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# Body Composition and Physical Fitness Level Evaluation Among Futsal Athletes Classified into Gender Schemas Typological Groups

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## ABSTRACT

Introduction: Self-concept is a structure formed by cognitive schemas, among of these there are gender schemas (male and female schemas). According to the Interactive Model, all individuals are composed of both schemas resulting in different psychological profile. Objective: This study aimed to evaluate if futsal athletes who differ in gender schemas typological groups present differences in body composition and physical fitness level. Method: The initial sample was composed of 92 male athletes, who were classified in the following gender schema typological group: Male Heteroschematic (MH), Female Heteroschematic (FH) and Isoschematic (ISO). In order to classify the sample in typological groups, the Male Inventory of the Self-Concept's Gender Schemas (IMEGA) was used. The Squat Jump, Counter Movement Jump and Running Anaerobic Sprint Tests were used to assess explosive power and anaerobic capacity, respectively. The results were analyzed with Analysis of Variance (ANOVA): One Way, Mixed and Manova. Results: The results showed no differences in body composition, but MH presented more fatigue than the ISO and FH groups. In the assessment of six sprints executed by the athletes, it was observed that MH presented more variation between the initial and final maximum power, when compared with the other groups. Conclusion: These results lead to the conclusion that different psychological profiles adapt better to some game positions performance and/or to some specific situations during the game. Finally, it is suggested that the psychological profile must be used as a criterion in the selection of the athletes, considering also physiological and technical factors.

**Keywords:** body composition, sports, athletic performance, personality.

## INTRODUCTION

The futsal modality is characterized as one of the most practiced sports in Brazil. However, despite the excellent results obtained in international competitions, this modality still needs scientific approach, presenting a reduced number of studies carried out with athletes from this sports modality[1].

Futsal is characterized as an intermittent activity, which blends moderate and high intensity efforts caused by explosive actions (through triggering movements in velocity, with and without the ball, feinting, dribbling, passing, finalizations, jumping, changing of direction), with medium and low intensity efforts mainly originated by game interruption situations (fouls, side attacks, corner kicks, among others)[2,3]. Therefore, the modality presents an expressive energetic contribution from the phosphagens metabolism (ATP-PC). Thus, it can be concluded that through the actions performed during the games, the alactic anaerobic metabolism significantly contributes to the tactic sustaining, evidenced by the capacity in efficiently defending-attacking (75 to 85%) of the total of actions and in lower contribution (15 to 25%) of the lactic anaerobic metabolism, which will depend on the duration of the actions as well as the time of recovery between them.

In high performance sports, though, psychological prepara-

tion seems to be as important as the physical, technical and tactical preparation. Among the psychological variables possible to be studied in this context, we add the self-concept. According to Giavoni and Tamayo[4], self-concept can be a cognitive structure, multidimensional, multifaceted and movable structure composed of a collection of self-representations. Such structure is made of cognitive schemas which associate, organize and coordinate the variety of images, theories, concepts, aims and ideals which we possess about ourselves.

The cognitive schemas are a result of the expressive volume of information obtained through the interaction with the socio-cultural environment. Bem[5] characterizes the schemas as cognitive association network, which organize, select and guide the individual perceptions. They possess a subjective nature and work as an anticipation structure, a perceptive filter, which the individual builds through the situations experienced throughout their lives, whose aim is to guide their cognition, affections and behavior in different contexts[6,7].

Among the schemas which compose the self-concept, there are those related to male and female aspects, which are termed gender schemas – male and female schemas. The male schema includes many experiences, traces, values and roles concerning masculinity, while the female schema includes characteristics, values, norms and roles concerning femininity. In the presence

of stimuli related to masculinity, for example, the male schema tends to be activated, influencing hence the cognitive, affective and behavioral responses of the individual; the same fact occurs to the female schema[4].

Subsequent investigations demonstrated that individuals with predominance of one of the schemas (male or female schemas) tend to a) memorize consistent words with the dominant schema[5,8,9,10-12]; b) more rapidly attribute to themselves consistent words with the dominant schema[5,13]; c) engage in consistent behavior with the dominant schema and avoid activities considered inappropriate to it[14,15]; and d) perceive the other according to the dominant schema[16,17].

According to the Interactive Model[18], all individuals can be conceived as having the two gender schemas, which differ concerning their level of development. A set of typological groups resulted from this relation between the schemas, which vary in their perceptions, cognition, feelings and judgment about themselves and others. Among these groups, we have those from one of the mathematical variables of the Interactive Model – the angle variable. This variable gives origin of three main groups, namely:

Male Heteroschematic (MH): Individuals with predominance of male schema over the female schema, who tend to filter the information according to the male schema, presenting cognitive, affective and behavioral responses coherent with the dominant schema content. Isoschematic (ISO): Individuals who present both schemas in a proportional amount. The cognitive, affective and behavioral patterns of these individuals are controlled by both schemas.

Female Heteroschematic (FH): Individuals with predominance of the female schema over the male schema, who tend to filter the information according to the female schema, presenting cognitive, affective and behavioral responses coherent with the dominant schema content.

According to the typological groups expected by the Interactive Model hence, the aim of the present study was to evaluate whether the body composition and the physical fitness levels differ among futsal athletes, classified in the different typological groups expected in the Interactive Model.

## METHODS

### Sample

This investigation was characterized as a transversal analytical study and was composed of a sample of 92 male athletes, practitioners of high performance futsal of the Brazilian southern and southeastern regions teams, who played the National Futsal League in 2007. Initially, the athletes were considered as a single group and each athlete filled out a Free and Clarified Consent Form and this study was approved by the Ethics in Research in Humans Committee of an institution (CEP/UCB), under the registration number 079/2007.

### Instruments

a) Psychological: In order to have the subjects classified under the typological groups of gender, schemas of the Male Inventory of the Self-Concept's Gender Schemas were used (IMEGA)[4]. This instrument is composed of 71 items which, using a five-point scale (score zero = item does not apply to the individual; score 4 = item totally applies to the individual), evaluates aspects of the male schema (factors: Egocentrism, Boldness and Rationalism) and of the female schema (factors: Integrity, Sensuality, Insecurity, Emotionality, Sensitivity). All factors present internal consistency indices in accordance with the psychometric patterns, ranging the Cronbach alpha from 0.77 to 0.90. This instrument enables that the subjects can be classified in the typological groups expected by the Interactive Model[18].

b) Physical fitness tests: Anaerobic power, fatigue index and velocity were measured by the Running Anaerobic Sprint Test – RAST anaerobic test. It was performed in the futsal pitch, with an instrument (Multi Sprint brand name - Hidrofit) composed of barriers with photocells interlinked via web cable to a computer and with software suitable to data collection. The test consists of performance of six 35-meter sprints at maximum velocity (seconds) and 10-second intervals between sprints. The following variables were calculated: Anaerobic Power (Watts) = Body Mass x Distance$^2$ / Time$^3$ and Fatigue Index (Watts/s) = [highest power obtained in the six races (Watts) – lowest power obtained in the six races (Watts)] / $\sum$ time of the six races (seconds).

Explosive strength measurement of lower limbs in the Squat Jump (SJ) and Counter Movement Jump (CMJ) was electronically performed by transmission of the data collected from the jump platform (Multi Sprint brand name- Hidrofit). Each individual performed three jumps (cm) with interval of one minute between them.

One week prior to the tests application, the sample performed familiarization with the protocols to be used. The evaluees were submitted to standardized warm-up with duration of 15 minutes for tests performance.

### Statistical Analyses

The statistical package SPSS 10.0 was used and descriptive and inferential analyses of Variance (ANOVA): One Way, Mixed and Multivariate (MANOVA) were performed. The Tukey *post hoc* and Bonferroni (for mixed ANOVAS) tests were used and 5% error was considered to verify possible differences between groups.

### RESULTS

a) Athletes' classification in the typological groups of the Interactive Model:

In order to classify the athletes in the Interactive Model fields, the following mathematic expressions were used:

Male Schema (MS) =

$$\sqrt{\sum (\text{Egocentrism})^2 + (\text{Boldness})^2 + (\text{Rationality})^2}$$

Female Schema (FS) =

$$\sqrt{\sum (\text{Sensuality})^2 + (\text{Insecurity})^2 + (\text{Sensitivity})^2}$$

Each athlete was positioned on the fields of the Interactive Model from its ordered pair (MS; FS). Figure 1 presents the fields expected by the Interactive Model. Due to the sample size, only three typological groups were outlined.
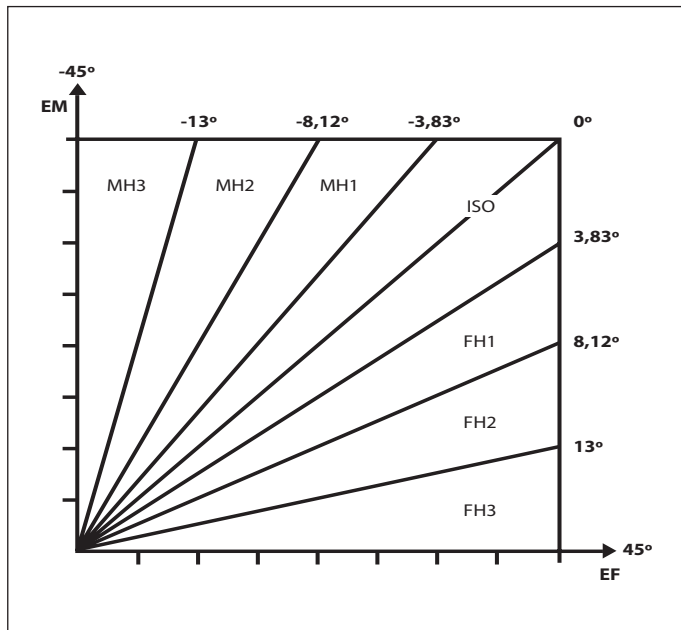


**Figure 1.** Typological groups in the fields of the Interactive Model.

The placement of the athletes' in the model's fields enabled that through the mathematic expression (deviation = 45° - arctg ê, where tg ê = MS/FS), the deviation of each athlete in relation to the bisection could be evaluated. Mathematically, the bisection characterizes the proportionality between the schemas. Thus, the first group outlined was the Isoschematic (ISO), which does not present significant differences between MS and FS, a difference assessed through the paired t test. The athletes from this group (n = 40) were placed in the interval $-3.83° \leq$ deviations $\leq +3.83°$, presenting age mean equal to 25.25 (±4.61) years.

Male Heteroschematic (MH) (n = 30) presented higher bisection deviations −3.83°, with age mean equal to 24.67 (±4.88) years and the Female Heteroschematic (FH) (n = 22) deviated 3.83° above the bisection, presenting age mean equal to 23.23 (±3.69) years.

In a trial to guarantee the Analysis of Variance assumptions, exploratory analyses of the data of the typological groups were performed, in order to evaluate any missing cases as well as normality deviations of the dependent variables. Normality deviations have not been found by group in the assessed dependent variables.

b) Evaluation of Body Composition, Explosive Strength, Anaerobic Power, Velocity and Fatigue Index of the typological groups:

Table 1 presents the means and standard deviations of the body composition variables and of the SJ, CMJ, Velocity tests and Fatigue Index.

The anthropometric data of the three typological groups do not present significant differences between each other and are similar to the ones found by other authors [1,19], indicating

hence that regardless of the typological group, the futsal athletes present an anthropometric profile similar and specific to the modality.

The results demonstrated that there was not significant difference between groups for the SJ, CMJ and velocity tests; however, differences were found for the Fatigue Index (p = 0.01), where in mean the MH group presented higher fatigue index than the FH group. Figure 2 presents the results obtained for the six sprints performed in the RAST test.

**Table 1.** Means (standard deviations) and significance levels obtained for the typological groups concerning the body composition, SJ, CMJ, Velocity and Fatigue Index variables.

| Groups | Body Mass (kg) | Stature (m) | Fat (%) | Lean Mass (kg) | SJ (cm) | CMJ (cm) | Veloc. (m/s) | Fatigue index (%) |
|---|---|---|---|---|---|---|---|---|
| MH | 74.3 (± 6.9) | 1.76 (± 0.05) | 11.9 (± 1.9) | 35.3 (± 3.2) | 36.74 (± 4.28) | 38.88 (± 4.00) | 7.2 (± 0.3) | 34.3 (± 6.1)* |
| ISO | 75.6 (± 7.2) | 1.77 (± 0.06) | 12.7 (± 2.0) | 35.3 (± 3.2) | 37.42 (± 4.86) | 39.72 (± 5.08) | 7.0 (± 0.4) | 30.9 (± 8.3) |
| FH | 73.4 (± 8.0) | 1.76 (± 0.05) | 12.2 (± 1.7) | 35.3 (± 3.2) | 36.61 (± 5.28) | 38.48 (± 4.80) | 7.0 (± 0.4) | 27.2 (± 10.8)* |
| p | 0.51 | 0.36 | 0.18 | 0.49 | 0.77 | 0.58 | 0.19 | 0.01 |

SJ = Squat Jump. CMJ = Counter Movement Jump. Veloc. = Velocity.
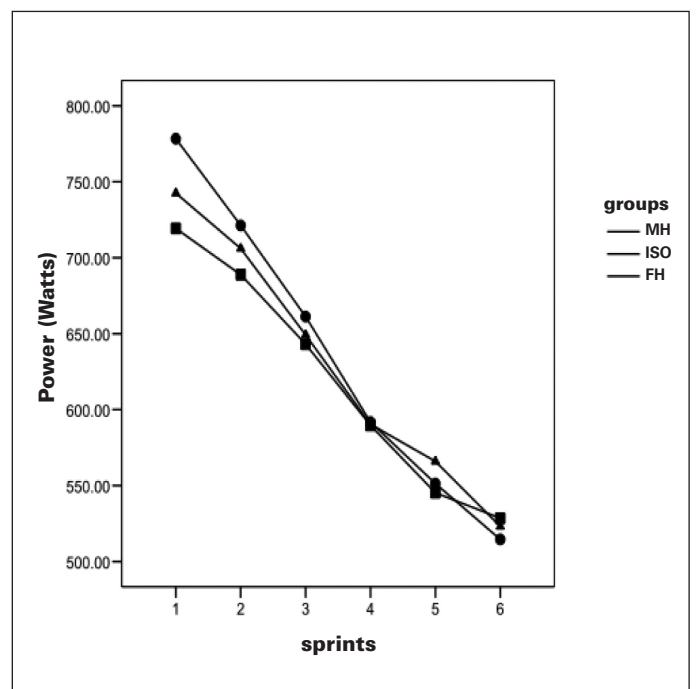


**Figure 2.** Power of the six sprints performed by the typological groups of the Interactive Model.

The results revealed that there is interaction effect (p = 0.02) between the typological groups and the anaerobic power during the six sprints. According to the data represented in figure 2, it can be observed that all groups present power decrease during the sprints, although this difference does not occur between groups, but intragroups, that is to say, in the six sprints per group. While the MH and ISO present significant differences in all sprints, the FH do not present differences between the first and second sprints, neither between the fifth and sixth one.

It is also observed that the MH and ISO present more remarkable decrease in the three first sprints, being equal to the FH in the fourth sprint and remaining this way until the end of the test. Variation analysis (delta) between the first and last sprint revealed that the groups differ between each other (p = 0.03), and variation mean in the power of the MH (263.73 ± 85.72) was higher than the ones presented by the FH (190.77 ± 96.45), while the ISO (219.36 ± 103.98) did not present differences concerning the remaining groups.

## DISCUSSION

The results demonstrated that the typological groups do not differ in their body compositions. However, concerning their physical fitness, they differ in the mean fatigue level, where the MH presented higher indices when compared to the FH. The assessment of the fatigue index during the six sprints revealed that the MH and ISO presented intragroup differences at each sprint, while the FH presented power maintenance on the first and second sprints, as well as in the fifth and sixth ones. This evaluation was corroborated when the variation mean (delta) between the first and last sprints was assessed, where the MH presented higher power variation when compared to the FH.

Since muscular fatigue is understood as the transitory decrease of results of functional capacity of the athletes, evidenced by the fail in maintaining performance in certain variables such as strength, velocity and power[20] and it is a result of minor imbalance between demand of the adenosine triphosphate (ATP) molecule of a muscle and its capacity to produce it[21], it can be observed that the MH and ISO degradated their muscular ATP supply in the intense initial sprints, especially the creatine-phosphate supplies (ATP-CP), which provides immediate energy in short exertions. During a maximal activity, the supplies are used out after approximately 10 seconds and in order to replace their reserve, recovery of approximately three to five minutes is needed[22]. Therefore, the intense subsequent sprints with intervals of only 10 seconds, did not allow replacement of this metabolic reserve, leading the athletes of the FH group to fatigue more rapidly than the athletes of the remaining typological groups.

These data suggest there is correlation between the fatigue mean levels and the personality traits of the typological groups. The MH and the ISO present among their personality traits, characteristics socially present in the masculinity domain and incorporated in the male schema, such as: competitiveness, boldness, rationality, self-determination, objectiveness, among others. These traits were assessed by the IMEGA and used for the classification of the individuals in the typological groups.

It is known that the schemas act as perception filters, influencing in the way of thinking, feeling and acting of the individuals. Individuals who present the male schema more developed Will tend to present cognition, feelings and behavior agreeing with the structure of their schemas[5,11,12]. Thus, the stimulus to perform the test triggered in these groups competitiveness, determination, need of self-overcoming, self-realization and reach for power when compared to the FH. Especially to the MH, these treats motivated them to perform the task the best they can, giving their best, aiming both at self-overcoming and surpassing the other team members[23].

Since the ISO present proportional development of the male and female schemas, they end up balancing these individual tendencies for power, self-overcoming and domain, reducing the need to stand out and therefore, presenting intermediate results in comparison to the remaining groups.

The FH individuals on their turn, since they do not present predominant individualistic traits, end up presenting lower oscillation between the first and last sprints. They tend to perform the test in a more moderate manner, presenting a curve with smaller depression, and it can be inferred that if more sprints were given, this group would end up surpassing the others, taking longer to reach the total fatigue stage.

However, it is not our wish to conclude that the FH do not present important traits and suitable to futsal practice, but instead that the personality traits should be considered during the evaluation of physical performance, since the traits are in concordance with the way the individual perceives and acts in a given event. Thus, the individuals who do not possess a personality structured on traits such as power, self-overcoming, competitiveness, self-fulfillment, among others, will tend not to give their best in tests with this aim. Very possibly, if the tests aiming collective goals were applied, as in the assessment of the commitment level and collaboration among the athletes of the same team, team cohesion, emotional leadership of the team, to name some, the more collective profile kinds would tend to stand out when compared to the remaining groups. This can be a proposal for future investigations.

Moreover, the results permit to infer that the typological profiles better adapt to some positions on the pitch. Very possibly, since the pivots need an aggresive, creative and unpredictable profile, and also since the position requires great power in attack moments, it can be inferred that the MH present better profile for this position. Likewise, those positions which need constant move along the pitch during the attack and defense moves and those which need constant defense, can present better profiles in the ISO and FH to take these positions. Therefore, the psychological types outlined by the Interactive Model let us conclude that there is not an ideal profile for an athlete, but rather that the many profiles differently adapt to the game situations, position in the pitch and kinds of physical and psychological tests.

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