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Student-athletes' need for competence, effort, and attributions of success and failure: Differences between sport and school

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ABSTRACT

Our purpose was to show that highly skilled student-athletes ($n = 146$, 41.1% female, mean age 14.1 years) differ across domains with regard to their need for competence, effort, and attributions. As hypothesized, the results show that relative to the school domain, in the sport domain, student-athletes had a stronger need for competence, a higher willingness to exert effort, and a stronger tendency to ascribe positive outcomes to personal effort, regardless of sex and sport. For professional practice, our findings imply that effective psychological interventions such as attributional retraining should vary across domains, particularly in case of explaining positive outcomes.

Lay Summary: In a unique sample of highly skilled student-athletes, we found that relative to the school domain, in the sports domain, student-athletes had a stronger need for competence, a higher willingness to exert effort, and a stronger tendency to ascribe positive outcomes to personal effort.

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The need for competence, defined as individuals' desire to feel competent and skilled, is often considered a universal, innate urge that serves the evolutionary function of adaptation to the environment (Deci & Ryan, 1985; Elliot, McGregor, & Thrash, 2002; Van Yperen, 2017; White, 1959). The context to which one would try to exercise this assumed innate urge, however, might differ (e.g., Hiemstra, Van Yperen, & Timmerman, 2019; Möller & Marsh, 2013). In the present study, we examined this among a unique, self-selected group of student-athletes who receive institutional support (i.e., day-to-day operational support of their school) to develop both their sport and school careers. Specifically, the purpose of the present study was to examine whether student-athletes' need for competence differs across these two relevant and distinct spheres of their activity (i.e., sport and school). Furthermore, we examined whether this assumed domain-specificity generalizes to other motivational constructs, including student-athletes' willingness to put effort into developing their domain-specific competence and their tendencies to explain their positive outcomes in terms of effort (cf., Jacobs,

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Lanza, Osgood, Eccles, & Wigfield, 2002; Marsh, Martin, Yeung, & Craven, 2017). For professional practice, these anticipated outcomes would imply that effective psychological need support in sports and school should vary accordingly.

Need for competence and effort

A high need for competence energizes individuals and leads them to search for possibilities to engage in challenging tasks, to acquire new skills, and to perform well (Deci & Ryan, 1985; Elliot et al., 2002). Although motivation is often examined at the contextual level (Marsh et al., 2017), an often neglected question is whether individuals' "universal and innate" need for competence (Deci & Ryan, 1985; White, 1959) can be high in one domain and not another. In different domains, individuals' need for competence may differ as a function of learning experiences, others' influences, contextual factors, and dispositional characteristics (cf., Bong, 2001; Harter, 2012; Jacobs et al., 2002; Marsh et al., 2017; Shen, McCaughtry, & Martin, 2008). As proposed by Dimensional Comparison Theory (DCT; Möller & Marsh, 2013), individuals compare their own accomplishments in one domain with those in other domains. An *assimilation effect* may occur in domains that are close to each other, such as math and science (e.g., Bong, 2001). For two dissimilar domains such as sport and school, DCT predicts a *contrast effect*. For example, in a one-year longitudinal study, Möller and Köller (2001) showed that the announcement of mathematics and verbal examination results were positively related to adolescents' competence self-perceptions in the corresponding domain and negatively in the contrasting domain. More generally, both experimental and field research have consistently shown that dimensional comparisons tend to lower competence self-perceptions in the worse-off domain while increasing them in the dissimilar better-off domain (Möller & Marsh, 2013).

Based on this contrast effect on competence self-perceptions predicted by DCT (for a review, see Marsh et al., 2017), we hypothesized (*Hypothesis 1*) that student-athletes' need for competence, and accordingly, their willingness to exert effort, would be higher in the sport domain than in the school domain. That is, relative to the school domain, student-athletes may feel better off in the sport domain because they participate in sports voluntarily, but they are socially and legally required to attend school. This motivation-driven self-perception is likely to be accompanied by a higher willingness to exert effort, a key element of motivation (e.g., McClelland, 1985). Furthermore, DCT would predict that individuals' strong need for competence in a specific domain (e.g., sport) should be unrelated to their willingness to exert effort in another, dissimilar domain (e.g., school). Hence, *Hypothesis 2* was that student-athletes' need for competence in the sport and school domains are positively related *only* to their effort expenditure in the sport and in the school domain, respectively.

Need for competence and attributions

In achievement domains such as school and sport, the predominant perceived causes of success and failure are effort and ability. According to Weiner (2018), people search for explanations along three causal dimensions: (1) *Locus of causality*: Does the cause reside within or outside the person? (2) *Stability*: Does the cause change or endure over time?

(3) *Controllability*: Can the cause be altered by oneself or another person, or not? In these terms, the effort is an internal and unstable cause, and more importantly, more personally controllable than alternative causes such as ability, luck, and task ease (Weiner, 2018). People's explanations for their outcomes are a function of social, temporal, and dimensional comparisons, as well as contextual and dispositional factors, including their need for competence (e.g., Hiemstra & Van Yperen, 2015; Marsh et al., 2017; Möller & Marsh, 2013). This implies that their subjective construals do not necessarily correspond to reality (Perry & Hamm, 2017). For example, the more value individuals attach to a specific dimension or domain, the stronger their motivation for a positive self-view (e.g., Brown & Weiner, 1984; Van Yperen, 1992) and the higher their perceived responsibility for their outcomes.

In the present study, we add to previous findings by showing that when individuals' need for competence is higher, the tendency to identify effort as the cause of achievements may be stronger, also because effort is a *sine qua non* for attaining competence (e.g., Ericsson, Krampe, & Tesch-Römer, 1993). By identifying effort as the main cause of success and failure, individuals may feel that, through their own effort, fulfilment of their need for competence is in their own hands. Based on the logic that people's motivation for personal control over outcomes is stronger in domains in which their need for competence is higher, *Hypothesis 3* was that student-athletes' attributions to effort are stronger in the sport domain than in the school domain.

In the sport domain, however, student-athletes may be more likely to use effort attributions to explain positive rather than negative outcomes (Mezulis, Abramson, Hyde, & Hankin, 2004). Individuals have a strong desire for a positive self-view, particularly in domains that are important and self-relevant (e.g., Brown & Weiner, 1984; Van Yperen, 1992). In these domains, they more often engage in self-serving attributional biasing by taking personal credit for success but not blaming themselves for failure. Specifically, Mezulis et al. (2004) examined the magnitude, ubiquity, and adaptiveness of a self-serving attributional bias, with people making more favorable attributions for positive events than for negative events. Across 266 studies, yielding 503 independent effect sizes, their meta-analytic findings confirm that the self-serving attributional bias is pervasive in the general population, and particularly strong among younger people in the sport domain. Especially in important and self-relevant domains, attributing successful outcomes to your own effort elicits pride and creates optimism about future success because you feel you have personal control (Brown & Weiner, 1984; Weiner, 2018). Hence, *Hypothesis 4* was that relative to the school domain, in the sport domain, student-athletes' attributions to effort are stronger, but only with regard to positive outcomes.

Previous research suggests that relative to team athletes, individual athletes tend to make more controllable attributions for both positive and negative events (Hanrahan & Cerin, 2009). The reason may be that individual athletes do not have to rely on teammates for their sport performances, so they perceive themselves to have greater control over and responsibility for their performances and outcomes than do team athletes (Hanrahan & Cerin, 2009). Furthermore, girls tend to emphasize effort more than boys (e.g., Butler & Hasenfratz, 2017), but Arnot, David, and Weiner (1999) concluded that "... the pattern of sex differences is often unstable across cultures, across time within cultures, and also through time in the development of children" (p. 57; cf., Jacobs et al.,

2002). Hence, in our analyses, we exploratively tested for type of sport (individual versus team) as well as for sex differences.

Method

Power analysis

We used the statistical power analysis program G*Power 3 to determine the required sample size. The input parameters were: F tests, ANOVA repeated measures, between factors, medium effect size = 0.25 (Cohen, 1988), α error probability = 0.05, Power (1- β error probability) = 0.80, number of groups = 4, number of measurements = 2, correlation among repeated measures = 0.30. This resulted in a required sample size of 120. Because the school requested to include all eligible student-athletes, the final sample consists of 146 participants with an actual power (1- β error probability) of 0.89.

Participants and procedure

The sample consisted of 146 student-athletes (41.1% female) from an Elite Sport Talent school in the Netherlands. This self-selected group, based on their wish to pursue a career in sport, received institutional support from the school to develop both their sport and school careers. Mean age was 14.1 years (SD = 1.58), and the mean age at which they became involved in their current sport was 7.1 years (SD = 2.38). Most (67.8%) were team sport athletes: Football (27.4%), Basketball (18.5%), Volleyball (11.0%), Field hockey (5.5%), Handball (4.1%), or Water-polo (1.4%). The individual sports represented in this sample are Skating (14.4%), Judo (6.2%), Athletics (4.1%), Tennis (3.4%), Swimming (2.1%), Cycling (1.4%), and Fencing (0.7%). A majority (64.4%) competed at the national level, and 30.8% and 4.8% at the local and international levels, respectively. The mean number of practice hours per week was 10.4 (SD = 3.82). Level and number of practice hour per week were unrelated ($ps > 0.12$) to the dependent variables (i.e., need for competence, effort expenditure, and effort attribution), and accordingly, not included as covariates in subsequent analyses.

Ethical approval was obtained from the university's ethical committee. All participants signed an informed consent form, and at least one parent/guardian signed an informed consent form as well. Student-athletes who did not sign an informed consent form were not included. For that reason, or because of absence during the data collection, 16% of the eligible student-athletes did not participate. At two separate sessions (Sport and School), within a time frame of no more than two weeks, the participants filled out the questionnaires online at school, in group settings with test leaders present. The measures used were part of this general survey of student-athletes' motivation and well-being.

Measures

Need for competence

We used adapted (to the domain of sport and school) versions of the four-item measure developed by Van Yperen, Rietzschel, and De Jonge (2014). The general stem was: "I

have the need ...". The four items were: (1) ... to have the qualities and skills to do well in my sport (studies); (2) ... to feel skilled in my sport (studies); (3) ... to feel that I can finish challenging drills (assignments) successfully; (4) ... to be good in my sport (studies). Need strength was indicated on response scales that varied from (1) *not at all* to (7) *an extremely large extent*. Cronbach's alphas were 0.87 (sport) and 0.82 (school). The scores on the four items of each scale were averaged to calculate an index for student-athletes' need for competence in sport and school.

Effort expenditure

Effort expenditure was measured using adapted versions (specified to the domain of sport and school) of the nine-item effort subscale from the Self-Regulation of Learning-Self-Report Scale (Toering, Elferink-Gemser, Jonker, Van Heuvelen, & Visscher, 2012). The participants were asked to indicate, for example, how often they worked as hard as possible on training drills (school tasks), or put forth their best effort when performing drills during training (school tasks). The responses scales varied from (1) *almost never* to (4) *almost always*. Cronbach's alphas were 0.91 (sport) and 0.90 (school). An effort score for each domain was created by averaging participants' scores on the nine items.

Effort attribution

To assess student-athletes' effort attributions of success and failure, they were first asked to describe a competitive event (sport version) or an exam (school version) with a very positive outcome for themselves. Second, we asked them to explain why the event worked out positively for them. Third, based on Weiner's (2018) attribution model, we asked the participants to indicate to what extent each of the following four factors had contributed to their positive outcome: Effort, ability, luck, and inferior opponent (sport version) or exam ease (school version). Following the procedure developed by Silver, Mitschell, and Gist (1995), the participants had to distribute 100 points among the four different causes. If the total did not sum up to exactly 100, participants were asked to correct their numbers, after which they could continue.

Next, the student-athletes followed the same three steps for a self-generated event that turned out negatively for them. The four potential causes were adapted accordingly: Lack of effort, lack of ability, bad luck, and superior opponent (sport version) or exam difficulty (school version). Note that (lack of) effort represents a personally controllable cause, whereas the other three potential causes are less, or not at all, under one's personal control.

Results

Hypothesis 1 was that student-athletes' need for competence and their willingness to exert effort would be higher in the sport domain than in the school domain. To test this hypothesis, two analyses of variance were conducted with sex (men versus women) and type of sport (individual versus team) as between-subjects factors. In the first analysis, Need for competence (sport versus school) was the within-subjects factor, which

was replaced by Effort expenditure (sport versus school) in the second analysis. In both analyses, we observed no (interactive) effects of the between-subjects factors ($ps > 0.30$). In contrast, both analyses revealed the expected within-subjects effect. That is, individuals' need for competence was higher in the sport domain ($M = 5.64$, $SD = 0.94$, $CI = 5.48, 5.81$) than in the school domain ($M = 4.96$, $SD = 0.91$, $CI = 4.81, 5.13$), $F(1, 142) = 46.66$, $p < .001$, $\eta^2 = 0.25$, observed power = 1.00. Similarly, willingness to exert effort was higher in the sport domain ($M = 3.17$, $SD = 0.58$, $CI = 3.06, 3.27$) than in the school domain ($M = 2.64$, $SD = 0.57$, $CI = 2.54, 2.74$), $F(1, 142) = 65.77$, $p < .001$, $\eta^2 = 0.32$, observed power = 1.00. These results provide strong empirical support for *Hypothesis 1*.

Empirical support was also found for *Hypothesis 2*. Student-athletes' need for competence in the sport domain was positively related *only*, and more strongly, to their effort expenditure in the sport domain ($r = 0.46$, $p < .001$). The nonsignificant correlation with effort in the school domain ($r = 0.06$, $p = .49$) was significantly lower, $z = 4.61$, $p < .001$ (Lee & Preacher, 2013). Similarly, student-athletes' need for competence in the school domain was positively related *only* to their effort expenditure in the school domain ($r = 0.36$, $p < .001$). The nonsignificant correlation with effort in the sport domain ($r = 0.15$, $p = .07$) was significantly lower, $z = 2.11$, $p = 0.03$. The correlation between the two need-for-competence measures was $r = 0.30$ ($p < .001$), and between the two effort measures, $r = 0.21$ ($p = .01$). These moderate correlations suggest domain-specificity as well.

Finally, we tested whether student-athletes' attributions to effort were stronger in the sport domain than in the school domain (*Hypothesis 3*), and stronger when explaining positive events than when explaining negative events, particularly in the sport domain (*Hypothesis 4*). We ran the same analysis of variance with sex (men versus women) and type of sport (individual versus team) as between-subjects factors. In this analysis, however, we added a 2 (Domain: Sport versus School) \times 2 (Event Valence: Positive versus Negative) within-subjects design. Again, no significant between-subjects effects were observed ($ps > 0.14$). The marginally significant within-subjects main effect of Domain ($F(1, 142) = 3.71$, $p = .056$, $\eta^2 = 0.025$, observed power = 0.48) provided marginal empirical support for *Hypothesis 3*: Student-athletes' attributions to effort were stronger in the sport domain ($M = 31.19$, $SD = 10.60$, $CI = 29.31, 33.07$) than in the school domain ($M = 28.47$, $SD = 12.95$, $CI = 26.16, 30.79$). The main effect of Event Valence was highly significant ($F(1, 142) = 129.76$, $p < .001$, $\eta^2 = 0.48$, observed power = 1.00), indicating that relative to negative outcomes ($M = 20.75$, $SD = 14.20$, $CI = 18.22, 23.27$), positive outcomes were much more strongly attributed to effort ($M = 38.92$, $SD = 10.67$, $CI = 37.02, 40.81$).

As expected, both main effects were qualified by the significant interaction between Domain and Event Valence, $F(1, 142) = 12.05$, $p = .001$, $\eta^2 = 0.08$, observed power = 0.93. **Figure 1** shows that relative to the school domain ($M = 34.95$, $SD = 17.24$, $CI = 31.87, 38.02$), in the sport domain, there was a stronger tendency among student-athletes to ascribe *positive* outcomes to their personal effort ($M = 42.88$, $SD = 11.71$, $CI = 40.80, 44.97$), regardless of sex and type of sport. With regard to *negative* outcomes, no differences were observed between the school ($M = 22.00$, $SD = 18.94$, $CI = 18.62, 25.38$) and sport domains ($M = 19.50$, $SD = 18.99$, $CI = 16.13, 22.87$). These findings provide strong empirical support for *Hypothesis 4*.

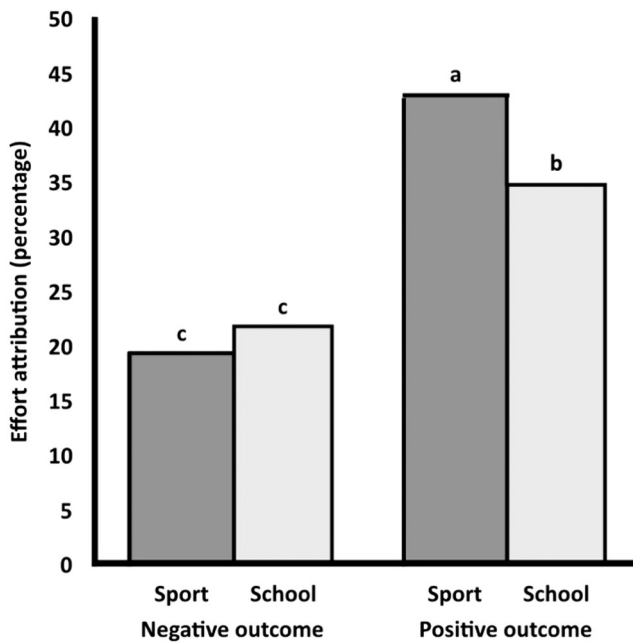


Figure 1. Scores on effort attribution (percentage) as a function of outcome valence (negative versus positive) and achievement domain (sport versus school). Note: Means that differ significantly ($p < .001$) have different letters.

Discussion

The desire to feel competent and skilled is often considered a universal, innate urge that serves the evolutionary function of adaptation to the environment (Deci & Ryan, 1985; Elliot et al., 2002; Harter, 2012; Van Yperen, 2017; White, 1959). Based on characterizations of adolescents as disaffected and disengaged in school (for reviews, see Steinberg, 2014; Yeager, Lee, & Dahl, 2017), one might suspect that students are globally unmotivated to gain, demonstrate, and experience competence. Drawing upon findings that individuals tend to differ in need for competence (Chen et al., 2015; McClelland, 1985; Van Yperen et al., 2014), our study extends existing knowledge by demonstrating that these differences in need for competence, and accordingly, student-athletes' effort expenditure and effort attributions, differ across the domains of school and sport. That is, we found clear evidence that student-athletes' basic need for competence (Deci & Ryan, 1985; White, 1959) was stronger in the sport domain than in the school domain. An obvious explanation for the stronger need for competence in the sport domain relative to the school domain is that the present sample is a unique, self-selected group based on their wish to pursue a career in sport. They are socially and legally required to attend school, but they have chosen for this particular school because it provides institutional support to develop a sport career as well.

We reasoned that differences in need for competence across the sport and school domains would imply that student-athletes also differ across these domains with regard to their effort expenditure and effort attributions. As expected, student-athletes' willingness to exert effort was higher in the sport domain than in the school domain, as was

their need for competence. Furthermore, need for competence in the sport domain was positively related *only* to their effort expenditure in the sport domain. Similarly, student-athletes' need for competence in the school domain was positively related *only* to their effort in the school domain. These findings provide additional empirical support for the domain-specificity of individuals' need for competence as well as their willingness to put effort into developing their domain-specific competence.

Our data reconfirm that individuals tend to take personal credit for success and that they are less likely to accept personal responsibility for failure (Mezulis et al., 2004). That is, student-athletes' attributions to effort were particularly strong when explaining positive events, regardless of sex and type of sport. Relative to causes such as ability, luck, and task ease, effort is an internal and unstable cause, that is, more personally controllable (Weiner, 2018; *cf.*, Perry & Hamm, 2017). Also, student-athletes' need for competence in a particular domain covaried with their tendencies to explain their domain-specific outcomes in terms of effort. Specifically, relative to the school domain, in the sport domain, in which their need for competence was stronger, student-athletes explained their *positive* outcomes more in terms of their own effort. This suggests that individuals' explanations for their outcomes are subjective construals based on individual differences such as need for competence. Our results are in line with previous findings that showed that the more value individuals attach to a specific dimension or domain, the stronger their motivation for a positive self-view (e.g., Brown & Weiner, 1984; Van Yperen, 1992) and the higher their perceived responsibility for positive outcomes.

A strength of the present study is the unique sample of student-athletes, but it also implies that generalizations are limited due to its homogeneity. We suspect, however, that our findings are not specific for the current sample, or representative only for adolescents, high school students, or young athletes. Obviously, future studies among employee-athletes or student-performers from a school for the arts, for example, should be conducted to demonstrate whether our findings can indeed be generalized to individuals who are engaged in different domains of competence, including sport, school, work, and art. Furthermore, future longitudinal studies may explore whether individuals' domain-specific need for competence changes over time, possibly as a function of age and experience (Elferink-Gemser, Te Wierike, & Visscher, 2018).

Our finding that student-athletes' need for competence is domain-specific is in line with McClelland's (1985) Motive Disposition Theory which states that need for competence can be learned and cultivated. This finding does not, however, provide compelling evidence to dispute Deci and Ryan's (1985) basic assumption that individuals' need for competence is innate. Assuming that individuals' need for competence is innate (Deci & Ryan, 1985), our results suggest that the context to which one would try to exercise it, might differ (*cf.*, Harter, 2012). Finally, the nature of our data does not allow any claim about causality or direction. Hence, we do not suggest that individuals' need strength determines effort expenditure or attributions for success and failure, or the other way around. Rather, we provide empirical evidence that individuals differ in their need for competence across domains, and that need strength is positively related to willingness to put effort into developing domain-specific competence and the tendency to explain positive outcomes in terms of effort.

An important research implication of the present findings is that, in future studies, individuals' need for competence and related self-perceptions (including effort and attributions), should be assessed through domain-specific measures. For professional practice, our findings imply that effective psychological interventions should vary across domains, particularly in case of positive outcomes (cf., Harter, 2012; Marsh et al., 2017). Relative to the sport domain, student-athletes were less likely to ascribe *positive* outcomes at school to their personal effort. For them, attributional retraining (AR) may be particularly effective in the school context. AR treatments are defined as motivation interventions aimed at shifting individuals' explanations of the causes of events from maladaptive to adaptive (Perry & Hamm, 2017). Making stronger effort attributions also for positive outcomes at school may enhance student-athletes' self-regulatory skills, including putting effort into developing their school-specific competence (Toering et al., 2012). In addition, AR programs may focus on changing student-athletes' explanations of *negative* outcomes in both domains (sport and school). Increasing their perceived responsibility for negative outcomes in either domain likely initiates action (i.e., greater or more efficient effort expenditure) to achieve a better result next time. In general, this type of psychological interventions may satisfy student-athletes' domain-specific need for competence, enhance their self-control, and improve their ability to objectively evaluate themselves, to manage their emotions, and to align their behavior with their goals and values. These are essential ingredients for optimal self-regulation, growth, and well-being in any domain.

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