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ORIGINAL ARTICLE

What distinguishes the successful athletes from elite athletes in terms of their self-competencies? Both groups are similar supported by the elite sports school system, but different in their performance level

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ABSTRACT

The special status of the elite schools of sport implies targeted support in order to legitimise the existence of the elite schools of sport. The poor track record of sports schools that support summer sports needs to be explained and optimised. The present study investigates the correlations between self-related competences and their differences in age- and performance-differentiated groups. The results show that the greatest differences between the groups exist between the athletes with regard to the stress and threat categories, with the successful athletes in particular showing lower scores on the threat scale (mean = 0.469, SD = 0.36; p = .038, η^2 = .117) and on the stress-related items (mean = 0.44, SD = 0.37, $p \leq .001$, η^2 = .556). At the same time, the level of certain areas of competence, such as the ability to plan, is higher in the group of top performers (mean = 1.71, p = .071, η^2 = .093). These differences are evident compared to the younger comparison group and also in comparison to athletes of the same age who have the same support systems but different performance levels. On the one hand, the results show that the stress potential increases with increasing time and that stress resistance is most likely already inherent in young athletes.

Keywords: Physical activity, Sports institutions, Sports coaching, Athletic performance, School age, Self-regulation.

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INTRODUCTION

This study aims to answer the question of how very good athletes differ from top athletes when the support systems are the same. To this end, 58 athletes were surveyed, 8 of whom are categorised as top athletes because they compete internationally. The study is based on the assumption that self-competence plays a key role in success. The ability to cope well with stress, for example, appears to be extremely important, as a competitive sporting career is subject to significant stress influences that need to be mastered (Haut, Prohl & Emrich, 2013, Emrich & Güllich, 2008). It can therefore be assumed that top athletes have significantly improved stress regulation skills and are more likely to perceive stressful situations as challenging, even though these situations apply equally to all athletes due to the organisational equality of the support systems. But why does the dropout rate increase for some athletes due to perceived stress and for others the stress remains without negative consequences (Pfitzner & Neuber, 2020)? Support systems therefore need to be developed that help as many athletes as possible to develop their skills so that they can manage their own competitive sporting career themselves in order to reduce negative stress. The elite schools of sport must play a major role in this context.

The resolution passed by the Conference of Sports Ministers and the DOSB in 2017 is clear: the further development of elite sports schools must be promoted. This will allow athletes to pursue successful careers without compromising their education. The success of an elite school of sport can ultimately be categorised by the number of medals, although this only allows limited conclusions to be drawn about the quality of the school support systems. One quality criterion in this study is that the top athletes have a squad status that enables them to compete internationally; a top 3 ranking in Germany is a prerequisite for this. The other athletes are also successful and have squad status, which is a prerequisite for being allowed to study at an elite school of sport. The participants in the study therefore have comparable talent potential and ultimately the same funding conditions. But what is the difference? What ultimately leads to top success and what prevents it? Self-regulation skills are compared in this study as one part of the answer to this complex question. The results of previous studies have shown that the existing motive structure influences career progression (Schröder, 2018). As the participants in this study are already part of the upper school and have therefore already had many years of training, it can be assumed that a suitable motivational structure is present and that no major differences are to be expected in this area. The findings should serve to optimise the areas of support and thus positively influence careers.

Theoretical background

The BMI's elite sport reform has set itself the goal of creating 'optimal framework conditions for athletes' (Hottenrott & Braumann, 2015) and promoting dual careers, emphasising the importance of career advisors, for example. When analysing the effectiveness of these measures, the BMI and the DOSB had to admit in 2022 that the increased investments did not bring about a turnaround in competitive sport (Bundesrechnungshof, 2023). For the 2023 budget, the BMI has a total of 300 million euros at its disposal to promote elite sports systems. Every year, an analysis of the potential of PotAS (analysis of the potential of elite sport) is carried out and the possible potential of sporting success is analysed, whereby the 'structures' are also analysed in addition to the success categories "*success*" and 'squad potential' (cf. Bundesrechnungshof, 2023), which also concern the elite schools of sport, for example. The Sports Promotion Act (BMI, 2024) is intended to create an independent body to manage and review the allocation of funds for elite sports promotion.

The present study is intended to examine the part of sports promotion at an elite sports school that deals with the areas of competence that are present in the sports students and may influence a career.

As a result of the findings, measures should be taken to ensure that students receive better support during their dual career in order to counteract a loss of motivation and the associated risk of dropping out (Granz et al., 2019, Schröder & Knisel, 2024). The importance of a dual career, in which an academic career is supported in addition to competitive sport, seems particularly challenging (Lopez-Chamorro & Simon, 2018; European Commission, 2012). The paths of a dual career can be divided into three areas, in which the sports or academic part predominates and in areas in which both are equally distributed (Stambulowa, 2021; Stambulowa & Wyllemann, 2019).

Sports practice at elite schools of sport (EdS) shows that these phases take place alternately and depend on the annual periodisation of the school and sport. It is important to optimally combine both planning phases in order to avoid negative stress. Barth, Emrich & Güllich (2019) point out that the needs for specialised sports training and participation in other sports also change over the course of the development of competitive sports careers. The results, as well as this approach, illustrate the possible influence of individualised support for athletes in order to provide optimal support.

The support systems in elite sport are hierarchically structured and sometimes confusing, meaning that capacities cannot be optimally utilised and therefore remain unused by the athletes. In this context, Borggrefe, Cachay and Werner (2024) point out that the high investment made by students at an Eds can only be legitimised by optimising a dual career between school and sport (Hummel, 2024). The measures to promote a dual career have resulted, among other things, in a sharp increase in financial support for elite sport, although the number of countable successes has tended to decrease (Hottenroth & Braumann, 2015). Emrich, Fröhlich, Klein & Pitsch (2009) have already shown that, unfortunately, there were no differences in performance in terms of sporting success between sports school students and non-sports school students at the Summer Olympics, which raises the question of the effectiveness of an elite sports school.

The reason for the lack of effectiveness may be problems that arise in reconciling the different demands of school and sport. Borggrefe, Cachay and Werner (2024, p. 45) speak of an inclusion problem in this context because the athletes are supposed to function as part of two different systems. Athletes therefore have a high degree of personal responsibility to integrate all demands, including their own, profitably into their everyday lives.

This requires very well-developed self-control skills, which the athletes must have in order to, for example, bring stress resistance and increase self-efficacy (Dirmanchi & Khanjani, 2019). Self-efficacy can only be demonstrated if athletes have the necessary skills to recognise and use resources. Support systems play a major role here, with coaches in particular playing a crucial role (Schröder, 2025; Sari & Bayazit, 2017). Time must be used optimally to create free spaces that also offer opportunities for recovery. In the context of dropout research in competitive sport, analysing the resources of older athletes is very important (cf. Schröder, 2018, Stambulova & Harwood, 2022). Therefore, the urge to justify competitive sport must generally be positive in order not to question the enormous effort involved. The question on which this study is based is therefore concerned with the different manifestations of relevant competences, comparing talented athletes with top athletes who had the same support systems and were also supported at the same elite sports school. The different results may indicate which needs are particularly high in terms of self-management skills in order to optimise career development. At the same time, the results could indicate that the competences are generally strong and that athletes need special support whose self-regulation competences are not strong enough in some areas, as a complex talent dimension naturally requires many areas in order to ultimately emerge as one of the most successful athletes. In the context of the psychological prerequisites analysed here, the relevant criteria for sporting talent include mental resilience, stress stability,

performance motivation, competitive anxiety and resilience (Hohmann, 2009; Seidel, 2011; Pfitzner & Neuber, 2020).

In their holistic model of athlete development, Thompson, Rongen, Cowburn and Till (2022) point out the influences of the sports school system and, among other things, address a lack of time, high pressure, including at school level, and an increased number of absences among the jeopardising aspects. These aspects imply further consequences that prevent a positive balance of investment in competitive sport, which in turn increases the risk of dropout. There is therefore a risk of losing social integration because, for example, no autonomy is possible in terms of time planning, which ultimately significantly reduces the degree of self-determination (Deci & Ryan, 2001).

The sports careers described above are subject to strong fluctuations. The ability to defy these and anticipate disruptive factors appears to be a key qualification. As stress can be understood as a processual and reciprocal person-environment transaction (Oertel, 2010), the support provided to female athletes must be of particular importance.

The balancing act between competitive sport and the demands of school leads to an increased perception of stress (Güllich & Richartz, 2015), which must be taken into account, as otherwise there is a risk of dropout or even depression (Weimann, 2014). A support network consisting of elite schools of sport and sports associations should serve as a basis for meeting the academic and sporting demands outlined above without losing sight of the athletes' needs (Wendeborn, Drewicke & Hummel, 2018). The DOSB emphasises the importance of elite schools of sport in optimally promoting both careers (DOSB, 2013, p. 18). In addition to school and sport-specific support programmes (Borchert, 2013; Stiller, 2023), the mental health of athletes must also be considered (Breithecker, 2018).

METHODS

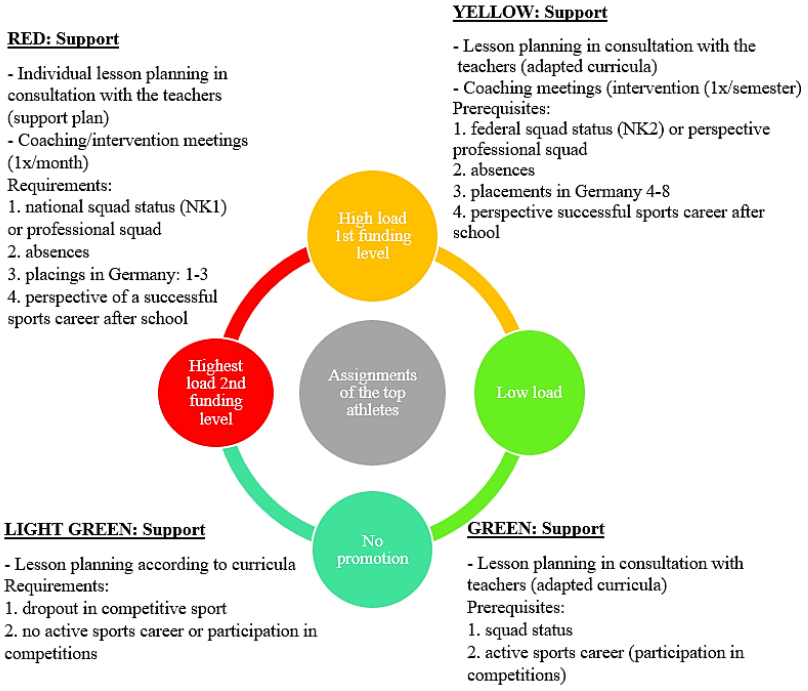

Figure 1. Athlete status as a f unction of athletic performance.

58 students aged from 10 to 18 years (mean age = 15.33, SD = 3.39) participated in the study. The students were recruited from the elite sport-school in Berlin and finally devited into three groups. 35 participants are part of the sportschool-system for a couple of years and now attending the final class (mean age 17.74, SD = 0.85). The other group (N = 15, mean age = 10.67, SD = 0.72) consists of students who are in the 7th grade of the elite sports school. The results of the 7-graders students are compared with the results of the older students as part of a cross-sectional study in order to be able to draw conclusions here as well. 8 athletes at the highest top level were also interviewed in order to identify differences between the top performers and those athletes who are equally supported in the sports school system but do not achieve top performances. The athletes were categorised using traffic light coding (see Fig. 1). This resulted in three groups (Table 1), which were compared with each other using ANOVA. A correlation analysis of the respective categories should provide information about the dependencies within the constructs. The SSI-K3 (Kuhl & Fuhrmann, 2004) is the most reliable tool for assessing self-control competencies for the present study. Its validity is consistently proven (α > 0.73 - 0.9) and has been validated for this study (α > 0.78) as well.

RESULTS

The logic of the results section presupposes that the validity of the questionnaire is shown first and that an item validity test must be carried out if Chronbach's alpha is unsatisfactory. Using a correlation crossover table, possible correlations between variables are first shown in order to then compare the variables that show significant differences between the groups with those that show a high correlation (Table 2). From this, dependencies are to be recognised, which can explain the group differences.

The three groups are tested for differences using an ANOVA to show whether the different age groups also show significant differences in mean values under similar conditions. These results are intended to show whether there may be a need for support because certain crucial skills are reduced in those who are talented but are ultimately no longer among the top performers.

Finally, group differences are measured among 12-graders of the same age who differ in terms of performance. For the sake of clarity, the two groups are only analysed with regard to the variables that already showed major differences in the descriptive statistics.

Table 1. Sample size and demographic characteristics.

Groups	Athletes 7 graders	Athletes 12 graders	12 graders top performer	Total
N	15	35	8	58
Mean age	11.47	17.4	17.2	15.54
SD	0.64	0.99	1.14	2.45

Table 2. Descriptive statistics, standard deviations, alpha reliability and correlations for main variables in the study.

Skala	N	M	SD	∝	1	2	3	4	5	6	7	8	9
Ability to plan	57	1.39	0.68	0.62	1								
Realise in-tentions	57	1.57	0.69	0.70	-.167	1							
Initiative	57	1.69	0.59	0.50	.100	.616**	1						
Self-access	57	1.88	0.61	0.87	.053	.552**	.330*	1					
Coping with failure	57	1.70	0.64	0.64	.058	.605**	.447**	.750**	1				
Self-aware-ness	57	1.86	0.76	0.76	-.002	.314*	.158	.904**	.541**	1			
Integration	57	2.08	0.76	0.83	.077	.493*	.248	.857**	.405**	.712**	1		
Stress	57	1.66	0.98	0.91	-.302*	-.014	-.045	.186	.171	.192	.104	1	
Threat	56	1.06	0.79	0.82	.179	-.308*	-.393**	-.332*	-.352**	-.191	-.313*	.106	1

*Note. **. Correlation is significant at the .01 level (2-tailed), *. Correlation is significant at the .05 level (2-tailed).*

It can be seen that the validity of the questionnaire categories is mostly given. The poorer results for the categories 'initiative' (.59), self-access (.61) and coping with failure (.64) can be explained by the fact that there is a large variance in the survey group and the group differences are quite large here. The validity with regard to the individual groups proved to be satisfactory, so that these categories are also taken into account in the interpretation of the results.

Table 3. Mean Value, SD of the groups related to the main variables.

Variable / **Group**	**Realise intentions**		**Self-Access**		**Coping with failure**		**Self-awareness**		**Integration**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
7 graders	1.72	0.83	1.94	0.46	1.77	0.63	1.93	0.35	2.12	0.74
Athletes 12 graders	1.53	0.55	1.88	0.58	1.70	0.62	1.85	0.78	2.09	0.69
12 graders Top performer	1.50	1.0	1.75	0.96	1.59	0.81	1.71	1.18	1.94	1.1
Total	1.57	0.69	1.88	0.61	1.7	0.64	1.86	0.76	2.08	0.76

Variable / **Group**	**Ability to plan**		**Initiative**		**Stress**		**Threat**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
7 graders	1.58	0.79	1.87	0.56	1.0	0.78	1.35	0.99
Athletes 12 graders	1.22	0.57	1.57	0.62	2.25	0.66	1.07	0.71
12 graders Top performer	1.71	0.72	1.87	0.47	0.44	0.37	0.469	0.36
Total	1.39	0.68	1.69	0.59	1.66	0.98	1.06	0.79

The differences in mean values shown in Table 3 are tested for significance using an ANOVA (Table 4).

Table 4. ANOVA tests showing group differences.

Categories	**Source**	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**η^2**
Stress	Within groups	30.13	2	15.06	33.84	<.001	0.556
	Between groups	24.04	54	0.45			
Threat	Within groups	4.06	2	2.03	3.495	.038	0.117
	Between groups	30.79	53	0.58			
Coping with failure	Within groups	0.156	2	0.078	0.185	.832	0.007
	Between groups	22.872	54	0.424			
Ability to plan	Within groups	2.400	2	1.20	2.774	.071	0.093
	Between groups	23.36	54				
Self-Access	Within groups	0.187	2	0.094	0.247	.782	0.009
	Between groups	20.43	54	0.378			
Realise intentions	Within groups	0.47	2	0.208	0.421	.658	0.015
	Between groups	26.7	54	0.495			
Self-awareness	Within groups	0.241	2	0.120	0.205	.816	0.008
	Between groups	31.753	54	0.588			
Initiative	Within groups	1.163	2	0.582	1.66	.199	0.058
	Between groups	18.89	54	0.350			
Integration	Within groups	0.194	2	0.097	0.163	.850	0.006
	Between groups	31.99	54	0.592			

*Note. * $p \leq .05$ two-tailed*

Table 5 shows the differences between the two groups of 7th graders and 12th graders. Table 6 shows the selected differences between the groups of Top performers and athletes at the same training level in relation to the selected categories. The variables that showed significance in the pre-tests and whose correlations were comprehensible were taken into account.

Table 5. Differences between 7 and 12-graders athletes, standard deviation, Mann-Whitney U-test, *p* and Cohen`s r.

Categories	Group	n	Mean	SD	Mean rank	Mann-Whitney U-test			Cohen`s r
						U	Z	*p*	
Stress	Athletes 7 graders	15	1.66	0.98	17.03	135.5	-3.27	.001	-0.43
	Athletes 12 graders	43			33.27				
Threat	Athletes 7 graders	15	1.06	0.79	33.03	239.5	-1.27	.206	-0.17
	Athletes 12 graders	43			26.84				
Self-Access	Athletes 7 graders	15	1.88	0.61	29.77	303.5	-0.201	.84	-0.03
	Athletes 12 graders	43			28.73				
Self-awareness	Athletes 7 graders	15	1.86	0.76	30.40	294.0	-0.385	.70	-0.05
	Athletes 12 graders	43			28.50				
Coping with failure	Athletes 7 graders	15	1.70	0.64	29.73	304.0	-0.201	.84	-0.03
	Athletes 12 graders	43			28.74				
Ability to plan	Athletes 7 graders	15	1.39	0.68	33.47	248.0	-1.22	.22	-0.16
	Athletes 12 graders	43			27.40				
Initiative	Athletes 7 graders	15	1.69	0.59	33.23	251.5	-1.17	.243	-0.15
	Athletes 12 graders	43			27.49				
Integration	Athletes 7 graders	15	2.08	0.76	29.50	307.5	-0.137	.891	-0.02
	Athletes 12 graders	43			28.82				
Realise intentions	Athletes 7 graders	15	1.57	0.69	30.03	299.5	-0.284	.77	-0.04
	Athletes 12 graders	43			28.63				

*Note. * p ≤ .05 two-tailed, r = Cohen`s r.*

Table 6. Differences between good athletes and Topperformer of the 12th grade.

Variable	Group	n	Mean	SD	Mean rank	Mann-Whitney U-test			Cohen`s r
						U	Z	*p*	
Stress	Athletes 12 graders	34	1.9	0.94	25.25	8.50	-4.13	<.001	-0.64
	12 graders Top performer	8			5.56				
Threat	Athletes 12 graders	34	.95	0.69	23.06	64.0	-2.25	.024	-0.35
	12 graders Top performer	8			12.50				
Self-Access	Athletes 12 graders	34	1.86	0.66	21.63	131.5	-0.144	.885	-0.02
	12 graders Top performer	8			20.94				
Self-awareness	Athletes 12 graders	34	1.83	0.86	21.66	130.5	-0.178	.863	0.03
	12 graders Top performer	8			20.81				
Coping with failure	Athletes 12 graders	34	1.68	0.65	22.03	118.0	-0.581	.561	-0.09
	12 graders Top performer	8			19.25				
Ability to plan	Athletes 12 graders	34	1.32	0.63	19.88	81.0	-1.78	.081	-0.27
	12 graders Top performer	8			28.38				
Initiative	Athletes 12 graders	34	1.63	0.61	20.34	96.5	-1.28	.210	-0.2
	12 graders Top performer	8			26.44				
Integration	Athletes 12 graders	34	2.07	0.77	21.43	133.5	-0.081	.937	-0.01
	12 graders Top performer	8			21.81				
Realise intentions	Athletes 12 graders	34	1.52	0.64	21.13	123.5	-0.41	.694	-0.06
	12 graders Top performer	8			23.06				

*Note. * p ≤ .05 two-tailed, r = Cohen`s r.*

DISCUSSION

The results of the ANOVA show differences for the categories stress and threat between the three groups of 7th-grade athletes, 12th-grade athletes and 12th-grade top athletes, whereby significant differences (p = .038; η^2 = .117) could be determined for the perceived threat and even highly significant differences ($p \leq$

.001; η^2 = .556) for the perceived stress. An analysis of the correlations between the categories of stress and threat reveals potential in the support systems.

Due to a correlation between a situation perceived as stressful and the ability to plan (r = -.302, p = .05), it becomes clear that good support may be able to provide follow-up, guidance and preparation for impassable situations.

For example, the Top performers tended to give a lower rating for the item 'My current life circumstances are already quite tough', whereas the item 'Before I start a big job, I decide how to proceed', for example, had a high rating.

There are also highly significant correlations between perceived threat and initiative (r = -.393, $p \leq .01$) and coping with failure (r = -.352, $p \leq .01$). A high level of initiative competence means, for example, that the item 'When something has to be done, I prefer to start immediately' receives a high score and correlates negatively with, for example, '*A lot has changed in my life that I have to deal with'*. An item for coping with failure is, for example, *'If I can't do a sporting task straight away, I get anxious'*. If this item is particularly high, the probability of lower initiative competence and therefore poorer athlete performance also increases.

It seems that stress related factors differs good athletes from the Top performers, because the Top performers indicate significantly lower values for Stress and Threat (see Fig. 2) and at the same time demonstrate certain competences more strongly. As a brief summary and regarding the correlation-effects there should be a focus on the variables self-access, coping with failure, initiative, and realise intentions. Although there is no difference between the groups regarding these four variables, the correlation between these and the stress-related variables is high (r ≥ 0.3) and partly high significant (p ≤ .001).

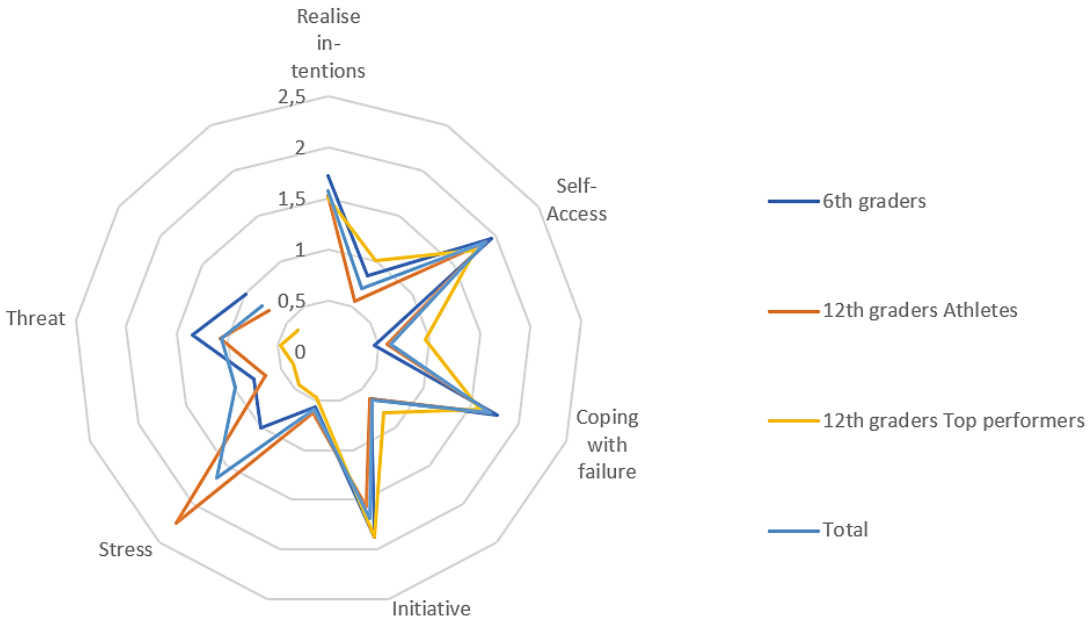

Figure 2. Main important results in relation to the stress-related influencing factors.

The aim of the research was, among other things, to determine psychological factors that favour or jeopardise a sporting career.

The investigation of perceived stress with regard to the same age groups, differentiated into top athletes and good athletes, showed large differences with a large effect size ($p \leq .001$, r = 0.64). The variable threat also showed a significant result ($p = .024$, r = 0.35). The planning ability shows large differences, which are not significant ($p = .081$), but the effect also seems significant due to the high differences in rank (r = 0.27). It also seems understandable that a lack of competence in planning skills can lead to a build-up of anxiety, which results in situations being perceived as threatening and stressful and no longer as positively challenging. This seems to be the biggest difference between the Top performers and the good athletes.

In a subsequent question, it must be clarified to what extent these competences are present or can be promoted through support at an elite school of sport.

The fact that the perceived stress in the comparison of the 7th-grade athletes differs significantly from the results of the older pupils ($p = .001$; r = .43) indicates that this is a talent factor that is already present. On the other hand, the fact that the perception of a threatening situation does not differ between athletes of different ages ($p = .206$; r = 0.17) could indicate that different experiences in the course of a sporting career lead to situations being viewed more as threatening and less as challenging. However, it is only logical that very young athletes have had little experience with threatening situations, so that there are few strong results in this category.

CONCLUSION

The results suggest that close-knit support is required in order to provide athletes with optimal long-term care. The importance of highly individualised support must be emphasised here (Hottenroth & Braumann, 2015; Lohaus & Vierhaus, 2014). The significant differences in self-regulation skills indicate that the resources available for recovery in the context of competitive sports training are not yet sufficiently known. A high level of self-regulation skills is an indication of increased performance in competitive sport (Mc Cardle et al., 2019, Wilson et al., 2021, Young et al., 2023). One conclusion, for example, is to develop a concept that enables athletes to optimally reconcile the stresses of school with those of sport, so that, for example, unnecessary time pressures can be avoided in order to optimise resources (Breithecker, 2018). In addition, regular meetings with sports psychologists should help to precisely formulate joint goals so that both sporting and school goals are not in conflict with each other. One example of increased support for dual careers at an elite school of sport is the additive Abitur. The additive Abitur enables competitive athletes to extend the upper secondary school level to four or five years and also to spread the individual Abitur examinations over several school years. This extends the functionalisation of school for elite athletes beyond the previously known level. Results show that pupils who take advantage of this particular extension achieve better, but not significantly different results. (Sallen et al., 2018). In the context of elite schools of sport, an extension of school time to 13 years must be taken into account in the planning. Within the scope of the time resources available, target discussions should serve to optimise processes for all those involved in promoting dual careers. Whitmore's GROW model (2010), for example, could be suitable for this, as it has a clear structure that quickly shows the athlete alternative courses of action. The goal is clearly defined (G), the goal formulation is compared with reality (R) and options are derived (O), which ultimately cause the will to act (W). The application of this GROW model is to be evaluated in further studies and elaborated as part of an intervention study at elite sports schools. The results of the 7th graders will also be examined continuously and individually as part of a longitudinal study in order to identify whether the skills are talent-dimensioned and whether these skills change over time and therefore need to be influenced more strongly by coaching measures in order to guarantee the athletes' sporting success and the efficiency of the elite schools of sport.

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