ORIGINAL ARTICLE

The impact of coaching advice on motor learning skills, with a particular focus on the role of self-competencies in high-performing athletes

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ABSTRACT

In the context of competitive sports training, it is imperative that athletes receive regular training in self-competence to enhance self-regulation and self-control, thereby empowering them to actively influence their own learning process and mitigate stress. The present study (N = 35, mean age: 17.06) suggests a negative correlation between stress load and self-control ($r = -.517$, $p < .001$). Concurrently, a positive correlation was identified between self-control and willpower ($r = .433$, $p < .005$), with willpower also exerting an influence on motor learning, although not significantly ($d = .358$). The study set out to examine the hypothesis that the manner in which coaches communicate has a significant impact on motor learning ($r = -.41$, $p < .005$). Subsequent group comparisons revealed significant variations in juggling performance, which were associated with higher expressions of willpower ($p = .027$, $d = .735$). In comparison with the groups that achieved high self-competence scores, the group that received negative coach instruction and simultaneously exhibited a low level of self-competence demonstrated the poorest results in motor learning and exhibited significant differences to the athletes with high self-competence ($p \leq .020$, $d \geq 0.75$). These results underscore the significance of promoting self-competence in top athletes.

Keywords: Performance analysis, Motor learning, Coaching advice, Self-competences, Willpower, Self-regulation.

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INTRODUCTION

A positive sporting career is characterised by both highs and lows. Furthermore, an athlete's convictions and skills are key factors in their ability to cope positively with difficult phases and prevent a premature dropout. These stress-reducing mechanisms, termed coping, can be associated with the problem itself through avoidance tactics or the reduction of competition goals. Alternatively, action strategies can be adopted to regulate emotions, thereby rendering high sporting goals as positive challenges rather than sources of stress (cf. Semmer, 2009). Positive emotions and a positive approach from coaches appear to be beneficial in the context of achieving sporting goals, thereby engendering optimism towards a sporting task (cf. Semmer, 2009). Positive coaching is of particular importance for young athletes, whereby empathy, triggered by positive coaching instructions, plays a decisive role (Visek et al., 2015; Wekesser et al., 2021; Jowett, Yang & Lorimer, 2012). In their meta-analysis with over 11,000 participants, Solberg Nes and Segerstrom (2006) posit that optimism exhibits a weak positive correlation with approaching stress management ($r = .17$) and a negative correlation with avoiding stress management ($r = 0.21$). Similar effects with a positive influence on stress management have been demonstrated by Prati and Pietrantoni (2009) and Lowe et al. (2013). Given the strong correlation between optimism and self-efficacy ($r = 0.48$, Gottschling et al., 2016), it is logical to also consider the expectation of self-efficacy (Bandura, 1977). The dimensions of social and verbal persuasion within the 4-factor model are particularly pertinent to the recent study, in which the coaches' speech and its consequences on motor learning processes are investigated, while focusing on general self-competences such as self-control, willpower, self-regulation and stress load. The aim is therefore to maintain elevated expectations of self-efficacy in challenging situations, with the objective of reducing stress and enhancing problem-coping abilities. The correlation between cognitive abilities and motor learning has been delineated by D'Anna, Mucci and Vastola (2021), among other scholars, and has been corroborated by numerous other authors, with perceived self-efficacy being attributed significant importance (e. g. Gomes et al., 2012).

Increased self-efficacy has been demonstrated to contribute to the setting of more challenging sporting goals, the pursuit of these goals with purpose, and an increase in the overall endeavour to be active in sport (Feltz et al., 2008; Hu, Motl, McAuley & Konopack, 2007). As self-efficacy is defined as a belief in one's own abilities, the survey of self-competences that forms the basis of the present study is of crucial importance (cf. Van Dinther, Dochy & Segers, 2011). This enables the determination of detailed correlations between areas of competence, motor learning and the trainer's approach. The present study assumes that strengthening self-efficacy improves motor learning and that this, in turn, depends on the trainer's approach.

Social factors have been shown to have a supportive effect (Morgenroth & Buchwald, 2015). Zier, Heiss & Ehrlenspiel (2016) have indicated that a high level of intrinsic motivation has a preventive effect against high levels of stress. Furthermore, the authors emphasise that athletes with effective coping mechanisms are better equipped to manage novel demands and consequently exhibit reduced susceptibility to overload (Raedeke & Smith, 2004).

In addition to personality traits, the environment plays a significant role, with coaches in particular exerting a substantial influence due to their role as accepted role models and the significant amount of time and emotional investment they make. When personality traits and environmental characteristics are conducive, stress is reduced, thereby enhancing athletic performance. As demonstrated by Davis et al. (2018), there was an increased cognitive performance ($\beta = -.228$, $p = .033$) when the coach-athlete relationship was perceived as positive. Although this correlation could not be proven for motor learning ($\beta = .019$, $p = .861$), these results indicate possible correlations between learning performance and the coach-athlete relationship.

Heiss et al. (2010) identified motivational, volitional and emotional thoughts that set goals, block negative thoughts and separate thoughts from feelings. The authors refer to the concept of self-leadership, which is defined as the ability to influence self-control and self-motivation processes in such a manner that they are conducive to the challenges encountered (Neck & Houghton, 2006; Heiss et al., 2010). It is further noted that the process of self-leading strategies is predominantly influenced by behaviour-focused strategies, constructive thought pattern strategies, and natural reward strategies (Houghton & Neck, 2002; Heiss et al., 2010).

Baumeister (2014) reports that self-regulatory fatigue (depletion) hinders the mastery of complex sports tasks, a phenomenon termed the 'ego depletion model'. This model establishes a connection between willpower and self-regulation, both of which serve to increase self-control. Ego depletion is described by some authors as the result of reduced self-control due to reduced resources. In this case, it was preceded by good self-control, which can be regarded as the basis of athletic performance (e.g., Baumeister, Vohs, & Tice, 2007). Despite the lack of substantiation in numerous instances of the ego-depletion model (Jia et al., 2016), the maintenance of adept self-control skills is imperative for the attainment of long-term sporting objectives. The endurance of athletes throughout their careers is facilitated by the ability to surmount both psychological and physiological challenges. Furley et al. (2013) identified differences in basketball sports groups (N = 40) that related to ego-depleted athletes having lower self-control resources and therefore also achieving poorer results in a speeded tactical decision-making task (p = .026, d = .0732).

The hypothesis that willpower is a finite resource, as posited by Baumeister (1998), suggests that its depletion occurs over time in response to frequent and intensive utilisation. However, contradictory evidence suggests that individuals who possess an infinite reserve of willpower exhibit reduced signs of fatigue in comparison to those who believe their willpower is limited (cf. Job, Dweck & Walton, 2010; Evans, Boggero & Segerstrom, 2016; Konze, Rivkin & Schmidt, 2017). Consequently, it can be deduced that cultivating athletes' willpower may be a pivotal factor in preventing attrition. Assuming that heightened willpower corresponds to enhanced self-regulation, a correlation between these two factors can be anticipated in the present study. Concurrently, the hypothesis is that self-control will demonstrate a dependency on willpower and self-regulation, and that a negative correlation with the stress level will be observed, given that increased stress will lead to increased willpower and self-regulation. This will result in an increased need for willpower in order to master sporting tasks despite perceived stress.

From the problems and correlations presented, questions can be derived that relate to the consequences of a positive or negative trainer response for motor learning performance. Using juggling as an example, taking into account co-factors such as existing self-competences, skin conductivity and blood volume pulse, which influence the motor learning process (cf. McEwen, 2013; Gerber & Fuchs, 2018), allows us to formulate hypotheses regarding the relationship between these factors and the motor learning performance in question.

MATERIALS AND METHODS

Study design and participants

The present study comprised 35 participants engaged in competitive sports (11 female, mean age = 17.18, SD = 1.32; 24 male, mean age = 16.96, SD = 1.04). It was hypothesised that none of the participants had prior experience in juggling, thus eliminating the need for a specific entry level. Furthermore, the random assignment of the two groups (positive and negative trainer instructions) was examined for comparability based on the initial self-competence levels of the participants (see Table 1). The distribution of results was visualised through a boxplot, which utilised the Mann-Whitney U-test to analyse the data (see Figure 1).

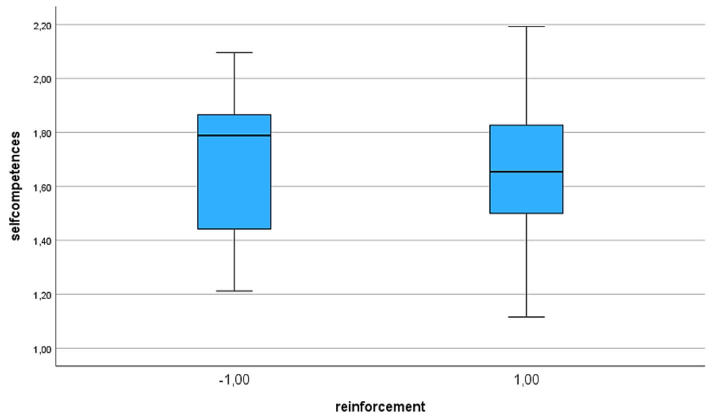

Figure 1. Box plot for the self-competences of the two groups, which were negative (-1) or positive (+1) reinforced by the coaches.

Table 1. Comparison of the groups with regard to their self-competencies, which were randomly given positive or negative reinforcement by the coach (Mann-Whitney U-test).

Motive	Group	N	Mean	SD	Mean rank	*p* (two-sided test)	Asymp. *p* (two-sided test)
Self competences	Neg. reinforced	14	1.67	.42	16.82	.653	.648
	Pos. reinforced	17	1.65	.53	15.32		
Self-regulation	Neg. reinforced	14	1.48	.45	15.75	.891	.889
	Pos. reinforced	17	1.58	.77	16.21		
Self-control	Neg. reinforced	14	1.50	.47	15.25	.681	.676
	Pos. reinforced	17	1.64	.76	16.62		
Will power	Neg. reinforced	14	1.58	.56	15.86	.953	.937
	Pos. reinforced	17	1.66	.52	16.12		
Self-access	Neg. reinforced	14	2.14	.68	17.64	.377	.366
	Pos. reinforced	17	2.06	.60	14.65		
Stress load	Neg. reinforced	13	1.14	.71	16.46	.621	.599
Life stress	Pos. reinforced	17	.97	.67	14.76		

Table 2. Items and Variables of the SSi-K3 including examples for items of each category.

Categories	Items	Examples
Self-regulation	2; 3; 15; 16; 28; 29; 41; 42	In a difficult job, I can look specifically at the positive sides. (15)
Self-control	4; 5; 17; 18; 30; 31; 43; 44	Before I start any extensive work I decide how I am going to proceed. (30)
Willpower	7;8;20;21;33;34;45;46	When something needs to be done, I like to start prefer to start immediately. (45)
Self-access	9;10;11;22;23;24;35;36;37;48;49;50	It's hard to get rid of worrying thoughts once they are there. (48)
Stress-load	12;13;25;26;38;39;51;52	My current living conditions are quite hard. (25)

Measures

The groups were surveyed using the SSI-K3 (German, 2004) with regard to their level of self-regulation (Cronbach's α from .75 - .90). This questionnaire compares 52 items, which were divided into 4 scales each rated on a 6-point Likert scale ranging from 5 = strongly agree to 0 = strongly disagree. The four scales are divided into the following: self-regulation, willpower, self-access and stress load. The fifth scale (self-regulation) was additionally created because of its importance in educational environments. In addition, skin conductance and blood volume pulse were measured using biofeedback to determine dependencies on possible physical reactions that could have an influence on motor learning performance (Biograph InfinitiTM software, ProComp Infiniti system). The assessment of motor performance was conducted using the 6 learning steps, which were subsequently categorised into learning performance levels 1-6 (see Figure 2).

The descriptive results of the scales are shown in Table 3. The correlations were calculated for all variables and illustrated in Table 4.

Table 3. Descriptive statistics, standard deviations, alpha reliability for main variables in the study and Test for normally distribution.

Variable	N	Mean	SD	∞	Groups of re-enforcement	Shapiro-Wilk	K - S *p*-value
Self-competences (total)	35	1.64	.28	.85	Positive	.748	.200*
					Negative	.439	.093
Self-regulation	34	1.60	.37	.75	Positive	.297	.115
					Negative	.400	.200*
Self-control	34	1.57	.47	.68	Positive	.184	.181
					Negative	.364	.200*
Willpower	34	1.58	.49	.82	Positive	.235	.181
					Negative	.683	.200*
Self-access	35	2.04	.61	.90	Positive	.258	.200*
					Negative	.122	.200*
Stress load	34	1.08	.70	.87	Positive	.068	.134
Life stress					Negative	.326	.200*

Table 4. Alpha reliability and correlations for main variables in the study.

Skala		∞[1]	∞[2]	1	2	3	4	5	6	7
1	Self-regulation	>.76	.75	1						
2	Self-control	>.73	.68	.713**	1					
3	Will power	>.79	.82	-.020	.433*	1				
4	Self-access	>.78	.90	.469*	.116	.599**	1			
5	Stress load	>.82	.87	.063	-.517**	-.430*	-.308	1		
6	Motor learning	-	-	-.118	-.019	.358	-.083	-.249	1	
7	Reinforcement	-	-	.028	.112	-.125	-.109	-.125	.41*	1

*Note. **. Correlation is significant at the .01 level (2-tailed), *. Correlation is significant at the .05 level (2-tailed), [1] ∞ - Autor, [2] ∞ - own results.*

Procedures

The participants were randomly divided into two groups. The first group watched a 6-step juggling instruction video while actively following the methodical steps with standardised balls (mass = 100 g) (see Figure 2). The second group watched the same video but received six positively reinforced instructions. The other group received six negatively reinforced instructions. The respective learning step was presented for 30 seconds and simultaneously imitated by the participant. The successful completion of each learning step was assigned a performance score ranging from 1 to 6, with 1 representing the highest level of proficiency. In the event of a cancellation of the motor learning process within a specific learning step, a score of 0.5 was allocated, ensuring a comprehensive and varied dataset.

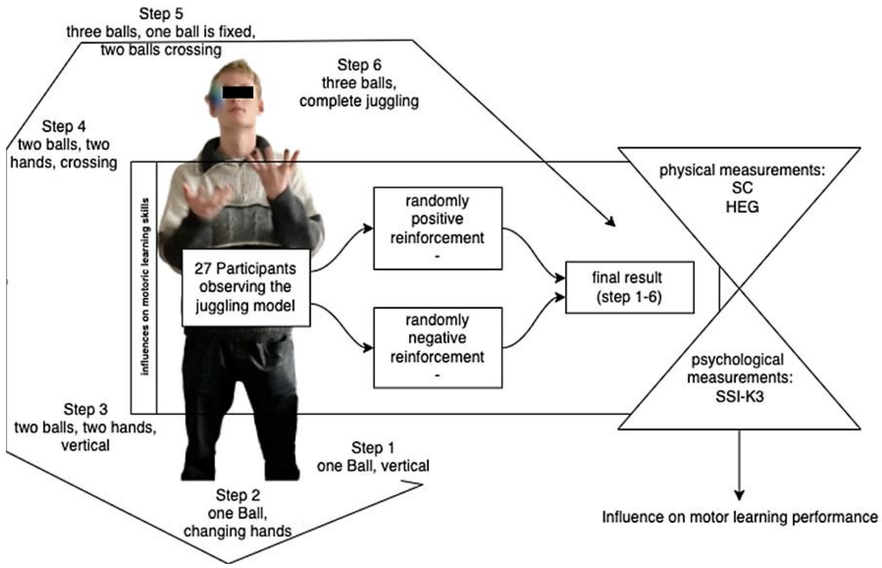

Figure 2. Standardised sequence of the 6-step video instruction for learning to juggle with three balls.

Ethics

The present study was preceded by an authorisation procedure by the local administrative authority (Berlin Senate Administration). Each participant signed a document outlining all data protection issues, as well as the procedure for conducting the study. All instruments that had to be completed by the participants were numbered using a code and will be destroyed within two years. The coding was based on the initials of the mother and her date of birth, generating a ten-digit code. The data collection pertaining to the individual practice performance (juggling) was also coded and followed the same pattern so that the values could be assigned later.

Analysis

The factors of the German SSI-K3 (Kuhl & Fuhrmann, 2004) generally demonstrated good internal consistency, a finding corroborated by other authors (see Table 4). However, a small number of items did not align with the study's requirements and were consequently excluded (see Table 2). Descriptive statistics were calculated for the variables, and the Kolmogorov-Smirnov test was employed to assess the normality of the data. In instances where the data exhibited a normal distribution, the t-test was employed to ascertain the significance between groups. Conversely, if the data did not follow a normal distribution, the non-parametric Mann-Whitney U-test was implemented to identify differences between groups. The subsequent result section involved a comparison between the group with lower self-competences and the group with higher self-competences, with the objective of determining any discrepancies. The groups were arranged in accordance with the mean of each variable.

The effect size was calculated with Cohen's d and interpreted as follows: $d = .20$ small effect; $d = .50$ medium effect; $d = .80$ strong effect (Cohen, 1988). The significance level was set at $p < .05$, and the statistical data treatment was carried out with SPSS 29.0. Pearson's correlation was used for the main variables of the study to analyse the relationship between all the variables. The results demonstrate the effect size (Cohen's d), which was validated by the Hedges correction due to the limited sample size (see Tables 4 and 5). The ANCOVA indicates the potential for variation in the motor learning process between the two groups, influenced by positive or negative reinforcement from the coach's instructions, depending on the impact of any variable (see Table 7).

RESULTS

As illustrated by the diagrams in Figure 3, enhanced self-competence appears to circumvent negative coaching instructions, thereby facilitating the attainment of favourable outcomes. Conversely, diminished self-competence has been observed to result in suboptimal outcomes when confronted with negative coaching instructions. The findings of both presentations substantiate, that positive coaching instructions are conducive to superior learning outcomes, particularly among athletes exhibiting inadequate self-competence. The ensuing discussion will delve into the analysis of these hypotheses. Conversely, the influence of coaches' instructions on willpower is particularly pronounced when willpower is limited and the coaches' approach is negative.

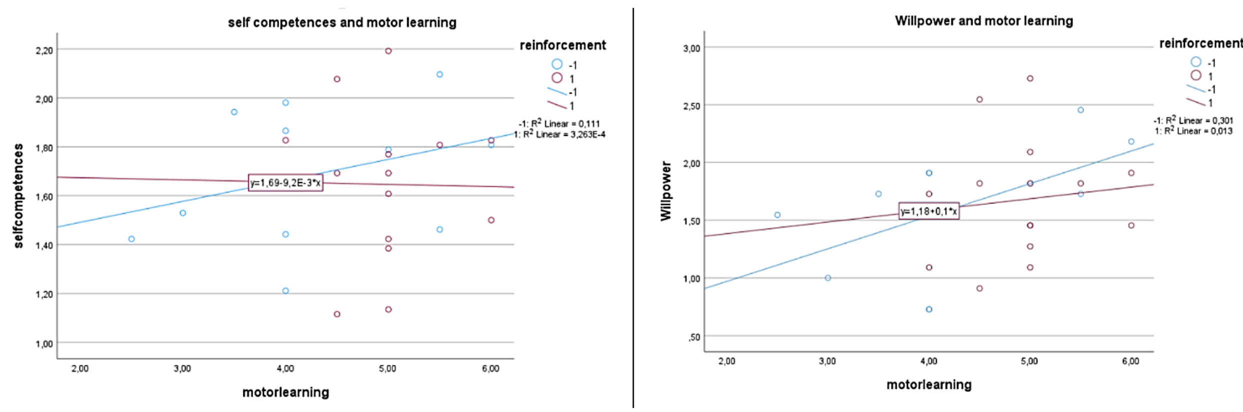

Figure 3. Motor learning success depending on the trainer's approach and the existing self-competences and willpower expression.

In order to analyse the presumed correlations shown in Fig. 3 in detail, the extent to which self-competences influence the motor learning process will be demonstrated in the following section. A one-sided significance test was conducted, as illustrated in Table 5, which revealed that there were differences between the two groups.

Table 5. Differences in motor-learning of the two groups having high or low self-competences-levels (Kolmogorov-Smirnov-*p*-value > .5).

Group		n	Mean	SD	df	T	p	d	K - S *p*-value	Hedges Corr.
Self-competencies	High	16	4.84	.72	28	-.853	.200	-.31	> .05	-.304
	low	14	4.57	1.02						
Self-regulation	High	15	4.87	.83	28	-.945	.176	-.35	> .05	-.336
	low	15	4.57	.90						
Self-control	High	15	4.70	.79	28	.103	.459	.038	> .05	.037
	low	15	4.73	.96						
Willpower	High	14	5.00	.61	28	-2.01	.027*	.735	> .05	.715
	low	16	4.39	1.02						
Self-access	High	14	4.79	.89	28	.402	.345	.147	> .05	.143
	low	16	4.66	.87						
Stress load	High	14	4.57	.89	27	.897	.189	.333	> .05	.324
	low	15	4.87	.88						

*Note. * p = < .05 one-tailed, d = Cohen`s d.*

Table 6. Alpha reliability and correlations for the relevant sub-categories of willpower in the study.

	Skala	∞	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	Self-access	.90	1							
2	concentration	.90	.702**	1						
3	Intents	.80	.565*	.662*	1					
4	Initiative	.79	.165	.368	.396*	1				
5	Stressload	.87	-.308	-.361	-.366	-.313	1			
6	Motor-learning	-	.083	.322	.329	.208	-.249	1		
7	SC	-	.023	.260	.263	.108	-.275	.093	1	
8	BVP	-	.087	.147	.187	.153	-.156	.034	.213	1

Due to the limited sample size, the results require alternative recording methods, with the effect size indicated at low significance and subsequently compared with a co-analysis of variance (ANCOVA). The assumption is made that the dependent variable, motor learning, can be predicted by the independent variables (covariates) of self-competences, self-regulation, self-control, willpower, self-access and stress load, with reinforcement taken into account.

The findings reveal that there is no significant difference between the groups with positive trainer instruction and those without effect size (see Table 5). However, the groups with negative reinforcement demonstrate a substantial effect, while the impact is not considered to be significant. It is hypothesised that the factors influencing learning performance are confounding variables. To address this, an ANCOVA is employed for the variables self-competences, self-regulation, self-control, willpower, self-access and stress load.

The hypothesis that the self-competences of the athletes are related to learning performance was examined, and the results are presented in Table 7.

Table 7. Test of between subject effects: ANCOVA, dependent variable: motor learning result of the two groups (positive or negative reinforced).

Variable	**Source**	**Sum Squares**	**df**	**F**	***p***	**Partial η^2**
Self-competences	Reinforcement Error	3.38	1 30	4.97	.034*	.156
Self-regulation	Reinforcement Error	3.16	1 30	4.59	.041*	.145
Self-control	Reinforcement Error	3.221	1 30	4.67	.040*	.148
Willpower	Reinforcement Error	3.02	1 30	4.90	.035*	.154
Self-access	Reinforcement Error	3.24	1 30	4.70	.039*	.148
Stress-load	Reinforcement Error	2.80	1 30	4.07	.054	.135

*Note. * p = < .05 two-tailed.*

The Bonferroni-corrected post-hoc analysis revealed a significant difference between the motor learning outcomes of the two positively and negatively reinforced groups (p < .035, MDiff = .64, 95%-CI [.047, 1.24]), after adjustment for willpower. After adjustment for self-competence, the results were p < .034, MDiff = .68, 95%-CI [.055, 1.31]), after adjustment for self-regulation p < .041, MDiff = .66, 95%-CI [.027, 1.28]), and after adjustment for self-control p < .040, MDiff = .67, 95%-CI [.034, 1.29]), self-access: p < .039, MDiff = .68, 95%-CI [.036, 1.31]) and stress-load: p < .054, MDiff = .63, 95%-CI [.012, 1.28]).

No correlations were found for the variables BVP and skin impedance (partial $\eta^2 < .046$, $p > .41$).

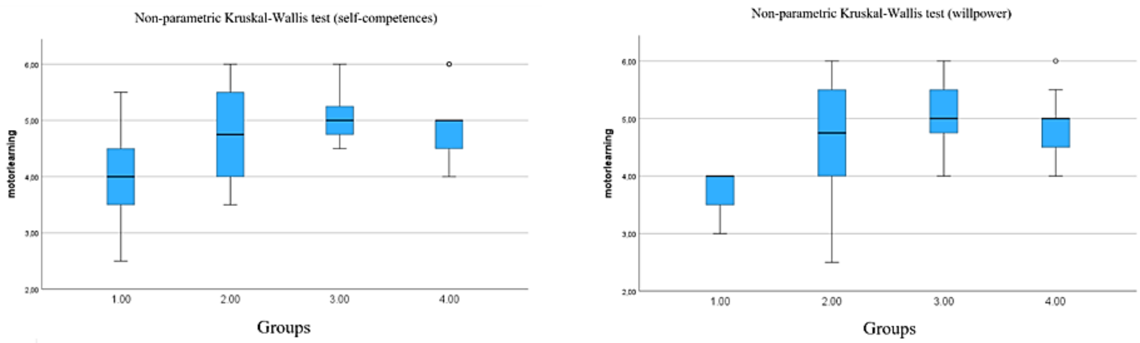

Figure 4. Kruskal-Wallis-test for the variables willpower (right) and self-competence (left) of the following groups: 1: negative reinforcement with less self-competence, 2. negative reinforcement with higher self-competence, 3: positive reinforcement with less self-competence, 4: positive reinforcement with high self-competence.

Table 8. Mann-Whitney-U-Test for the results of motor learning of the four groups and their Willpower and positive or negative reinforcement.

Group	n	Mean	SD	Groups	df	Mean rank	Z	U	*p*
1	3	3.67	.58	1-2	11	4.33 7.80	-1.375	7.00	.169
				1-3	9	2.33 7.38	-2.33	1.00	.020*
2	10	4.55	1.07	1-4	10	2.33 7.89	-2.37	1.00	.018*
				2-3	16	8.45 10.81	-.966	29.500	.339
3	8	5.06	.68	2-4	17	9.15 10.94	-.709	36.500	.49
4	9	4.94	.58	3-4	15	9.44 8.16	-.358	32.500	.720

A Mann-Whitney U-test was employed to ascertain whether there were any discrepancies in motor learning performance between the four distinct groups. The comparisons of groups one and three, as well as one and four, exhibited a statistically significant difference (Kolmogorov-Smirnov $p < .05$). A significant disparity was identified between the motor learning performance of the positively and negatively reinforced trainer instructions, as evidenced by the Mann-Whitney U-test results (U = 1.00, Z = -2.33, $p = .020$; U = 1.00, Z = -2.37, $p = .018$; see Table 8).

DISCUSSION

The present study is to be regarded as a pilot project, to be followed by a significantly larger sample, especially for Group 1, which was ultimately reduced to three participants. This will ensure that generalised statements can be made about the dependencies of learning performance on the sports performance self-competencies of the athletes and on the instructions of the coaches. It is hypothesised that this will lead to optimised implications for the athletes' accompaniment during the difficult steps of a successful dual career of sport in school. The enhancement of self-competencies, fostered by constructive coaches' instructions, is poised to yield enhanced performance outcomes, particularly in the domain of motor learning, while concurrently mitigating the occurrence of premature attrition.

Beckmann and Kellmann (2004) posit that self-regulation is of significance in this regard, as it facilitates the identification of the discrepancy between fatigue caused by tiredness and stress and the desirable state of physical and mental activation. This, in turn, can enable the implementation of appropriate measures to achieve the desired state. The knowledge of available resources can also be used to minimise this discrepancy in general, as precautionary measures can be taken, for example, to shorten the time it takes to restore performance (Ziljstra et al., 2014). It can therefore be concluded that self-regulation plays a crucial role in the context of recovery processes. Given the high levels of stress present in competitive sports, the ability to self-regulate is of paramount importance (Kenttä & Hassmen, 1998). The present study's findings, which demonstrate no correlation between self-regulation and motor learning as a function of the trainer's approach, can be explained by the theoretical construct of self-regulation processes (Ziljstra et al., 2014). This is due to the fact that fatigue processes were not to be expected.

In the context of competitive sports training, athletes frequently experience exhaustion, which can result in the development of fatigue syndrome and an increased likelihood of dropout. Self-regulated learning has been demonstrated to be associated with enhanced sporting performance, with self-regulated learners exhibiting elevated levels of personal skills in novel and intricate learning scenarios (Winne & Perry, 2000; McCardle et al., 2019; Wilson et al., 2021; Young et al., 2023). The relationship between self-directed learning processes and awareness of one's own abilities leads to self-efficacy, which is defined as the belief in one's own ability to organise and carry out the courses of action necessary to achieve certain goals (Bandura, 1977, 1995, 2012). Sitzmann and Yeo (2013) investigated the relationship between athletic performance and self-efficacy in the field of sport. Pattinson (2017) investigated the relationship between top divers and their self-efficacy (SE) in relation to performance level. The findings indicated that the more accomplished diving young athletes (aged 9-13 years) exhibited stronger social beliefs (F (1.175) = 30.69, p < .001) and physiological/emotional states (F (1.175) = 12.41, p = .001).

According to Bandura's (1977) self-efficacy theory, social persuasion and physiological and emotional states can be considered as sources of this theory. This theory was extended by Feltz, Short and Sullivan (2008), who added physiological and emotional states to the original list of sources, which included mastery experience, vicarious experience, social persuasion, and physiological and affective states. The role of self-efficacy beliefs in maintaining motivation is highlighted, as they facilitate decision-making processes within activities and ensure the pursuit of primary objectives without the encumbrance of protracted physical and mental preparation, which could be exemplified by the Olympics. The prevailing hypothesis suggests a positive relationship between self-efficacy and sporting performance, with the objective of optimising performance in sports (Vieira et al., 2011; Machado et al., 2014). The relationship between self-efficacy, flow and sports performance was investigated by Sklett, Lorås & Sigmundsson (2018) in the context of ski jumping performance.

The present study found that efficacy beliefs have a positive influence on positive thinking, meaning that athletes with higher SE levels have more positive emotions such as happiness, while athletes with lower SE levels show more anxiety and negative thoughts. These results are in line with other findings on self-confidence, flow and self-efficacy perceptions by Gomes et al. (2012).

The objective of high-performance athletes is to avert mental exhaustion resulting from a high training load, which engenders a diminution in self-control during the process of motivational stabilisation. The risk of loss of self-control and elevated anxiety levels in high-performance athletes has been delineated by numerous authors (Baumeister, Vohs & Tice, 2007; Gucciardi et al., 2010). This finding suggests a potential correlation between self-control and willpower, which could be explained by the hypothesis that willpower stabilises the motivational state and self-control simultaneously.

The present results underscore these assumptions (r = .487). Concurrently, a negative correlation is observed between self-control and stress load (r = -.476), aligning with the theoretical approach and the established negative correlation between willpower and stress load (r = -.430). The findings indicate that the reduction of stress load is pivotal to success, as it is anticipated that willpower and self-control will concomitantly increase. The findings also demonstrate a negative correlation between stress load and motor learning performance (r = -.249), which is consistent with the results reported by other researchers. Ehrlenspiel, Wei & Sternad (2010) emphasise that anxiety is a pivotal factor influencing performance in competitive settings, and that this can be addressed through three distinct mechanisms. Firstly, the relationship between experienced anxiety and performance in competition is analysed, then psychological factors are investigated to determine why anxiety has a performance-reducing effect and the question of personality factors that are related to athletic performance and anxiety. However, studies demonstrate that athletes do not suffer from mental illness more frequently than the general population (Rice et al., 2016; Bär & Markser, 2013), although there is a higher risk for injured athletes (Gulliver et al., 2015).

Situations triggered by anxiety and ultimately perceived as negatively stressful have been shown to result in reduced performance (Fletcher, Hanton & Mellalieu, 2006; Mellalieu, Hanton & Fletcher, 2009). Such stress-inducing situations can also be found in the area of organisational support. These can be divided into the areas of sport organisation, sport relationships and inter-personal demands, athletic career and performance, for example, and are of similar importance for both top athletes and non-elite athletes.

CONCLUSIONS

What drives successful athletes to overcome these obstacles and sustain their training and competitive efforts? Ainslie (2021) outlines two possible scenarios that relate to the links between willpower and the reward that comes from potentially achieving a goal. Two scenarios are outlined that either relate to higher level goals or to the suppression of a pattern of behaviour. In the case of higher-order goals, for example, athletes would subordinate themselves to a coach's instruction, even though it may not be in the athlete's best interest but is likely to serve the overarching goal of athletic success. This could be a strenuous strength training session, the training effect of which has a positive impact on competitive performance. The second option suppresses the intention to rebel against a coach's instructions, for example, in order to remain true to one's own intentions. It is clear from the examples given that maintaining willpower is essential for long-term career success, and that its maintenance should be continuously supported by goal coaching measures to avoid stress and possible loss of motivation, as these are inevitably linked to willpower (Ainslie, 2021; Evans, Boggero & Segerstrom, 2016; Konze, Rivkin & Schmidt, 2017).

The results presented here illustrate the need to optimise a dual career, with the support of sport psychology, in order to reconcile the different needs and demands of the partners involved. In particular, the changes in the athlete's personality during a sporting career in relation to their education and the associated changes in needs need to be constantly adapted and reviewed. For example, the GROW model (Whitmore, 2006) can be used for this purpose. It facilitates the regular adjustment of goals and the formulation of possible options based on real conditions. Goal coordination defines the will that needs to be present in order to achieve the formulated goals. The GROW model is also well suited for the training of coaches and teachers, who can apply the concept to specific coach-athlete discussions. The aim is to positively influence the dual career by providing optimal psychological support for the athletes and strengthening their self-competence. In particular, the high double burden during school education leads to the need for individual support (Stambulova & Harwood, 2022).

The negative influences on the attitudes of athletes can be described, for example, as an increased number of injuries, loss of schooling, reduced time with family and friends and also increased pressure to perform (Thompson, Rongen, Cowburn & Till, 2022). In particular, coping with increased pressure to perform, which manifests itself at different levels during schooling, needs to be taught by strengthening self-competence.

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