

# Psychological profiles of gender and personality traces of Brazilian professional athletes of futsal, and their influence on physiological parameters

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**Abstract:** The present study aimed to identify the psychological profiles of professional futsal players in terms of the gender schema and to evaluate the physiological parameters (speed, acceleration, strength, and power) and fatigue index of these athletes according to their gender profiles and relative to their positions on the court. The Masculine Inventory of the Self-concept Gender Schemas was used to classify the sample into typological groups, and the Running Anaerobic Sprint Test was used to measure the physiological parameters (speed, acceleration, strength, and power) and the fatigue index. The study sample was composed of 64 male professional futsal players who competed in the National Indoor Soccer league in 2013; the subjects had an average weight of  $76.00 \pm 6.7$  kg. Among the athletes studied, 23 (35.9%) were classified as heteroschematic female, 22 (34.4%) as heteroschematic male, and 19 (29.7%) as isoschematic. Regarding their positions on the court, eleven were goalkeepers (17.2%), 13 (20.3%) were defenders, 28 (43.8%) were midfielders, and 12 (18.8%) were attackers. The players had similar weights even when belonging to different typological groups and having different positions in the court. However, it is worth noting that male heteroschematic players had a greater mean weight ( $77.11 \pm 5.93$  kg) and that the goalkeeper was, on average, the heaviest player ( $79.36 \pm 8.14$  kg). The results of the physiological parameter analysis relative to typological group showed that, on average, high-level soccer players presented similar performance profiles in different rounds, as statistically significant differences were not found in any of the studied physiological variables (weight, distance, speed, acceleration, strength, power, and fatigue index). Although the results of this research did not reveal statistically significant differences between the groups in terms of the assessed variables, we observed that some results related to personality traits associated with both the male and female components could help to clarify and establish relationships with some strategic aspects inherent to futsal.

**Keywords:** futsal, Masculine Inventory of the Self-concept Gender Schemas, fatigue index, anaerobic power, psychological profiles, personality traits

## Introduction

Sport science has become a popular area of study in recent decades.<sup>1</sup> Scientists, researchers, coaches, and all professionals from fields related to sport science have been motivated to constantly seek solutions to various problems related to the pursuit of optimal athletic performance, such as knowledge of physiological and psychological characteristics, which is essential to improve the structure of training in futsal, for instance.<sup>1,2</sup>

In recent decades, sport psychology professionals have contributed significant improvements to the performances of athletes, coaches, and other professionals in sports and exercise fields.<sup>3</sup> These improvements resulted from the assistance provided

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to all individuals involved in sports-related assessment in an attempt to facilitate the development of better coping strategies for withstanding psychological and physiological factors involved in training and competition.<sup>4</sup> Regarding psychological factors, athletes who are outgoing, assertive, and intrinsically motivated, among other features, have been observed to stand out from those with other personality traits.<sup>4,5</sup>

Regarding the physiological factors needed for good futsal performance, Chagas et al declared speed, strength, power in the lower limbs, resistance, agility, and a suitable body composition to be essential performance attributes.<sup>6</sup> The universal symptom of fatigue, which is not directly related to acute or chronic illness, is among the most common complaints of high-performance athletes in relation to the practice of any high-performance sport.<sup>7</sup>

Although it is difficult to determine the cause of fatigue, which is affected by many factors, Foss and Keteyian,<sup>8</sup> Santos et al,<sup>9</sup> and Lepers et al<sup>10</sup> define muscular fatigue as the inability of a given muscle to maintain and continue power generation during a particular activity.

Over the years, the concept of fatigue has undergone several changes. In the literature, descriptions of fatigue development in different types of exercise have been published, along with research intended to elucidate the processes and mechanisms involved. However, the literature has revealed different points of view that depend on the mechanisms and processes associated with fatigue.<sup>11</sup> The study<sup>11</sup> was important, because their aim is to improve athletic performance.

According to Gomes et al,<sup>1</sup> high-performance sport has evolved significantly worldwide in recent decades. Because of this evolutionary process, the study of sports training has adopted a practical approach to athletic preparation, using widespread scientific knowledge as guidance for intervention in the technical commissioning of the team. For example, some of the many challenges faced by the practitioners of sports science in training include assessment of futsal athletes' fatigue levels and identification of which conditions are better for training and competition.<sup>12-14</sup>

Futsal is among the most practiced sports in Brazil, but questions regarding the best type of training and best performance of players have not yet been addressed satisfactorily. A systematic analysis of literature related to this discipline revealed that studies attempting to identify factors related to fatigue (eg, psychological aspects) are scarce. Although psychological aspects are an important variable in the performance of elite athletes, coaches and coaching staff still

base their training on empiricism, without consolidating their working methodologies with scientific evidence.<sup>1</sup>

In this sense, it becomes important to understand the cognitive and emotional schemas of the high-performance athlete in order to draw inferences about future behavior in competition situations.<sup>5</sup> This concern regarding athletes' cognitive styles is not new to the field of sports psychology, and some researchers have sought and still seek the ideal athletic psychological traits, or personality structures that are better adjusted to events occurring in a sporting context.<sup>15-18</sup>

For example, Markus et al defined self-concept as a multidimensional structure composed of cognitive, affective, and behavioral components, resulting in patterns of self-perception and perception of others.<sup>19</sup> Therefore, a person's self-concept is not inherent to the self-being but is rather a construction developed throughout life, resulting from that person's interpersonal relationships, family, school, and social environment, and self-perceptions of success and failure derived from personal experience. Athletes are the results of all of these influences, and their performances are directly affected by the individual personalities they have constructed throughout their lives. The self-schema is an important aspect of self-concept; this is considered an important feature and is used by individuals in their self-descriptions.<sup>20</sup> Self-schemas act as lenses that shape, filter, focus, and guide perception, and thus, influence the way in which information is processed. Among the existing self-schemas, those related to gender are formed from observations and experiences of the characteristics, roles, and norms pertaining to the constructs of masculinity and femininity. As each individual has experiences consistent with gender constructs during social interaction, they eventually incorporate these experiences in different proportions and measures, resulting in specific cognitive schemas called gender schemas. In Brazilian culture, for example, characteristics such as sensitivity, gentleness, emotionalism, sensuality, fragility, and passivity are considered relevant to femininity, whereas rationality, aggressiveness, competitiveness, objectivity, individualism, and stubbornness are considered relevant to masculinity.<sup>21</sup> During a game, elite athletes encounter situations wherein these psychological constructs can directly influence how they face the challenges of competition, and hence, their performance. It thus becomes critical for coaches not only to identify this intervening variable, but also, if possible, to achieve control over it.

Despite the search for an ideal athletic psychological profile, as justified by the pursuit of better performance,

Melo et al<sup>4</sup> and Melo and Giavoni<sup>5</sup> concluded that there is no such ideal profile.<sup>4,5</sup> Different profiles may be better suited to different sport disciplines, depending on their specific characteristics. In addition, suitable profiles may vary depending on the player's position on the court/field (team sports), type of competition (in the case of individual sports), and specific action taking place. Therefore, it can be stated that there is no single ideal psychological profile, but rather several profiles that require specification.

Despite the importance of investigating possible causes that lead an individual to experience fatigue during exercise, an investigation of the psychological aspects that influence this fatigue has also become an area of interest for all sports professionals working in the field of high-performance sports. The reviewed literature suggests differences between the fatigue levels of men and women; however, as the purpose of this study was to evaluate differences between the genders, no comparative studies of these differences were found. Overall, health-related studies treat gender as sex, when in fact gender and sex have two different definitions. Sex refers exclusively to the biological and physiological characteristics related to men or women. Gender refers to the addition of the psychological aspects of masculinity and femininity (eg, behaviors, attitudes, social roles) to the characteristics of sex.<sup>22</sup> All of these studies originated from a study by Giavoni,<sup>23</sup> who constructed mathematical models capable of assessing the gender profiles of men (Masculine Inventory of the Self-concept Gender Schemas [IMEGA]) and feminine (IFEGA) and classifying these profiles as heteroschematic masculine, heteroschematic feminine, or isoschematic. This classification identifies the psychological gender profile of an individual independently of sex.

The present study aimed to identify the psychological profiles of professional futsal players in terms of the gender schema and to evaluate the physiological parameters (speed, acceleration, strength, power) and fatigue index of these athletes, according to their gender profiles and relative to their positions on the court. The hypothesis of the current research is that the results in the Running Anaerobic Sprint Test (RAST), which assesses the fatigue index, would be higher in a male heteroschematic gender profile than in the isoschematic and female heteroschematic profiles, because futsal is taken mainly as a sport with similar traits to those that constitute the male schemas in the Brazilian culture, and therefore, the male heteroschematic athlete would engage more in the practice of this sport, either in trainings or competitions, as well as in RAST.

## Materials and methods

The current study was submitted to the Research Ethics Committee of the Catholic University of Brasília (CEP/UCB). Ethics approval was granted (approval number CAAE 00949012.0.0000.0029) and written informed consent was obtained from participants.

## The sample

The current study sample was composed of 64 professional male futsal players who constituted a sample of all athletes competing in the 2013 National Indoor Soccer League. This was a convenience sample, because the withdrawal of at least 15 subjects was required from each profile (heteroschematic male, heteroschematic female, and isoschematic). Author MGBN was not informed about the psychological profiles of the sample in order to ensure a double-blind study free of any researcher bias. Each participant received a statement of informed consent form informing them about the research purposes and possible risks and benefits of the study, as well as the voluntary nature of their participation. All sample members were treated as a single group, and data related to the psychological gender profiles derived from their self-concepts as well as muscle fatigue were collected. These data were collected within each athlete's or team's training environment.

The inclusion criteria were:

1. status as an athlete from a team that participated in the 2013 National Indoor Soccer League;
2. attendance for all required data collection procedures;
3. adult category; and
4. agreement with the specifications of the informed consent form.

## Instruments and procedures

### IMEGA

IMEGA is a psychometric instrument used to assess male and female individuals according the self-concept schemes. It is an identification related to social and cultural construction of the personality of each subject. Validation of the Portuguese-language version in Brazil was carried out by Giavoni and Tamayo.<sup>24</sup>

IMEGA features 83 items, of which 41 belong to the male scale and 42 belong to the female scale. The subject uses a variation ranging from zero to four to express how much he identifies with each item. The male scale is based on neglect, rationality, boldness, and aggressiveness factors, while the female scale is based on integrity, sensuality, insecurity, emotionality, and sensitivity factors.<sup>24</sup>

From the interaction between more or less prevalent characteristics, a three-dimensional vector is formed, which represents the spatial form of the male or female scheme (male heteroschematic and female heteroschematic, respectively). There is also the possibility that the interaction between contemplated characteristics by IMEGA identify a hybrid scheme called isoschematic.<sup>24</sup>

The athletes were instructed not to communicate with each other during the application of IMEGA and not to comment on this assessment before completing the other data collection procedures.

## RAST

RAST is a field test used to assess anaerobic capacity according to four values: maximum power, average power, minimum power, and fatigue index. Test validation was performed by Zagatto et al.<sup>25</sup> RAST is composed of six 35 m sprints; subjects perform all sprints at maximum speed. All test times are recorded in seconds, and measurements are precise to hundredths of a second. Each run is separated from the next by an interval of 10 seconds. The end of this interval, which is also the starting point for the next sprint, is indicated by a sound stimulus (whistle).

The 35 m stretch was delimited by two electronic barriers (Multi-Full Sprint, Hidrofit, Belo Horizonte, Brazil) equipped with photocells. These instruments identified the moment when the subjects left the starting point and the moment when they reached the finishing point, and transmitted this information to a connected computer. A specific computer program processed the data and generated test results. A 10 yard length was marked with cones before the first electronic barrier and after the second electronic barrier, to provide space for deceleration after each run.

## Assessment of fatigue

### Assessment of fatigue by RAST

The assessment of fatigue by RAST was calculated using the fatigue index. It was therefore necessary to calculate the power of each run according to the following formula:

$$\text{Power} = \frac{(\text{Body Mass}) \times (\text{Distance})^3}{(\text{Time})^3} \quad (1)$$

Body mass is expressed in kilograms, distance in meters, time in seconds, and power values in watts. Maximum power corresponds to the power used in the fastest run, and minimum power corresponds to the power used in the slowest run.

Once identified, maximum power and minimum power were used to obtain the fatigue index value using the following formula:

$$\text{Fatigue Index} = \frac{\text{Maximum Power} - \text{Minimum Power}}{\text{Sum total of the 6 runs}} \quad (2)$$

## IMEGA self-concept questionnaire

The self-concept questionnaire was applied in the host cities of teams participating in the National Indoor Soccer League. The questionnaire was administered by author MGBN, and custody of the materials (completed questionnaires) was the responsibility of the research team.

## Statistical treatment

To investigate the hypothesis of this study SPSS version 22 for Windows was used. One-way analysis of variance (ANOVA) and one-way repeated ANOVA for repeated data were conducted. The aim of the one-way ANOVA was to compare the averages of several physiological parameters relative to the groups; a difference in the mean physiological parameter values of the three groups would result in a statistical difference between subjects classified as heteroschematic male, isoschematic, and heteroschematic female. Accordingly, the calculated *P*-value would be less than the adopted significance level (5%).

## Results

The study sample was composed of 64 male professional futsal players who competed in the National Indoor Soccer league in 2013; the subjects had an average weight of 76.00±6.7 kg. Among the athletes studied, 23 (35.9%) were classified as heteroschematic female, 22 (34.4%) as heteroschematic male, and 19 (29.7%) as isoschematic. Regarding their positions on the court, eleven athletes were goalkeepers (17.2%), 13 (20.3%) were defenders, 28 (43.8%) were midfielders, and 12 (18.8%) were attackers. The players had similar weights, even when belonging to different typological groups and having different positions on the court. However, it is worth noting that male heteroschematic players had a greater mean weight (77.11±5.93 kg) and that the goalkeeper was, on average, the heaviest player (79.36±8.14 kg). The analytic results are shown in Tables 1 and 2.

Athletes classified as heteroschematic males started sprints at the highest speed but ended at the same speed as the isoschematic athletes. The differences were statistically insignificant. Heteroschematic male athletes began with

**Table 1** Physiological parameters relative to psychological gender profile

	Psychological gender profile	Average	Standard deviations	P-value
<b>Physiological and anthropometric parameters</b>				
Weight (kg)	HM	76.7	7.4	0.51
	ISO	75	6.8	
	HF	77.1	5.9	
	Total	76	6.7	
Sprint 1 (35 m)	HM	4.9	0.3	0.64
	ISO	5	0.3	
	HF	5	0.3	
	Total	5	0.3	
Sprint 2 (35 m)	HM	5	0.3	0.57
	ISO	5.1	0.3	
	HF	5.1	0.3	
	Total	5.1	0.3	
Sprint 3 (35 m)	HM	5.2	0.3	0.59
	ISO	5.2	0.3	
	HF	5.3	0.2	
	Total	5.2	0.3	
Sprint 4 (35 m)	HM	5.3	0.2	0.61
	ISO	5.4	0.3	
	HF	5.4	0.3	
	Total	5.4	0.3	
Sprint 5 (35 m)	HM	5.5	0.3	0.76
	ISO	5.5	0.2	
	HF	5.5	0.3	
	Total	5.5	0.3	
Sprint 6 (35 m)	HM	5.5	0.3	0.47
	ISO	5.6	0.3	
	HF	5.7	0.3	
	Total	5.6	0.3	
<b>Physiological parameters</b>				
Speed 1	HM	7.1	0.4	0.63
	ISO	7	0.4	
	HF	7	0.4	
	Total	7	0.4	
Speed 2	HM	7	0.4	0.55
	ISO	6.9	0.3	
	HF	6.9	0.3	
	Total	6.9	0.4	
Speed 3	HM	6.8	0.3	0.57
	ISO	6.7	0.4	
	HF	6.7	0.3	
	Total	6.7	0.3	
Speed 4	HM	6.6	0.3	0.63
	ISO	6.5	0.3	
	HF	6.5	0.3	
	Total	6.5	0.3	
Speed 5	HM	6.4	0.3	0.79
	ISO	6.4	0.3	
	HF	6.3	0.4	
	Total	6.4	0.3	
Speed 6	HM	6.3	0.3	0.45
	ISO	6.2	0.3	
	HF	6.2	0.3	
	Total	6.2	0.3	

(Continued)

**Table 1** (Continued)

	Psychological gender profile	Average	Standard deviations	P-value
Acceleration 1	HM	1.5	0.2	0.62
	ISO	1.4	0.2	
	HF	1.4	0.2	
Acceleration 2	Total	1.4	0.2	0.54
	HM	1.4	0.2	
	ISO	1.4	0.1	
Acceleration 3	HF	1.4	0.1	0.54
	Total	1.4	0.1	
	ISO	1.3	0.1	
Acceleration 4	HM	1.3	0.1	0.64
	ISO	1.3	0.1	
	HF	1.3	0.1	
Acceleration 5	Total	1.3	0.1	0.72
	HM	1.2	0.1	
	ISO	1.2	0.1	
Acceleration 6	HF	1.1	0.1	0.44
	Total	1.2	0.1	
	ISO	1.1	0.1	
Strength 1	HM	111.1	15.1	0.38
	ISO	105	15	
	HF	109.5	16.2	
Strength 2	Total	107.8	15.4	0.4
	HM	107.8	17.6	
	ISO	101.6	13.5	
Strength 3	HF	104.9	15.2	0.44
	Total	104.2	15.1	
	ISO	101.5	16.2	
Strength 4	HM	96	12.7	0.5
	ISO	98.6	14.1	
	HF	98.2	14	
Strength 5	Total	98.2	14	0.59
	HM	95.1	14.7	
	ISO	90.5	12	
Strength 6	HF	92.8	13	0.41
	Total	92.3	13	
	ISO	91	14.7	
Power 1	HM	87.1	10.1	0.42
	ISO	88.9	14.8	
	HF	88.6	12.6	
Power 2	Total	88.3	15.5	0.4
	HM	83.4	9.8	
	ISO	84.7	12.4	
Power 1	HF	85.1	12.2	0.42
	HM	794.6	143.2	
	ISO	739.1	140.6	
Power 2	HF	775.3	152.9	0.4
	Total	763.5	144.3	
	ISO	758.9	157.7	
Power 2	HM	702.7	122.7	0.4
	ISO	726.9	138.3	
	HF	724.1	136.5	

(Continued)

**Table 1** (Continued)

	Psychological gender profile	Average	Standard deviations	P-value
Power 3	HM	693	138.5	0.45
	ISO	645.7	111.3	
	HF	661.5	121.7	
	Total	662.5	121.3	
Power 4	HM	627.9	120.4	0.53
	ISO	590.3	103.4	
	HF	603.9	109.2	
	Total	603.9	109	
Power 5	HM	586.8	116.4	0.64
	ISO	556.7	83.5	
	HF	567.7	126.4	
	Total	567.6	104.2	
Power 6	HM	562.8	124.4	0.4
	ISO	522.6	84	
	HF	526.9	99.9	
	Total	534.4	100.1	
Maximum power	HM	812.8	160.7	0.37
	ISO	750.5	136.6	
	HF	779	146.3	
	Total	774.6	145.8	
Minimum power	HM	558	115.3	0.43
	ISO	521.7	82.8	
	HF	522.3	101.5	
	Total	531.5	97	
Mean power	HM	670.7	123	0.42
	ISO	626.2	99.7	
	HF	643.7	118.2	
	Total	642.6	111	
Fatigue index	HM	30.8	10	0.48
	ISO	29.9	6.7	
	HF	32.8	6.7	
	Total	30.9	7.7	
Delta	HM	254.8	101.8	0.46
	ISO	228.8	80.3	
	HF	256.7	75	
	Total	243.1	84.9	

**Notes:** Speed was measured in m/s, acceleration in m/s<sup>2</sup>, strength in kg/m/s<sup>2</sup>, and power in watts.

**Abbreviations:** ISO, isoschematic; HF, heteroschematic feminine; HM, heteroschematic masculine.

a small difference relative to the other groups; however, these athletes ended with the same acceleration as the isoschematic and heteroschematic female athletes. Athletes classified as heteroschematic males started and ended with greater strength values. However, there were no statistically significant ( $P>0.05$ ) differences in terms of strength among the groups.

Athletes need more power and less fatigue to maintain peak performance. The fatigue indices of the three groups were similar. The data proved the lack of significant differences between the groups relative to the fatigue index ( $P=0.48$ ). When analyzing the data descriptively, because the

**Table 2** Male and female factors relative to the athletes' court positions

Factors	Court positions	Average	Standard deviations	P-value
Self-centeredness	Goalkeeper	0.9697	0.6	0.91
	Defender	0.8846	0.5	
	Midfielder	0.9539	0.5	
	Attacker	0.8438	0.5	
Boldness	Total	0.9219	0.5	0.14
	Goalkeeper	3.3306	0.4	
	Defender	2.9231	0.5	
	Midfielder	2.9935	0.5	
Rationality	Attacker	2.947	0.4	0.53
	Total	3.0284	0.5	
	Goalkeeper	3.0152	0.5	
	Defender	2.8205	0.6	
Integrity	Midfielder	2.9405	0.5	0.48
	Attacker	3.1111	0.4	
	Total	2.9609	0.5	
	Goalkeeper	3.5124	0.3	
Sensuality	Defender	3.3636	0.3	0.75
	Midfielder	3.4026	0.4	
	Attacker	3.553	0.3	
	Total	3.4418	0.4	
Insecurity	Goalkeeper	1.974	0.9	0.69
	Defender	1.9121	0.9	
	Midfielder	2.1378	1	
	Attacker	1.8095	1	
Emotionalism	Total	2.0022	0.9	0.57
	Goalkeeper	1.1948	0.6	
	Defender	1.5055	0.5	
	Midfielder	1.3724	0.6	
Sensitivity	Attacker	1.3452	0.8	0.56
	Total	1.3638	0.6	
	Goalkeeper	3.5455	0.5	
	Defender	3.3538	0.7	
Standard male	Midfielder	3.1286	1	0.3
	Attacker	3.3167	1	
	Total	3.2813	0.9	
	Goalkeeper	3.5333	0.4	
Standard female	Defender	3.359	0.4	1
	Midfielder	3.3024	0.5	
	Attacker	3.4556	0.5	
	Total	3.3823	0.5	
	Goalkeeper	4.6426	0.6	
	Defender	4.1955	0.6	
	Midfielder	4.3493	0.6	
	Attacker	4.4123	0.4	
	Total	4.3803	0.6	
	Goalkeeper	4.3128	0.6	
	Defender	4.2727	0.5	
	Midfielder	4.2946	0.7	
	Attacker	4.2976	0.6	
	Total	4.2939	0.6	

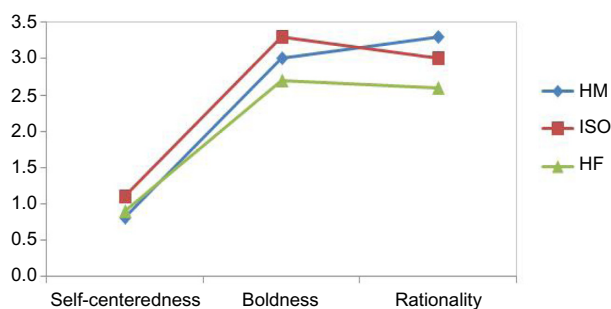
$P$ -values obtained in the test prevented any type of statistical inference for the entire target population, it was observed that heteroschematic female players had a higher fatigue index, thus contradicting the findings of a similar study conducted by Gomes et al.<sup>1</sup> The results of the physiological parameter

analysis relative to typological group showed that, on average, high-level soccer players presented similar performance profiles in different rounds, as statistically significant differences were not found in any of the studied physiological variables (weight, distance, speed, acceleration, strength, power, and fatigue index).

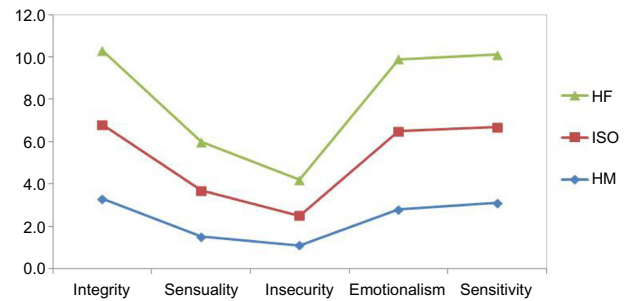
According to an exploratory data analysis, goalkeepers were found to have higher fatigue indices, whereas attackers had lower indices. However, the results obtained in this study were not significantly different ( $P=0.41$ ). There were no statistical differences in male and female factors relative to the athletes' court positions. The male factors of self-centeredness, rationality, and boldness received  $P$ -values of 0.91, 0.14, and 0.53, respectively. The female factors of integrity, sensuality, insecurity, sensitivity, and emotionalism also received  $P$ -values of  $<0.05$  (0.48, 0.75, 0.69, 0.57, and 0.56, respectively). The correct observation would be that there are no differences between gender schemes (HM, ISO, and HF) ( $P=0.10$ ). However, the male factors of rationalism and boldness had  $P$ -values of  $<0.05$  ( $P=0.00$ ). The heteroschematic male and isoschematic groups had significantly higher scores than the heteroschematic female group for both the boldness and the rationality factors (Figure 1).

Significant differences were observed for all female factors except integrity ( $P=0.18$ ). The respective  $P$ -values for sensuality, insecurity, sensitivity, and emotionalism were all  $<0.05$  (0.01, 0.01, 0.00, and 0.01, respectively). When compared with other typological groups, the results showed that heteroschematic females had significantly higher values with respect to the factors of sensuality, insecurity, emotionalism, and sensitivity (Figure 2).

The chi-square test at a confidence level of 95% was used to determine whether associations existed between court positions and typological groups. The test found no predominance of any typological group in terms of specific player positions ( $P=0.60$ ). However, we observed some



**Figure 1** Averages of male factors according to typological group. **Abbreviations:** HM, heteroschematic male; HF, heteroschematic female; ISO, isoschematic.



**Figure 2** Averages of female factors according to typological group. **Abbreviations:** HM, heteroschematic masculine; HF, heteroschematic feminine; ISO, isoschematic.

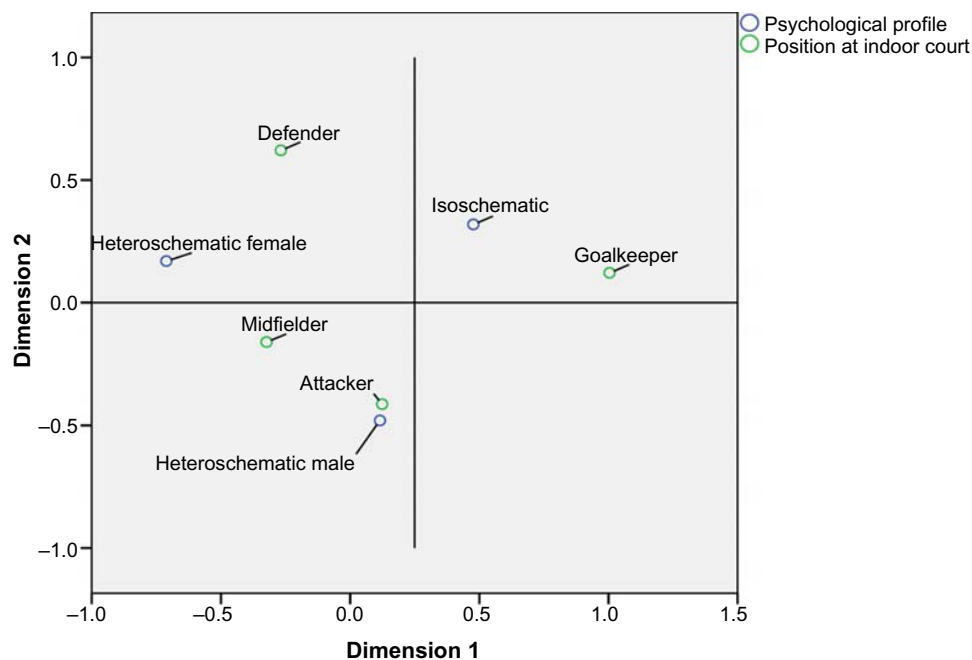
possible associations through a descriptive percentage data analysis (Figure 3).

## Discussion

According to the above data, there are possible associations between the attacker and midfielder positions and the heteroschematic male typological group, between defending athletes and the heteroschematic female group, and between the goalkeeper and the isoschematic group. The analysis suggested that the midfielder and attacker positions favor male factors, whereas the defending position favors female factors.

Related research concerning the relationship between personality type and choice of sporting discipline has been the subject of investigation for many researchers.<sup>26-29</sup> Most studies<sup>27-30</sup> have understood the concept of personality to be associated with individual differences; however, there is disagreement regarding whether personality is a subjective or a behavioral trait. We are anxious to find a pattern or model in the field of sports psychology that can characterize the high-performance athlete. Explanations for issues ranging from methods and techniques to the relationship between typology and the selection of a particular sport that are sufficiently conclusive to satisfy coaches and athletes, or even scholars, have not yet been reached.

Machado evaluated the relationship between personality and sports practice and detected some common ground between these factors.<sup>30</sup> He concluded that the individual's psychological state influences their behavior and psychological response during exercise, that sports practice has a favorable effect on the social development process, and that physical activities become more effective when associated with cognitive work. In the sports domain, personality is considered a poor predictor of performance but is a predictor of the long-term conversion of skills into achievements.<sup>31</sup>



**Figure 3** Perceptual map of positions and typological groups as determined via a correspondence analysis.

**Notes:** Dimension 1 explains 56.0% of the inertia of the cloud, while dimension 2 explains 44%. These two dimensions are sufficient to retain the maximum possible variability (inertia). This Perceptual map displays major contributions of the model in opposition to the origin and is based on individual quadrants. In the first quadrant we observe a possible association between the pivot and wing position while the typological group is heteroschematic. In the third quadrant we can see the goalkeeper with an isoschematic configuration and in the fourth quadrant the athlete standing with the female is heteroschematic in configuration. The chi-square test at a confidence level of 95% was used to determine whether associations existed between court positions and typological groups. The test found no predominance of any typological group in terms of specific player positions ( $P=0.60$ ). Nevertheless, we can see that there is a higher correlation with the heteroschematic male attackers – the closer the typological group is on the court position, the greater the correlation between them.

Allport stated that personality traits are unchangeable (immutable) aspects of the individual that accompany changing (mutable) aspects.<sup>32</sup> Currently, the most widely used taxonomy in sports psychology is the so-called Big Five Factors (BFF).<sup>33–41</sup> The BFF addresses five dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness.<sup>42</sup>

The research conducted by Weinberg and Gould indicated that the main investigations into the personalities of athletes have been oriented to the identification of a number of defining traits.<sup>34</sup> A personality trait is a characteristic tendency of an individual to act and behave in a certain manner. These investigations,<sup>34</sup> which are mainly based on personality questionnaires, focus on the determination of personality traits corresponding to sports participation and the achievement of better results in competitions. The possibility of identifying those traits and to what degree they are present in athletes might allow us to anticipate the athlete's behavior, or at least their psychological reactions.

A small number of studies<sup>35–38,40,41</sup> concerning the personality traits of footballers from the perspective of the BFF theory have been published worldwide; very few have been published in the Brazilian context. Although several studies<sup>1,43</sup> have investigated both the characteristics of football players and multiple applications of the BFF theory, the lack of articles linking these aspects demonstrates that the study of

psychological traits remains unused as a tool to map and possibly anticipate the advantages, difficulties, and general behaviors of football players.

Melo et al suggested that the athletic personality trait assessment could be viewed from an alternative perspective: the psychological gender profile assessment used in the current study.<sup>43</sup> Early research linking gender profiles and sports used the Bem Sex Role Inventory (BSRI). The BSRI was developed in 1971 by Dr Sandra Lipsitz Bem and has been widely used in research up to the present.<sup>44–48</sup> The purpose of this inventory was to characterize personality as either masculine, feminine, androgynous, or undifferentiated. The BSRI is based on gender stereotypes; therefore, its real goal is to measure how well an individual fits into his/her traditional sex role.

Several studies using interactive models of gender schemas have been conducted in Brazil. It is worth highlighting the research reported by Custódio,<sup>49</sup> Alves et al,<sup>50</sup> Gomes et al,<sup>1</sup> Marques et al,<sup>51</sup> and Leite.<sup>22</sup>

In this study, we identified the personality traits of professional athletes from the Brazilian Indoor Soccer League, according to the work of Giovanni and Tamayo.<sup>21</sup> Beginning from the social constructs of masculinity and femininity, Giovanni and Tamayo developed and validated a psychometric instrument that enabled evaluation of the gender schemas



associated with self-concept.<sup>21</sup> The concepts of masculinity and femininity are psychological social constructs that have been used since the beginning of the century.

After identifying the interactive model typological groups to which high-performance futsal athletes belonged, we expected heteroschematic male subjects to perceive futsal as a sport with traits similar to those that comprise the male schema, and that they would accordingly be more engaged in the sport through either training or competition, as well as physical fitness tests. This was because in addition to the predominantly male nature of soccer and futsal in Brazil, which is a game composed of strong features that define masculinity (aggressiveness, strength, endurance, pain tolerance, resistance to fatigue, among others), these subjects would exhibit a tendency toward individualism and would value traits such as overcoming limitations, self-determination, self-realization, power, competitiveness, and hedonism. Conversely, heteroschematic female subjects were expected to exhibit lower engagement in the activities that permeate this sport, because they would perceive the masculine traits of the discipline as incongruent with the structure of their predominant schema. Furthermore, given the collectivist nature of the female schema, these individuals would not exhibit a desire to overcome their own limits, embrace competitiveness, or other traits valued by individualists. These subjects would rather consider that the advancement of their goals and personal development would be directly related to appreciation and prestige of the group. The isoschematic type was expected to exhibit an intermediate performance relative to the other groups, as this group comprises a mix of the male and female schemas. The presence of a developed male schema would not cause these individuals to consider futsal as a discipline in which traits were inconsistent with their personality structure. Accordingly, because of this perception, the behavior of these individuals would tend to be similar to that displayed by heteroschematic males in terms of valuing individualistic traits such as self-determination, self-realization, power, and hedonism. However, the presence of the female schema softens this individualistic trend and inserts the collectivist perspective of seeking self-improvement and self-realization while simultaneously seeking the cohesion, success, and well-being of the team.

Futsal is a sport that combines individualistic traits (dribbling, feinting, finishing) and collective traits (collective coordination of attack and defense). In this sense, building and structuring a team with athletes belonging to only one typological classification of gender schemas could be a mistake, as there are certainly very powerful athletes who are suitable for individual actions (techniques) but who fatigue

easily due to the commitment with which they perform their tasks; these athletes would therefore not have a collectivist vision of the game and the team.

On the other hand, the opposite is not recommended by the authors either, as a team composed of only players characterized by the collectivistic aspect and who do not present individualistic characteristics would be highly detrimental. Therefore, the best approach is to evaluate the individual characteristics of athletes and to structure and compose the team according to the demands imposed by each game.

From the analytical perspective of applicability, these results allow technical staff to intervene by taking advantage of the psychological profiles of futsal athletes to define the best team lineup for the game. However, this variable should not be analyzed in isolation but instead while considering other predictors of sports performance such as physical, cognitive, and coordination abilities.

Thus, the psychological profile can be used to guide technical staff members in the design of a tactical game plan. This can be done by determining which athletes should be used in attacking and defending situations and by taking into account the needs of each futsal match to maximize the athletes' physical, technical, tactical, and psychological performances, with the goal of tactically overcoming their opponents in the search for victory.

## Conclusion

Although the results of this research did not reveal statistically significant differences between the groups in terms of the assessed variables, we observed that some results related to personality traits associated with both the male and female components could help to clarify and establish relationships with some strategic aspects inherent to futsal. This study is considered unique because it studied the influences of the psychological profiles of gender schemas of self-concept on the physical fitness of elite futsal players through an assessment of their performances regarding the main physical skills used in the sport. Based on these results, a suggestion of this study is the use of gender schema typology for guiding the athletes participating in this sport, with the aim of better performance in specific court functions or even to solve certain problem situations within the game, as athletes belonging to different typological groups will likely exhibit different responses when subjected to the same game situation.

In futsal, there are often many talented athletes with good physical capabilities, extremely well-developed technical skills, and great cognitive abilities, all of which provide the opportunity to produce a satisfactory athletic performance.

However, these athletes quite often fail to succeed in the sport or to exhibit inconsistent performances when exposed to certain requirements and/or moments of intense competition. Quite possibly, a better understanding of the psychological makeup of these athletes could be used for guidance in order to maximize their performances at a competitive level.

The study of athletes' psychological profiles relative to the gender schema of self-concept can also be used as a talent detection support mechanism. However, for this process to be established as effective, reliable, and valid, other factors involved in the athlete formation process must be considered, including technical, tactical, physiological, social, and cultural variables. These considerations are required to ensure that technical staff decision-making processes occur through a contextualized analysis of data (global decision making), rather than an analytical form that considers only one intervening sports performance variable (partial decision making).

Regarding the small number of studies conducted on athletes of this discipline, another contribution of this study is the data concerning the studied dependent variables such as force, acceleration, and anaerobic power; these data could serve as a reference for prescribing activities or even for future studies. The results concerning the anaerobic power variable might also serve as an indicator of good performance in high-level soccer players.

The main limitation of this study was, perhaps, the small number of athletes; it is possible that as a result of the small sample, no statistically significant results were achieved. Another limitation was the lack of assessment regarding the technical and tactical components of the game, as the study was limited to an only the physical component.

In order to fill knowledge gaps such as those remaining in psychology and sports science disciplines, future research should correlate the psychological gender schema types with behavioral, physiological, and biochemical variables, as well as technical and tactical components, because those factors affect sports performance. Furthermore, studies should be conducted to compare psychological profiles with physical fitness in a selected sample of elite female futsal players.

## Disclosure

The authors report no conflicts of interest in this work.

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