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PERSONALITY AND INDIVIDUAL DIFFERENCES

Predicting athletic performance using the five-factor model of personality

Ralph L. Piedmont[a,*], David C. Hill[b], Susana Blanco[c]

[a] *Department of Pastoral Counseling, Loyola College in Maryland, 7135 Minstrel Way, Columbia, MD 21045, USA*
[b] *University of Maryland, Baltimore, MD, USA*
[c] *Towson State University, USA*

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Abstract

The purpose of this study was twofold: (a) to determine if the dimensions of the five-factor model of personality could be used as predictors of athletic performance and (b) to demonstrate the utility of the five-factor model as a theoretical paradigm capable of organizing personality research on athletic competition. Subjects were 79 female athletes from four different women's NCAA Division 1 soccer teams. All subjects completed a bipolar adjective scale designed to measure the five factors. Coaches' ratings on several performance dimensions and actual game statistics were also collected. Regression analyses indicated that the personality dimensions of neuroticism and conscientiousness explained approximately 23% of the variance in coaches' ratings, while conscientiousness was the sole predictor of actual games statistics, explaining about 8% of the variance. The potential theoretical and empirical value of these findings were discussed.

1. Introduction

Numerous studies have evaluated the role of personality in sport and have found that measures of personality can differentiate athletes from nonathletes. An early review by Cooper (1969) showed that athletes possessed a higher motivation to achieve as well as higher levels of social confidence and social aggressiveness than nonathletes. Garland and Barry (1990) noted similar findings with collegiate football teams. These differences in personality are not limited to just men. Renfrow and Bolton (1981) noted that female athletes had higher levels of conscientiousness and self-control than the normative group. In addition to identifying the 'athletic personality profile', research has documented that personality plays a role in athletic performance as well. Morgan (1980) has noted

* Corresponding author. +1-410-617-7625; e-mail: piedmont@vax.loyola.edu

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that personality has been shown to consistently explain 20% to 45% of the variance in athletic performance. Garland and Barry (1990) found that tough-mindedness, group dependence and emotional stability were predictive of superior collegiate football performance. Several studies have shown that various types of anxiety also have an impact on performance (Jones & Swain, 1992; Maynard, Hemmings, & Warwick-Evans, 1995).

This line of research has generated an amalgam of personality variables germane to athletic competition. However, as Eysenck, Nias, and Cox (1982) have pointed out, such a long list of predictors in the absence of any interpretive theoretical framework makes it difficult to see the role and value of personality in shaping competitive behavior. Further, the many statistical and methodological weaknesses that characterize this area of endeavor (e.g. small sample sizes, psychometrically weak assessment scales, heterogenous athletic samples) make it difficult to replicate findings and obtain stable estimates of personality's actual contribution. Such a state of affairs has led some to question whether traits are even useful for describing athletes (e.g. Vealey, 1992). However, Eysenck et al. (1982) showed that theoretically consistent, empirically meaningful results can be obtained when broad, established dimensions of personality are applied to high ability athletes in a specific sport. Although those authors favored a three-factor model, this report will employ the dimensions of the Five-Factor Model of Personality (FFM) as the measurement framework. This well researched, cohesive paradigm has been shown to provide a broader description of personality (e.g. Costa & McCrae, 1995). The purpose of this study is to demonstrate the utility of the five-factor model of personality as both a relevant predictor of performance and as a theoretical paradigm capable of furthering our understanding of competitive behavior in an athletic context.

Over the past 30 years research has converged on the existence of five trait dimensions that have been shown to constitute an adequate taxonomy of personality characteristics (Digman, 1990). These five factors (Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness) were derived empirically from trait ratings and have been shown to be stable over time, robust and able to represent constructs derived from a wide range of psychological theories (see Digman (1990) and McCrae and John (1992) for reviews of the model). More importantly, the five-factor model has been shown to predict achievement-related life outcomes such as occupational and scholastic success (Digman, 1989; Tett, Jackson, & Rothstein, 1991; Piedmont, 1995a). It seems reasonable that these dimensions should be related to other achievement-related outcomes, like athletic success, as well.

Some specific correlations of the five-factor model to athletic performance are anticipated. The high self-confidence and low anxiety of athletes should correspond to lower levels of Neuroticism. Their achievement orientation and competitiveness should be seen in higher levels of Conscientiousness. Several studies found tough-mindedness as an important characteristic of athletes (e.g. Garland & Barry, 1990), but it is not clear whether this construct represents low Agreeableness (e.g. aggression) or is another facet of Conscientiousness (competitiveness). Extraversion has also been found relevant, particularly with team athletes (e.g. Taylor & Doria, 1981). However, no hypotheses have been made relevant to Openness to Experience. Hammermeister and Burton (1995) noted that the presence of negative ideation had an adverse impact on performance. Whether these cognitions result from a poor self-esteem (a facet of Neuroticism) or reflect an inner world open to diverse thoughts and ideas, is not clear. Nonetheless it appears that most, if not all, of these five dimensions may be relevant to understanding performance.

1.1. Measuring athletic performance

The most content valid approach to measure performance is to use actual game statistics, which provide a direct index of actual level of ability. However there are some drawbacks to this approach. First, it is hard to generalize findings over different sports, or even from one position to another within a sport. What constitutes success for a goalie in soccer is different from success for a forward. Second, there may also be salient facets to performance that are difficult to measure. Third, actual performance may overlook the contribution of other factors which may, ultimately, facilitate or impair performance for the athlete and the team. For example, a player may evidence great ability but have a capacity for disruptive behavior that could injure not only the team's cohesiveness but prevent him or her from performing optimally.

Another area relevant to performance measurement is coaches' ratings of qualities outside of actual performance. Aside from seeking individuals with high levels of ability, coaches also wish to build teams and/or work with athletes who are amenable to training and receiving instruction. These collateral abilities may also be important for athletes in order to reach their full potential. An advantage to coaches' ratings is that the dimensions assessed can be used for all players on a team as well as being generalizable to many different types of sports. For example, a player's *commitment to the game* would probably be a construct germane to all athletes and would reflect a performance dimension that is salient for coaches. Further, coaches' ratings may be related to a wider range of personality dynamics than game statistics.

This study will include both types of measures. Game statistics relevant to soccer players (e.g. shots taken, goals, games played, assists) as well as ratings of important collateral qualities, such as *team playerness*, *game performance* and *coachability* will be used. Using multiple regression analyses, the relative predictiveness of these two classes of constructs by personality dimensions can be compared.

2. Method

2.1. Subjects

Subjects were 79 female athletes (ages 18 to 21) from four Mid-Atlantic university women's soccer teams. All of these schools are NCAA Division 1 teams. Game statistics were not available for one of the teams ($n=21$). This sample was collected for two reasons. First, research focusing specifically on female athletes is lacking in the literature and thus this information will be useful in filling out the research base in this area. Second, previous research has shown the dimensions of the five-factor model to be relevant predictors of womens' academic competitive performance (Piedmont, 1995a), so it seems reasonable that these constructs would also be significant predictors of womens' athletic endeavors as well.

2.2. Measures

2.2.1. Bipolar adjective scale

Developed by McCrae and Costa (1985); McCrae and Costa (1987), this 80 item scale is designed to capture the five major dimensions of personality: Neuroticism, Extraversion, Openness, Agree-

ableness and Conscientiousness. Research has shown this scale to capture stable, trait dimensions of personality. Responses are measured on a 1 to 7 Likert scale and scores for each dimension are found by simply summing responses for each dimension. Half the items are negatively reflected to reduce acquiescence effects. Although initially developed and validated for adults, Piedmont (1995b) has shown this scale to be reliable and structurally valid with college students. In this sample, alpha reliabilities for the five domains were 0.81, 0.85, 0.73, 0.71 and 0.84, respectively.

2.2.2. Coachs' ratings

Each player was rated by both the Head and Assistant coaches on 5 performance-relevant dimensions: *coachability* (the player's ability to listen, learn and apply coaches' instructions), *athletic ability* (the amount of athleticism the player exhibits), *game performance* (how well the player performs overall in games), *team playerness* (the ability of the player to get along and mesh with teammates, on and off the field) and *work ethic* (amount of effort and commitment the player dedicates to the team, herself and the coaches). Ratings were made on a 1 *below average* to 7 *above average* Likert scale. The coaches' ratings on each dimension were averaged to enhance the reliability of each rating. The effective reliabilities of these averaged ratings ranged from 0.71 for coachability to 0.82 for game performance (see Rosenthal & Rosnow, 1984, p. 163).

2.2.3. Performance indices

Game statistics for each player were obtained from the most recent soccer season. These statistics included: *scores* (the number of goals earned), *assists* (number of times a player helps a teammate score a goal), *games played* (number of games played in by each player) and *shots* (the number of shots on goal). These measures were computed for each player over the entire season and represent an appropriate index of each player's athletic ability.

2.3. Procedure

Individuals completed the bipolar scales separately at the end of the soccer season. Coaches also completed their ratings individually at the end of the season insuring that these ratings were based on a full season of working with the athletes. Each player was rated by two coaches. All subjects gave permission to the authors to access their performance records for the season. In order to make performance data comparable across all four teams, individuals' scores on all performance indices were standardized within school.

3. Results

Table 1 presents the inter-correlations between the two sets of performance ratings. As can be seen, there are numerous correlations between the two sets of performance criteria. These correlations provide some evidence for the validity of the coaches' ratings; their evaluations of the players' ability correspond to actual performance outcomes. As noted above, the actual game statistics were not available for one team, thus the smaller sample size for these analyses.

In order to facilitate analysis of these data, two composite performance variables were created, one for coaches' ratings and the other for the game statistics. This was done by standardizing each

Table 1
Descriptive statistics for and correlations between coaches' ratings and game statistics

Coaches' ratings	Mean[a]	S.D.	Game statistics			
			scores	assists	games played	shots
Coachability	5.6	1.0	0.36*	0.23	0.26*	0.30*
Ability	5.5	1.1	0.29*	0.27*	0.66**	0.39**
Game performance	5.4	1.1	0.38**	0.30*	0.70**	0.53**
Team playerness	5.5	1.1	0.30*	0.16	0.25	0.28*
Work ethic	5.8	1.1	0.32*	0.18	0.35**	0.34*

[a]Range of ratings was from 2 to 7.
* $p<0.05$; ** $p<0.01$ two-tailed.

variable within teams and aggregating them. Creating overall composite variables helps to increase the reliability of the performance measures. Correlations between the self-rated personality scales and the athletic performance variables are presented in Table 2.

Table 2
Correlations between self-ratings of personality and coaches' ratings and game statistics

Performance ratings	Self-rated personality dimensions				
	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Coaches' ratings[a]					
Coachability	−0.31***	−0.03	−0.04	0.26**	0.33***
Athletic ability	−0.40***	0.12	−0.10	0.07	0.05
Game performance	−0.45***	0.16	−0.09	0.13	0.27**
Team playerness	−0.28***	0.15	0.07	0.18	0.19
Work ethic	−0.16	0.10	0.06	0.18	0.39***
Composite	−0.43***	0.14	−0.03	0.22	0.33***
Game statistics[b]					
Scores	−0.21	0.12	−0.08	0.08	0.21
Assists	−0.07	0.03	−0.07	0.13	0.09
Games played	−0.24*	0.14	−0.13	0.29**	0.47***
Shots	−0.23*	0.10	−0.23*	0.09	0.22*
Composite	−0.23*	0.12	−0.16	0.18	0.30**

* $p<0.10$.
** $p<0.05$.
*** $p<0.01$, two-tailed.
[a] $N=79$.
[b] $N=58$.

As can be seen, the personality dimensions of Neuroticism and Conscientiousness appear to exhibit numerous associations with coaches' ratings and its composite. Self-ratings of personality were mostly independent of actual game statistics. Conscientiousness did have a significant association with the number of games played ($r(56)=0.47$, $p<0.001$) and the overall composite ($r(56)=0.30$, $p<0.05$).

In order to determine the strength of relationships between self-rated personality and performance, two step-wise multiple regression analyses, using forward selection, were conducted. The first analysis used the coaches' ratings composite as the dependent variable and the personality dimensions as the predictors. Consistent with the correlation results, only Neuroticism and Conscientiousness emerged as significant predictors (betas $=-0.38$ and 0.25, respectively; $R=0.50$, $F(2, 76)=12.57$, $p<0.001$). Because regression analyses capitalize on chance, the adjusted R^2, which corrects for sample size and number of predictors, provides a more unbiased estimate of variance. This regression analysis indicated that 23% of the variance in coaches' ratings can be explained by the self-rated personality scores. A similar regression analysis was performed using the game performance composite as the dependent variable. Only Conscientiousness emerged as a significant predictor (beta $=0.30$; $R=0.30$, $F(1, 56)=5.69$, $p<0.02$), explaining 8% of the variance in actual game performance.

4. Discussion

Overall the results of this study showed that the personality dimensions of Neuroticism and Conscientiousness were significantly related to athletic performance among women college soccer players. These associations were found for coaches' ratings on several ability dimensions. Only Conscientiousness had a very limited degree of overlap with the actual performance statistics, although the magnitude of this association is consistent with previous research (Eysenck et al., 1982). That the personality dimensions were less predictive of actual performance than the ratings raises the question, "why the differential relatedness of personality constructs to criteria that are themselves highly correlated?". One response may be that the game statistics may not be an optimal index of performance for all players. For example, many soccer teams may use a 'sweeper', a player whose purpose is to disrupt the opponent's advances. These players may not be involved much in offense, yet may be the best and most important members of their teams. They will play in all the games and get high coaches' ratings and yet not score well on the actual performance measures. Thus, the four statistical indices included here may not have been sufficiently sensitive to all types of performance manifested by team members. Future research may want to develop performance indices tailored to specific positions.

Another interpretation for these findings may be that personality does not affect actual performance at all. When an athlete takes the field, what is most strongly controlling performance is actual athletic ability. Physical coordination, fitness level and athleticism all directly contribute to how well the individual performs. Personality's contribution may be more indirect. One's traits and personal characteristics may motivate an individual to pursue a particular life direction. Being competitive leads one to seek out competitive endeavors, like athletics. Being aggressive, calm under stress and able to follow training directives will make one appear suitable to the evaluating eyes of the coach. These personal qualities provide the temperamental foundation for developing

athletic ability. This interpretation is consistent with the conclusions of Eysenck et al. (1982), p. 17) who noted that "...personality may be associated with interest rather than with success in sport". Future research may wish to apply causal models to evaluate how personality may directly and indirectly impact performance.

These results show that personality's contribution to explaining performance may be very selective; broad measures of game performance may not be the best medium for evaluating personality constructs. However, professional ratings may offer a useful added evaluative dimension. Coaches may be employing more varied criteria for evaluating a player's worth than simple performance ability. As noted earlier, a player who has great ability but compromises the cohesiveness of a team may prove more of a liability than an asset. This underscores the need for researchers to use multiple sources of performance-related information for determining success.

4.1. Using the five-factor model in a sports context

Two implications for research emerge from this study. First, the results of previous studies can be interpreted within the context of the five-factor taxonomy. As noted earlier, findings that athletes were higher on variables such as tough-mindedness (Garland & Barry, 1990), social aggressiveness (Cooper, 1969) and dominance (Peterson, Weber, & Trousdale, 1967), can now be interpreted as indicating less of a confrontative, antagonistic attitude (i.e. low agreeableness) than a strong competitive drive towards achieving high standards of success. The original terms imply a type of aggressive interpersonal attitude; the current findings suggest more of a focused, goal-driven motivation.

The findings with Neuroticism are consistent with previous research that found that self-esteem, self-confidence and self-control were related to performance. Being able to maintain a good sense of self under pressure, being able to tolerate stress and control impulsivity are all parts of low neuroticism (Costa & McCrae, 1992). Ambition is not enough for success. Being able to maintain an internal affective state that is undisturbed by distracting, negative impulses appears most related to coaches' ratings of ability. No doubt a high degree of emotional stability enables players to benefit from instruction and allows coaches to build a unified team spirit.

The role of Extraversion in predicting performance has not been well outlined in previous research. Kane (1964) suggested that Extraversion enabled athletes to perform well in front of an audience. Peterson et al. (1967) found team players to be higher on this dimension than individual competitors. Still others (e.g. Coleman, 1980) have argued that *low* Extraversion was a characteristic of extremely superior athletes. The tendency towards Introversion was believed to help them cope better with the pressures of competition. The results of this study showed that higher levels of Extraversion were not significantly correlated with any of the performance variables. However, the linking of Extraversion to coping with stress may be misplaced. Ability to manage stress is more a function of Neuroticism than extraversion (see Costa & McCrae, 1989; Piedmont, 1993). Coping ability does play an important role in performance, as seen by Neuroticism's relationship to several of the rated criteria.

The second implication of this study is the potential opportunity to integrate research in this area with the larger literature on motivation and performance. In evaluating performance on competitive tasks in an academic context, Piedmont (1995a) noted that the dimensions of Neuroticism and Conscientiousness were the most relevant for understanding such performance. Pied-

mont proposed a circumplex model of motivation using these two dimensions as the anchoring constructs. Performance-related variables such as need for achievement, fear of success, fear of failure, and test anxiety were all located in this two dimensional space. The current results show that these dimensions were also relevant for the competitive world of athletics. The combination of low neuroticism and high conscientiousness represents the personality profile of the prototypical achiever: emotionally stable, capable, with a heightened sense of competence and drive to succeed. These individuals set high standards for themselves and are able to withstand the inevitable threats to esteem that arise in any competitive undertaking. Future research needs to determine if these constructs generalize to other sports in a similar way. Are Neuroticism and Conscientiousness equally relevant in predicting success in individual competitive sports, such as tennis, bicycling and gymnastics?

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