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Elite athletes are higher on grit but lower on conscientiousness than a comparison sample of non-athletes

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Abstract

This study examines whether grit and conscientiousness distinguish elite athletes from a comparison sample of non-athletes. Participants were 128 elite athletes and 1701 non-athletes. Both groups filled out short-form questionnaires measuring grit and conscientiousness. Consistent with expectations, there was a high positive correlation between grit and conscientiousness and the elite athletes reported higher grit than the non-athletes. Contrary to expectations, the non-athletes scored higher on conscientiousness compared to the elite athletes. The relationship between grit and conscientiousness and their importance for attaining expert performance in sport is discussed.

Keywords: Grit, Conscientiousness, Expert performance

Introduction

Understanding who will attain elite status within a given field has been the focus of much discussion (Galton, 1892; Ericsson, Krampe & Tesch-Römer, 1993; Duckworth, Peterson, Matthews & Kelly, 2007). Elite status is achieved through the highest level of performance in a highly constrained activity, also defined as expert performance (Ericsson et al. 1993). Research has found that engagement in deliberate practice is one of the best predictors of expert performance (Ericsson, 2006). Deliberate practice refers to any focused training activity aimed at improving a specific aspect of an individual's performance, which requires cognitive and/or physical exertion, and does not lead to immediate personal, social or financial reward (Ericsson et al., 1993).

Ericsson and his colleagues emphasised that expert performance was more dependent on deliberate practice than personality characteristics (Ericsson et al., 1993). However, certain personality traits may support engagement in deliberate practice and thus propel individuals towards expert performance within a given domain. In the present study, we examined whether elite athletes would score higher on grit and conscientiousness compared to a sample of non-athletes. We focused on grit and conscientiousness because both traits have been connected to deliberate practice and performance (Duckworth, Kirby, Tsukayama, Berstein and Ericsson, 2011; Eskreis-Winkler, Duckworth, Shulman & Beal, 2014; Ozer & Benet-Martínez, 2006; Barrick & Mount, 1991; Barrick, Mount & Judge, 2001). Examining both traits in relation to elite athletes also allows us to analyse whether the two traits, which have been found to be highly related (Credé, Tynan & Harms, 2017), distinguish elite athletes from a comparison group of non-athletes in similar ways.

Conscientiousness and sports performance

One of the most established understandings of personality is the five-factor model, where personality traits are defined as individual differences in persistent ways of thinking, feeling and acting (McCrae & Costa, 1997). The model organises specific traits into five overall dimensions of extraversion, neuroticism, openness, agreeableness, and conscientiousness (Costa & McCrae, 1992). Several meta-analyses have concluded that conscientiousness is the trait most strongly associated with performance across domains (Ozer & Benet-Martínez, 2006; Barrick & Mount, 1991; Barrick, Mount & Judge, 2001). Conscientiousness is the disposition towards rational thoughts, focusing on competence and achievement, as opposed to impulsive behaviour and emotionally guided processes. It is a broad trait that subsumes several facets, including competence, self-discipline, deliberation, dutifulness, achievement-striving and order (Costa & McCrae, 1992). Individuals high on conscientiousness are thus thorough, organised, diligent, and self-disciplined in the pursuit of ambition (Costa & McCrae, 1992). These characteristics would appear to make individuals more likely to engage in deliberate practice and attain expert performance. This link between conscientiousness and deliberate practice is supported by Tedesqui and Young (2018) who found that conscientiousness, especially the underlying facet of achievement-striving, was positively associated with athletes' weekly performance and deliberate training practice. Despite the plausibility of an association between conscientiousness and expert performance in sports, there are only few studies in this area, which will be reviewed below.

Piedmont, Hill and Blanco (1999) assessed athletic performance based on coach evaluations of various dimensions (i.e., ability to follow instructions, match performances, working ethics), as well as statistical

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observations (number of goals and matches) of 79 footballers playing at teams from high-ranking universities. They found a significant positive relationship between conscientiousness and performance. In a later study, Allen, Greenlees and Jones (2011) operationalised success in terms of the level at which athletes compete. Participants included 253 athletes from 34 different sports who competed at national and international levels (classified as high level, n = 40) or at university, clubs, and regional levels (classified as lower levels, n = 200). A comparison between the two groups showed that high-level athletes scored significantly higher on conscientiousness than lower level athletes. Finally, one study compared athletes to a group of non-athletes and found that athletes (high level, n = 197) scored significantly higher on conscientiousness than non-athletes (n = 126) (Steca, Baretta, Greco, D'Addario & Monzani, 2018). When the group of athletes was divided into elite and amateur levels, it was found that amateur-level athletes did not score higher on conscientiousness in comparison to non-athletes.

Together the studies suggest that high-level athletes report higher conscientiousness than lower level athletes and non-athletes, which suggests that highly conscientious individuals may be more likely to achieve expert performance in sport. In the present study, we aimed to replicate the findings from Steca and colleagues (2018) while including measurement of grit in order to compare grit and conscientiousness in relation to expert performance in sports. We expected that the group of elite athletes would score higher on conscientiousness than the comparison group of non-athletes.

Grit and sports performance

Grit is a newer concept in personality research than conscientiousness and has received less attention. It is conceptualised as including two dimensions: Perseverance and passion for long-term goals (Duckworth et al., 2007). Perseverance refers to the ability to work hard and to maintain one's efforts over years, even when facing failure and adversity; passion refers to exploring personal interests and identifying goals worthy of persistent pursuit (Duckworth et al., 2007). Several studies have shown that gritty individuals are more likely to succeed in their goal pursuit. For example, grit has been found to predict higher ranking in the US national spelling contests (Duckworth et al., 2011), retention of cadets at West Point Military Academy, as well as workplace performance and academic grade point average (Eskreis-Winkler et al., 2014).

Tedesqui & Young (2017; 2018) also found that athletes' level of perseverance (one of the dimensions of grit) was linked to weekly quantity of deliberate practice, suggesting that individuals with high persistence cope better with the strenuous conditions of deliberate sports practice. Below, the few studies that have examined relations between grit and sports performance will be reviewed.

Martin, Byrd, Watts and Dent (2015) examined wheelchair basketball players at US national level (n = 75) and found that athletes with higher grit were significantly more engaged in their sport. Similar to this, Larkin, O'Connor and Williams (2016) found that football players (n = 385) with higher grit spend significantly more time on sports-specific activities such as competition and training compared to their colleagues with lower grit. Finally, Meyer, Markgraf and Gnacinski (2016) investigated football players (n = 305) from regional to international level. They found minimal differences in grit between the different levels and concluded that competitive athletes regardless of elite or amateur level are highly gritty populations.

In sum, grit appears to be related to engagement in sport, although it does not distinguish between high level and lower level athletes. However, none of the existing studies have compared elite athletes to a non-athlete comparison group. Further, it remains unclear whether grit may predict likelihood of becoming a high level athlete. Based on the literature showing that grit is associated with deliberate practice (Tedesqui & Young, 2017; 2018) and performance in general (Eskreis-Winkler et al., 2014), we expected that elite athletes would score higher on grit than a comparison group of non-athletes. Since some studies suggest that the two dimensions of grit are not always highly correlated and are differentially associated with outcomes (Datu, Valdez & King, 2015; Jordan, Gabriel, Teasley, Walker & Schraeder, 2015; Tedesqui & Young, 2017; 2018), we examined both total grit score as well as separate scores for perseverance and passion.

Relationship between Grit and Conscientiousness

Grit and conscientiousness are conceptually related and there has been some debate about whether they refer to the same underlying individual difference (Credé et al., 2017). Studies have found large correlations between grit and conscientiousness. For example, Duckworth et al. (2007) found a correlation of .77, and a recent meta-analysis found a strong estimated population correlation between conscientiousness and total grit, ρ = .84 as well as between conscientiousness and the grit dimensions perseverance, ρ = .83 and passion, ρ = .61. Ivcevic and Brackett (2014) argue that the grit dimension of perseverance is also an aspect of conscientiousness, since several studies have found perseverance to be a facet of conscientiousness (i.e., Hough & Ones, 2001; MacCann, Duckworth & Roberts, 2009). This might indicate that especially the perseverance dimension of grit is conceptually overlapping with conscientiousness, which is consistent with a study showing that particularly perseverance correlates strongly with conscientiousness (Fite, Lindeman, Rogers, Voyles, & Durik, 2017).

Still, Duckworth et al. (2007) argue that grit differs from conscientiousness on two accounts: 1) for grit the emphasis is more on long-term stamina, and 2) grit is specifically tied to a few highly salient goals reflecting internalization of the values underlying goal-relevant activity. Other authors agree that grit and conscientiousness are conceptually distinct despite the high correlations (Cooper, 2014).

Based on this literature, we expected a large and positive correlation between grit and conscientiousness. We also examined a conceptual relationship between grit and conscientiousness by testing whether they distinguished between elite athletes and a comparison group of non-athletes in similar ways.

Methods

Participants and recruitment

To estimate the number of participants needed for the study, a power analysis was conducted (Faul, Erdfelder, Lang & Buchner, 2007). A pilot study had shown an effect size of Cohen's d = .48, which reflects a moderate effect. The other input parameters in GPower were set to statistical power of 0.8 (1 - β) and a two-tailed significance level of 0.05 (α). The analysis indicated that a total sample size of at least 140, 70 in each group, was needed.

Participants in the control group (non-athletes) were recruited by consultants as a part of obtaining a personality profile constructed by e-stimate (2018). e-stimate (2018) is a private company that provides profiling tools for the human resource industry; that is, for purposes of selection,

development and outplacement. The majority of consultants assess employees in the private and/or public sector, where some consultants assess students in colleges and universities, and a few assess individuals who seek for a new job. Thus, a large proportion of the participants belong to the category of working adults. The consultants contacted participants using standard e-mails providing a link and login credentials to an electronic survey including the measures used in the present study.

Over three months in the fall of 2017, a total of 1791 individuals responded (n = 1 answered in Spanish, and n = 89 answered in Swedish, wherefore they were excluded, since the translation of grit and conscientiousness items did not follow a strict translation procedure). Therefore, there were 1701 participants in the final non-athlete sample[1] aged 13-77 years (M = 39.15 and SD = 12.28; 46.1% were women). The education level is shown in Table 1.

Elite athletes were recruited by contacting the sport directors of various sport federations in Denmark. They were informed about the purpose of the study as well as the inclusion criterion (daily practice and performance at the highest national or international level) and asked whether they would administer a standard e-mail to relevant athletes. Additional participants were recruited directly by the first author via social media. To double check that participants fulfilled the inclusion criterion, we also included the following question in the questionnaire: "Do you practice your sport daily at the highest national or international level?" (yes or no).

The questionnaire was sent to 526 athletes, of which 137 answered (26%). N=1 was excluded due to lack of demographic information, n=6 were excluded due to missing items in the grit questionnaire, and n=2 were excluded due to the inclusion criterion. Thus, 128 participants were included in the elite athlete sample yielding a final response rate of 24% (aged 18-45 years, M = 24.27 and SD = 4.97; 54.7% women)[1]. The athletes represented several sports including athletics (15.6%), badminton (3.9%), cycling (6.3%), golf (3.1%), motoring (0.8%), rowing (4.7%), sailing (9.4%), swimming (4.7%), basketball (3.9%), soccer (20.3%), handball (17.2%), ice hockey (7.0%); and "other" (3.1%, these athletes are expected to represent riding or tennis, as these sports were included late in the process and were not an option in the electronic questionnaire). Characteristics indicating the elite level of the athletes (as assessed by self-report questions in the questionnaire) are shown in Table 2.

None of the participants in the control or elite athlete group received any compensation for participating in the study.

Materials

The questionnaire included questions on demographic variables. Items pertaining to grit and conscientiousness were included as part of the larger e-stimate (2018) profile questionnaire.

Grit

The short grit scale (Grit-S; Duckworth & Quinn, 2009) was used to measure grit. The scale has shown to possess good psychometric qualities (Duckworth & Quinn, 2009; Muenks, Wiggield, Yang & O'Neal, 2016). Four items measure perseverance (i.e., "Setbacks don't discourage me"), and 4 items measure passion (i.e., "I have difficulty maintaining my focus on projects that take more than a few months to complete" – reverse coded). Participants rate items on 5-point likert scales ranging from 1 (strongly disagree) to 5 (strongly agree). Grit-S was translated into Danish following a strict translation back-translation procedure (Beaton, Bombardier, Guillemin & Ferraz, 2000). Cronbach's alpha for both samples was .74, which is satisfactory.

Conscientiousness

Conscientiousness was measured by a scale, which e-stimate (2018) had developed based on the IPIP-NEO-120 (Johnson, 2014). e-stimate (2018) translated items from the IPIP_NEO-120 into Danish following a translation back-translation procedure and adapted items to create more variance when examining conscientiousness in relation to the human resource industry (Olesen & Friis, 2013). The adapted version of the IPIP_NEO-120 retained the five-factor structure and for the present study, the highest loading item and highest loading reversed item on each of the six conscientiousness facets were selected, generating a 12-item scale. The six facets include 1) Self-efficacy, belief that one can make means and ends meet (i.e., "Complete all tasks successfully"); 2) Self-discipline, being able to follow through with tasks (i.e., "Feel 100% motivated - even if the task is boring or difficult"); 3) Diligence, cautious planning for the future (i.e., "Sometimes cut corners" - reversed); 4) Dutifulness, complying with rules and living up to expectations (i.e., "Sometimes avoid doing my duties" - reversed); 5) Achievement striving, working hard on ambitious goals (i.e., "Work hard"); 6) Order, creating order and structure (i.e., "Organise all my things into systems"). Cronbach's alpha for both samples was .78, which is satisfactory.

Education level	Control group n (%)	Elite athletes n (%)
Primary school	52 (3.1)	4 (3.1)
High school or upper secondary school	163 (9.6)	54 (42.2)
Vocational education	334 (19.6)	4 (3.1)
Short higher education (SHE)	228 (13.4)	3 (2.3)
Medium higher education (MHE)	558 (32.8)	28 (21.9)
Longer higher education (LHE)	352 (20.7)	35 (27.3)
Missing values	14 (0.8)	-

Table 1. Overview of education level for the control group and elite athletes

[1] N=69 answered in English in the control group and N = 1 answered in English in the elite athlete group

Indicators and response categories	n (%)
"Are you able to live of your sport?"	
Yes, completely	42 (32.8)
Yes, partially	32 (25.0)
No	54 (42.2)
"Have you participated in: EM, VM, OL, more of the above, none of the above?"	
EM	26 (20.3)
VM	19 (14.8)
OL	1 (0.8)
More of the above	38 (29.7)
None of the above	44 (34.4)
"Have you achieved a medal at: EM, VM, OL, more of the above, none of the above?"	
EM	18 (14.1)
VM	7 (5.5)
OL	0 (0)
More of the above	13 (10.2)
None of the above	90 (70.3)

Table 2. Overview of elite indicators in the elite athlete group

Data analyses

Before testing the main hypotheses, we checked for relationships between age and gender as pertaining to both grit and conscientiousness using Pearson's r and independent t-test, respectively. Our concern was to ensure that any differences between elite athletes and controls were not due to simple demographics.

To examine the relationship between grit and conscientiousness, we used Pearson's r correlation interpreting effect sizes according to the following guidelines: Pearson's r ≥ .1 (small effect), r ≥ .3 (moderate effect), r ≥ .5 (large effect).

To examine group differences in grit and conscientiousness independent t-tests were used with Cohen's d calculated to determine effect size, interpreted based on the following guidelines, small = .2, moderate = .5, large = .8 (Lakens, 2013). To further examine whether the group difference in conscientiousness was explained by age, we used multiple regression.

Results

Preliminary analyses

We found no gender differences (ts(1827) = .03 and .46, ps > .60, for conscientiousness and grit, respectively). Age showed a weak, but positive correlation with conscientiousness (r(1827) = .11, p < .001) and grit (r(1827) = .05, p = .03).

Relationship between Grit and Conscientiousness

We expected a positive relationship between grit and conscientiousness and analyses confirmed this expectation (see Table 3). Total score on grit was strongly and positively associated with conscientiousness, as were the two dimensions of perseverance and passion (although note that the correlation coefficient is lower for passion).

Group differences between elite athletes and controls

We then examined whether elite athletes scored higher on conscientiousness and grit compared to the control group. The results of independent t-tests showed that the elite athletes scored higher on total grit and the subscale of passion, but not perseverance. Contrary to expectations, the control group scored higher on conscientiousness (see Table 4).

The preliminary analyses showed that age was positively associated with conscientiousness and since the control group was significantly older than the elite athletes (t(1827) = 28.03, p < .001), we tested whether age could account for the differences in conscientiousness between the two groups. We entered conscientiousness as the outcome variable and group (labelled 1 = elite athletes and 2 = control group) and age as the predictor variable. The overall model was significant (F(2, 1826) = 14.72, p < .001, Adj. R^2 = .02). Further, both group (β = .07, p = .004) and age (β = .08, p = .001) significantly predicted conscientiousness. Hence, age cannot account for the group difference in conscientiousness.

	Grit, perseverance	Grit, passion	Conscientiousness
Grit total	.79***	.91***	.69***
Grit, perseverance	-	.45***	.65***
Grit, passion	-	-	.56***

Table 3. Correlations between Grit and Conscientiousness. ***p <. 001

	Elite athletes (n=128)		Control group (n=1701)		t (df=1827)	Cohen's d
	M	SD	M	SD		
Grit total	3.92	.62	3.73	.65	3.25***	.30
Perseverance	4.15	.62	4.16	.61	-.10	.02
Passion	3.69	.81	3.30	.90	4.77***	.46
Conscientiousness	3.42	.67	3.65	.61	-3.79***	.36

Table 4. Group differences in Grit and Conscientiousness. *p<.05, ***p<.001

Discussion

Relationship between Grit and Conscientiousness

Our results confirm previous studies showing strong positive relations between grit and conscientiousness (Credé et al., 2017; Duckworth et al., 2007). The correlation coefficient between conscientiousness and the perseverance dimension of grit was numerically higher than the correlation coefficient between conscientiousness and passion, a finding that also aligns with previous studies (Credé et al., 2017; Hough & Ones, 2001; MacCann et al., 2009).

Conscientiousness contains facets such as self-discipline, which is conceptually closely related to perseverance. While passion was also positively related to conscientiousness, it may diverge from conscientiousness since it focuses on passion for valued long-term goals. This is reflected in the following reverse-coded passion item: "I often set a goal but later choose to pursue a different one", where a low score reflects a sustainable interest and focus over time in spite of distractions. The item stresses the importance of maintaining interest or personally valued goals over long time intervals. Conscientiousness does not emphasise passion for a goal over time to the same extent. For example, an item of diligence reads: "Thorough in everything that I do", which measures thoroughness generally, not related to focus on a particular valued goal.
In sum, grit and conscientiousness are highly related. Nevertheless, there are conceptual differences, which will be discussed below. In addition, analyses of group differences yielded different results for grit and conscientiousness, also suggesting that they are best viewed as related but distinct constructs.

Elite athletes, Grit and Conscientiousness

As expected, elite athletes scored higher on grit compared to the control group and additional analyses revealed that it was particularly passion that distinguished the two groups. The result is consistent with and extends prior studies, which have found that higher grit is related to more deliberate practice (Larkin et al., 2016; Tedesqui & Young; 2017; 2018) and engagement in sport (Martin et al., 2015). The result differs from Meyer et al. (2016) who found few differences in grit between football players at different levels. However, combining findings from the studies may suggest that while grit predisposes individuals to attain expert performance and thereby become elite athletes, it may not distinguish between elite athletes at different levels. Still, more studies are needed to examine this possibility.

The finding that passion, but not perseverance, was higher among the elite athletes compared to the control group contrasts somewhat with previous studies which emphasise that the dimension of perseverance has a stronger predictive validity of expert performance compared to passion, across both domains (Credé et al., 2017) and within sports (e.g., Tedesqui & Young, 2017). Previously, these studies have claimed that the primary utility of grit is perseverance. However, the higher score on passion in the elite athlete group may suggest that within the sports domain, maintenance of interest and internalization of valued goals are essential for success and for attaining elite status. However, there are too few studies of grit and its two dimensions to draw firm conclusions regarding their combined and separate contributions to expert performance in sports.
Surprisingly, we did not find that the elite athletes reported higher conscientiousness compared to the control group. This is contrary to existing literature (e.g., Steca et al., 2018), and in fact the control group scored higher on conscientiousness than elite athletes. It is possible that the higher score on conscientiousness in the control group reflects that these individuals were tested as a part of profiling in relation to work where aspects of conscientiousness are highly valued (Van Vugt, Hogan & Kaiser, 2008). This context may have led the control participants to emphasise their conscientiousness as a part of a (perhaps unconscious) strategy to present themselves in the most positive way, although this strategy is less common than suspected (Hogan & Kaiser, 2005). This motivation was probably not present for the elite athletes who completed the questionnaire out of interest as a part of participating in an anonymous survey. It is also worth noting that some of the participants in the control group were probably experts in their work domain, which is fostered by high levels of conscientiousness and perhaps are pushing the overall conscientiousness score of the control group upwards.

In sum, we found that high grit, in the form of passion, marks a personality difference that distinguishes elite athletes from non-athletes. Even though research shows that engagement in deliberate practice is essential for the development of expert performance, the present study contributes with the understanding that certain personality traits, like grit, likely enable certain individuals to sustain demanding activities as deliberate practice in the sports domain. The study, however, does not allow inferences about causality. That is, whether higher grit causes engagement in deliberate practice; or whether as Ericsson et al. (1993) suggest, domain specific and contextual influences cause the development of gritty nature; or whether the relationship is bi-directional.

Limitations and future directions

The sample of elite athletes included many different sports. While this heterogeneity allows for broader generalizations, it may also mask possible differences across sports. For example, the field of soccer is a large sport with many resources, whereas smaller sports, such as athletics, attract fewer resources. Individual differences in grit may impact differently on whether a promising young athlete goes on to become an elite athlete within such different sports. Future studies could examine possible differences in the predictive value of grit across sport domains.

Focusing on implications for practice, grit may be a particularly relevant parameter in selection, coaching, and talent-development programs. This is especially the case while athletes are young talents; it might not just be talent and current performance, but rather the will and capacity (i.e., passion) to value and work towards the long-term goal of an elite sport career.

Conclusion

Grit and conscientiousness were highly related, but whereas grit was higher in a group of elite athletes compared to a control group of non-athletes, conscientiousness was higher in the control group compared to the elite athletes. This suggests that the two concepts, although related, are distinct. It also confirms and extends prior studies showing that grit is important for expert performance.

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