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Extraversion and Neuroticism in Contact Athletes, No Contact Athletes and Non-athletes: A Research Note

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ABSTRACT

Two groups ($n = 86$) of university athletes (contact, no contact) and two matched groups ($n = 86$) of non-athletes completed the Eysenck Personality Inventory (Eysenck & Eysenck, 1968). Extraversion did not vary significantly between athletes and non-athletes or between contact and no contact athletes, but it was higher for athletes compared to American college norms. For neuroticism, athletes scored significantly lower than non-athletes. Because neither extraversion or neuroticism changed over time (four years of study), these results are consistent with the gravitational hypothesis that people higher in extraversion and lower in neuroticism are attracted to university sports.

Introduction

To understand the psychology of athletes, researchers have asked whether they differ in personality from non-athletes and whether athletes vary among different sports. One of the few consistent findings is that athletes are more extraverted and less neurotic than non-athletes (Kirkcaldy, 1982; Morgan, 1980; Singer, 1975). However, there is less agreement on how personality varies from sport to sport (Wann, 1997).

Although this state of affairs may be due methodological inconsistencies among studies (Newcombe & Boyle, 1995), another reason may be that research on personality in sport has not been designed to test theories that could account for the relationship between personality and athletic participation (Vealey, 1992). Furthermore, descriptive methods with subject variables, which compare already-existing groups of athletes and non-athletes on personality, cannot distinguish whether certain kinds of people were drawn into sport, the *gravitational* or *selection* hypothesis, or whether participation in sport contributes to the differences between athletes and

non-athletes, the *developmental* hypothesis (Cox, 2002; Wann, 1997). The purpose of the present study is to provide further evidence of how extraversion and neuroticism vary with athletic participation at the level of representing the university, but in the context of Eysenck's personality theory (Eysenck, 1967) and the two explanatory hypotheses (gravitational, developmental) for higher extraversion and lower neuroticism in athletes.

Theoretical Considerations

According to Eysenck (1967), extraversion is a function of cortical arousal in the central nervous system. Extraverts are under-aroused and seek stimulation to increase arousal to the optimal level. Introverts, in contrast, are already optimally aroused or are even over-aroused so that they avoid stimulation to decrease arousal to the optimal level. Eysenck's proposal has been supported by evidence that relates measured extraversion to brainstem auditory evoked responses (Swickert & Gilliland, 1998). Furthermore, it has been found that extraverts' verbal ability task performance increased when arousal was raised to the optimal level with time pressure and caffeine whereas introverts' performance was reduced. This is consistent with Eysenck's theory and the Yerkes-Dodson law, also known as the inverted U-shaped function, according to which performance is best with a moderate level of arousal and poorer with both lower and higher levels of arousal (Revelle, Amaral, & Turriff, 1976).

We suggest that athletes are higher in extraversion than non-athletes because participation in vigorous sporting activity increases cortical arousal. If this is the case, athletes in contact sport may be more extraverted than those in no contact sport because the physical contact may provide more arousal. Indeed, it has been found that extraversion was higher for athletes in "direct" sports where aggression is permitted via contact than in "parallel" sports where it is not (Newcombe & Boyle, 1995). This is similar to the idea that high sensation-seekers engage in riskier sports to satisfy their need for new experiences (Young, 1990), which implies that there are pre-existing differences that draw participants into different sports (the gravitational hypothesis). In the present study with university athletes, it is argued that extraverts select sport as a means of reaching their optimal level of cortical arousal. This implies that the differences between athletes and non-athletes would show up early in participation because the two groups already vary in extraversion and that the differences would not change over the four years spent studying and competing because extraversion is not affected by participation.

Neuroticism is a function of autonomic nervous system arousal. Neurotics have a highly labile system, which means that they become emotionally aroused very quickly but return to normal very slowly (Eysenck, 1967). Perhaps athletes are lower in neuroticism than non-athletes because becoming emotionally aroused too easily may interfere with athletic performance. However, because all sport involves motor skill, neuroticism may not vary as a function of contact. If this means that neurotics avoid sport (the gravitational hypothesis), differences between athletes and non-athletes will show up early in participation and will not change over time.

On the other hand, there is experimental evidence that exercise activity can lower trait anxiety (e.g., Folkins, 1976; Ledwidge, 1980). Sport may expose athletes to repeated emotional highs and lows, allowing their autonomic nervous system to adapt, diminishing its lability,

leading to a lowering in neuroticism. This implies that neuroticism may not differ much between athletes and non-athletes in the early stages of participation, but it may decline over time with athletes but remain constant with non-athletes (the developmental hypothesis). A third possibility is that there are *both* pre-existing differences in neuroticism *and* changes in it due to participation. If this is the case, athletes would initially be less neurotic than non-athletes and this difference would be greater over time.

In previous research on personality in different sports, athletes were compared to a general group of non-athletes (e.g., Newcombe & Boyle, 1995). However, athletes in contact sports are likely to differ in a number of ways from those in non-contact sports, particularly in height and weight. If personality is related to body build, physical differences may account for personality differences between athletes in various sports. In fact, while he recognized that some of the relationship may be based on stereotypes, Sheldon found that more muscular types (mesomorphs) are more outgoing than less muscular types (ectomorphs) (Hall & Lindzey, 1957, pp. 356-365). The present study was unique in that contact and no contact athletes were compared to corresponding groups of non-athletes who were matched to the athletes in body build, giving four groups based on two variables (physical size, athletic participation): larger athletes (contact sports), larger non-athletes, smaller athletes (non-contact sports), and smaller non-athletes. This design permits a comparison of athletes to non-athletes in general, as in past research, but also a more precise comparison of contact and no-contact athletes to non-athletes with physical size controlled.

Summary of Predictions

On the basis of Eysenck's (1967) personality theory and the gravitational hypothesis, we predicted that contact university athletes would be more extraverted than no contact athletes, that no contact athletes would be more extraverted than non-athletes and that these differences would show up at the beginning of their university careers and remain constant over time. We also predicted that athletes in general would be less than neurotic than non-athletes and that this difference would also show up early. However, it might remain constant or dissipate over time.

Method

Participants were 86 university athletes and 86 non-athletes. "Athletes" represented their university in a contact sport (football, rugby, basketball, soccer; $n = 46$) or a no contact sport (baseball, volleyball, track, golf; $n = 40$). "Non-athletes" were identified simply by asking if they represented the university in a sport or not. This means that they did not represent the university in a sport, but that they might have participated intramurally, might have exercised individually, or might not have exercised at all. Each athlete was matched with a non-athlete in weight, height, age and year of study, so that there was a non-athlete control group for contact sport and another non-athlete control group for no contact sport. Because weight and height were greater for the contact athletes and their controls than for the no contact athletes and their controls, the four groups constituted a 2 x 2 (Physical Size x Athletic Participation) design.

Participants completed the Eysenck Personality Inventory (Eysenck & Eysenck, 1968), which measures extraversion (24 items), neuroticism (24 items) and faking (lie scale) (9 items) by

answering yes or no to each question. Eysenck and Eysenck report that internal consistency and test-retest reliability coefficients for extraversion and neuroticism range from .75 to .95. They also cite evidence of concurrent and factorial validity. The lie scale is designed to measure “faking good,” and is elevated when people are instructed to give a “good impression”. Scores above 4 or 5 are considered to cast doubt on responses to the other scales (Eysenck & Eysenck, 1968). That is, a person’s scores on extraversion and on neuroticism might be contaminated by response bias and should be interpreted with caution. Usually, lie scores are used when people’s scores are interpreted individually, but not in research where they are combined with scores of others.

Results and Discussion

A 2 x 2 x 4 (Physical Size x Athletic Participation x Year of Study) ANOVA was carried out for extraversion and for neuroticism. For extraversion, none of the effects were significant, which contradicts previous research that athletes are more extraverted than non-athletes (Kirkcaldy, 1982; Morgan, 1980; Singer, 1975). It also contradicts the prediction that athletes in contact sport would score higher on extraversion than those in no contact sport. In fact, the mean score for contact athletes was slightly lower than that for no contact athletes ($M_s = 14.7, 15.0$; see Table 1). However, this result supports the results of a study by Newcombe and Boyle (1985), who found no difference in extraversion between athletes in direct (contact) and parallel (no contact) sports. The lack of a difference between athletes and non-athletes is particularly surprising, because one of the robust findings in sport psychology personality research is that athletes are more extraverted than non-athletes (Cox, 2002; Kirkcaldy, 1982; Morgan, 1980; Singer, 1975; Wann, 1997). One reason for the present nonsignificant difference may be that some of our “non-athletes” could have participated in sports at a lower level than representing the university. In previous research, the non-athletes may have been genuine non-participants in that they did not exercise at all. Furthermore, the present non-athletes were chosen to match athletes who were higher and lower in physical size, so they may not have represented the non-athlete population.

Table 1. Mean Scores on Extraversion and Neuroticism for Athletes and Non-athletes

Physical Size	Year of Study														
	1			2			3			4			Total		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Extraversion															
Bigger															
Athletes	11	16.1	2.4	9	14.1	4.0	10	14.2	5.2	16	14.3	2.7	46	14.7	3.5
Non-Athletes	8	13.8	3.2	12	14.8	3.3	17	14.1	3.7	9	13.9	3.5	46	14.2	3.4
Smaller															
Athletes	15	15.5	3.9	9	14.1	4.0	10	14.6	3.5	6	15.5	3.3	40	15.0	3.7
Non-Athletes	12	14.1	3.8	12	13.2	3.3	7	13.1	4.1	9	14.9	2.9	40	13.8	3.5
Neuroticism															
Bigger															
Athletes	11	10.4	5.2	9	9.9	3.1	10	8.4	4.2	16	8.9	4.0	46	9.4	4.2
Non-Athletes	8	11.0	4.3	12	12.6	5.5	17	9.8	4.9	9	11.3	5.0	46	11.0	4.9
Smaller															
Athletes	15	7.5	5.4	9	7.4	4.2	10	8.2	5.6	6	11.5	3.0	40	8.3	5.0
Non-Athletes	12	10.8	4.8	12	11.3	4.6	7	11.0	4.1	9	8.7	4.1	40	10.5	4.4

Note. Maximum score for extraversion and for neuroticism is 24.

This possibility was examined by assuming that non-athletes in previous studies scored close to population norms for extraversion, whereas the present groups of athletes and non-athletes both scored higher, perhaps minimizing any athlete/non-athlete difference. Consequently, each of the four groups was compared with the mean score on extraversion for American college students ($M = 13.1, SD = 4.1$; Eysenck & Eysenck, 1968). Single-sample t -tests showed that the mean scores for the bigger athletes (contact athletes) and the smaller athletes (no contact athletes) were both significantly higher than the norms, $t(45) = 2.60, p < .01, t(39) = 2.85, p < .01$, respectively. However, the mean scores for both the bigger non-athletes and the smaller non-athletes were not significantly different from the norms, $t(45) = 1.62, p > .05, t(39) = 0.66, p > .20$, respectively. Thus, rather than all four groups scoring above the population norm for extraversion, only the two groups of athletes fell into this range. Consequently, these results are consistent with previous reports that athletes' scores on extraversion are elevated. Together with the fact that scores did

not change over time for athletes or for non-athletes, they are also consistent with the gravitational hypothesis that people who are higher in E select themselves to play sports.

For neuroticism, athletes scored significantly lower than non-athletes, $F(1, 168) = 7.63, p < .01$ ($M_s = 8.85, 10.78$), confirming previous research that athletes are more stable (less neurotic) than non-athletes (e.g., Kirkcaldy, 1982). In addition, as predicted, and as found by Newcombe and Boyle (1995), neuroticism did not vary between contact and no contact athletes. In addition, there was no effect of year of study and it did not interact with the other variables. This is also consistent with the gravitational hypothesis of pre-existing differences according to which people who are high in neuroticism avoid sports participation. However, a weakness of the present study is that, because the sample sizes in each cell were small (as low as 7), it lacks power to detect interactions with year of study. The downward trend over the years in the contact athletes' mean scores for neuroticism (10.4, 9.9, 8.4, 8.9) might have been significant with larger samples. Future research on the gravitational and developmental hypotheses should ensure that there are healthy sample sizes in all conditions of the study.

Another weakness of the present research is that, although the consent form made no mention of the fact that athletes were being compared to non-athletes, many of the athletes were tested in groups, perhaps leading them to suspect that they were chosen because of their athletic status. If they thought that athletes are more extraverted and less neurotic than non-athletes, this demand characteristic might have affected their responses to the Eysenck Personality Inventory. Future research should avoid testing participants in identifiable groups.

An important design feature of the present study was that athletes were matched to non-athletes on physical size, because it was thought that extraversion might be related to this variable. However, neither extraversion or neuroticism varied significantly between larger and smaller participants. On the other hand, although the results for extraversion and for neuroticism were not affected when they were analyzed with lie scores as a covariate, bigger participants ($M = 2.13, SD = 1.30$) had significantly lower lie scores than smaller participants ($M = 3.15, SD = 1.69$), $F(1, 156) = 14.48, p < .001$. That is, contact athletes scored lower than no contact athletes, but bigger non-athletes also scored lower than smaller non-athletes. These results differ from those of Newcombe and Boyle (1995) who found that athletes in general had lower lie scores than non-athletes, but that there was no difference between participants in direct and parallel sports, where physical aggression was and was not permitted respectively.

Finally, although we compared contact and no contact university athletes, the contact athletes played one of four team sports (football, rugby, basketball, soccer) whereas the no contact athletes plays one of two team sports (baseball, volleyball) or one of two individual sports (track, golf). Although there were no significant differences between contact and no contact athletes in extraversion and neuroticism, future research should avoid the potentially confounding variable of team/individual sport.

Conclusion

The main purpose of the present study was to examine extraversion and neuroticism in contact and no-contact athletes and to compare them with non-athletes. We found evidence that

extraversion is elevated and neuroticism is lowered in athletes and that these differences exist in the participants prior to their university careers. This implies that personality might be a factor in the ability to play. However, it would be premature to choose athletes on the basis of these traits, because research would have to demonstrate a link between them and actual performance. Notably, elite athletes have been found to be less tense and more vigorous than average athletes – the “iceberg” profile (Morgan, 1980; Newcombe & Boyle, 1995). This suggests that elite athletes might be less neurotic and more extraverted than average athletes.

As advocated by Vealey (1992) future research on personality in sport should also be designed to test theories that offer explanations for differences between athletes and non-athletes and among athletes in various sports. In addition, we recommend the practice of matching non-athletes with athletes on variables that are likely to be related to the traits being examined. Finally, sample sizes should be greater than in the present research, athlete groups should be formed without potentially confounding variables, non-athletes should be genuine non-participants, and demand characteristics should be minimized.

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