Jago, R., & Fox, K. (2011). Why some do but most don't. Barriers and enablers to engaging low-income groups in physical activity programmes: A mixed methods study. *BMC public health*, 11, 507. <https://doi.org/10.1186/1471-2458-11-507>

World Health Organization. (2019). *Global Action Plan on Physical Activity 2018-2030: More Active People for a Healthier World*. Geneva: World Health Organization.

Zimmerman, F. H. (2012). Cardiovascular disease and risk factors in law enforcement personnel: a comprehensive review. *Cardiology in review*, 20(4), 159-166. <https://doi.org/10.1097/CRD.0b013e318248d631>