
BALBINOTTI SCALE OF FUTURE PERSPECTIVES OF MOTIVATION FOR ATHLETES (EBMPFA-15): EVIDENCE OF VALIDITY BASED ON THE INTERNAL STRUCTURE OF THE CONSTRUCT AND RELIABILITY

ESCALA BALBINOTTI DE MOTIVAÇÃO DE PERSPECTIVA FUTURA PARA ATLETAS (EBMPFA-15): EVIDÊNCIAS DE VALIDADE COM BASE NA ESTRUTURA INTERNA E PRECISÃO

Daniela Wiethaeuper¹, Leonardo Pestillo de Oliveira², Evandro Morais Peixoto³, Marcos Alencar Abaide Balbinotti¹, Ricardo de Almeida Castillo¹

¹Université du Québec à Trois-Rivières, Quebec, Canadá.

²Instituto Cesumar de Ciência, Tecnologia e Inovação, Maringá-PR, Brasil.

³Universidade de Pernambuco, Garanhuns-PE, Brasil.

RESUMO

O objetivo desta pesquisa foi testar o modelo tridimensional – Orientação ao Prazer pelo Aprendizado (OPA); Orientação à Dedicação e Entusiasmo (ODE); Orientação à Motivação Circunstancial (OMC) – avaliado pela Escala Balbinotti de Motivação de Perspectiva Futura para Atletas (EBMPFA-15). A amostra foi constituída de 707 praticantes regulares de atividades físicas, ambos os sexos, com idades entre 12 e 33 anos. Resultados: as análises fatoriais exploratória (61,1% da variância total do construto) e confirmatória ($\chi^2/df = 3,99$; CFI = 0,97; TLI = 0,96; RMSEA = 0,06; I.C. 90% = 0,05 – 0,07) corroboram a tridimensionalidade e a adequabilidade do modelo testado para avaliar homens e mulheres (invariância). Os índices Alpha, Ômega e GLB obtidos (0,70 a 0,89) asseguram sua precisão. Conclui-se que o instrumento apresenta satisfatoriamente suas primeiras evidências de validade e estabilidade interna, assim como a precisão do modelo teórico de medida. Novos estudos devem testar outras evidências de validade e normas interpretativas da EBMPFA-15.

Palavras-chave: Validade. Praticantes. Atividade Física.

ABSTRACT

This research aimed to test the three-dimensional model - Orientation to Pleasure by Learning (OPA); Orientation to Dedication and Enthusiasm (ODE); Orientation to circumstantial Motivation (WTO) - evaluated by Balbinotti Scale of Future Perspectives of Motivation for Athletes (EBMPFA-15). Sample: 707 regular physical activity practitioners, male and female, aged between 12 and 33 years. Results: Exploratory (61.1% of the total variance of the construct) and confirmatory factor analysis ($\chi^2 / df = 3.99$; CFI = 0.97, TLI = 0.96; RMSEA = 0.06; 90% CI = 0.05 to 0.07) corroborate the three-dimensionality and the suitability of the tested model to evaluate men and women (invariance). The Alpha, Omega and GLB indices (0.70 to 0.89) ensure its reliability. In conclusion the instrument has satisfactorily first evidence of validity and internal stability, as well as the accuracy of the theoretical model measure. Further studies should test other evidence of validity and interpretative rules of EBMPFA-15.

Keywords: Validity, Practitioners, Physical Activity.

Introduction

This work is part of a larger, continuous study that seeks to explore and describe the psychological profile of individuals who practice regular physical activity. The aim is to explore and discuss, based on data collected in contemporary Brazil, the latent dimensions of the variable “Future (Time) Perspective and Motivation” (FPM) for individuals who exercise regularly and for athletes. The idea is to test a three-dimensional model of orientation and manifest content¹⁻⁴ –, namely Orientation to Pleasure through Learning (OPA), Orientation to Dedication and Enthusiasm (ODE), Orientation to Circumstantial Motivation (OMC), evaluated via the Balbinotti Scale of Future Perspectives of Motivation for Athletes

(EBMPFA-15), via the metric principles of exploratory and confirmatory factorial analysis as well as calculations of invariance and internal consistency, taking into consideration the singular importance of this variable for the structure of the personality of a subject in this specific population⁵, in their various levels of practice (ranging from amateurism to professionalism).

Its importance is based on the fact that studies^{5,6} have focused on the FPM variable as a prominent element in all five of the eminent and renowned motivational theories of the present day, namely: General Theory of Human Motivation⁷, Theory of Motivational Significance of Future Perspectives⁸, General Theory of Choice (decision) and Professional Development⁹, Motivation and Self-Representation Theory¹⁰ and, arguably, the most frequently studied today, Self-Determination Theory¹¹.

According to one study, in which the authors conducted several reflections and explanations with regard to the FPM variable⁵, the motivation of athletes may also be understood as a movement in search of one or more specific objectives, possibly even to be a professional athlete (among other objectives). As for the time required to attain this goal, it should not be treated as physical-chronological in nature but rather subjective, where each individual sets his own “goals and times” and his mental function should begin from this perspective. Considering the importance of these reflections, the following questions are foremost: How do we define and evaluate the FPM variable? What are the lateral dimensions of the FPM variable? Indubitably, it is not easy to answer these questions. Clearly, it may be inferred that this, as with any other variable in respect of human personality, is all about a psychosocial and multidimensional construct in which its evaluation will only be possible if we take into account some of its diverse lines of intersection¹².

Following the considerations about motivation, studies¹³ show that motivation deriving from future objectives that are subordinated to present learning, is instrumental motivation, and in this regard needs to be analyzed in order to understand which elements lead the subject to orientation to learning and dedication, to attain the desired objective. Unfortunately, these same researchers did not propose a formal tool for evaluating these lines, at any rate not from the point of view of future perspectives, so that they can be explored in minute detail. Thus, this study seeks precisely to formulate and validate an instrument, inspired by nationally and internationally recognized sporting motivation scales, notably IMPRAFE-126 and the EMS I and EMS II (*Échelle de Motivation dans les Sports*), known as the “Balbinotti Scale for the Motivation of Future Perspective for Athletes (EBMPFA-15)”, in which the variable FPM can be explained from three distinct perspectives: 1) FPM as a way to obtain personal satisfaction from the standpoint of interest in learning new skills or techniques, among others; 2) FPM as a quest for positive emotions arising from affective investment, enthusiasm and dedication that keeps the subject enthusiastic about regular practice or sporting activity; and, 3) FPM as a stimulus to get, and keep, fit, to feel good about oneself and even occupy one’s time productively. Thus, in order to better answer these two questions and, fundamentally, the objectives of this study, we initially present a number of aspects related to the relevant theoretical FPM-related plan and, subsequently, some aspects that refer to the empirical plan, also related to this same variable. Accordingly, it is believed possible to explore sufficiently the understanding of this content that is ever present in the practice of sport.

Overall empirical aspects related to FPM

Human motivation is a variable that will always be the focus of academic study due to the theoretical possibilities and practical applications of this knowledge¹⁴, which is why many different theories and understandings of this construct exist. The importance of an empirical

study of this construct stems from the fact that it is one of the most revealing driving forces for something to be achieved, i.e. for an individual to attain his goals and objectives, irrespective of what they may be¹⁵. This is possibly why, gradually, the Theory of Motivational Significance of Future Perspectives (TMSFP) is gaining ground in general academic research¹⁶ and, notably, applied to the sporting context⁵.

There have been many studies that are educational in nature. In the 1980s, studies investigating affective attitudes associated with the personal futures of 230 students, aged between 17 and 19, concluded that the group which perceives education as important to their future success is significantly more motivated than the group that perceives it as less important, revealing through this viewpoint that motivation oriented towards pleasure associated with learning could be an important indicator of an extended future perspective¹⁷. Then in the 1990s, studies into the characteristics of 211 motivated and demotivated students concluded that the group having a negative, affective attitude towards their personal futures, is found to be significantly less motivated in the present than the group with positive affective manifestations, confirming through this view that minor immediate satisfactions are all that is necessary for the group with extended future perspectives¹⁸.

It was, however, only at the start of the present century that some authors¹⁹ attempted to establish if those students who perceived the importance of learning a second language, for the future, were more motivated than those who did not attribute to it the same importance. Given the mixed results, the authors concluded that other specific factors (such as issues of a broader order, of a cultural as well as a personal nature, such as dedication, enthusiasm, etc.) should be included in the FPM variable's evaluation grid. These considerations had, in fact, already been presented in other studies, highlighting that the perception of the importance of education alone is not capable of keeping students interested in learning²⁰, it being understood that the motivation to learn should not be the only dimension of the FPM variable.

Studies highlight the individual interest of students in specific activities, notably mathematics, the sciences and physical/sporting activities²¹. This selective interest, therefore, should not be neglected as it could be another fundamental, representative aspect of their motivation grids for future perspectives, showing that these students, being more selective, are motivated in terms of the way they use their present time, this perspective revealing a sensation of well-being with themselves, that is to say, a positive, affective attitude in relation to their personal future.

More recently, studies were conducted using certain measurement tools, including a questionnaire on motivation and future goals, in a group of 206 students, and their results indicated particularly high correlations ($0.64 \geq r_{(204)} \geq 0.51$) with variables "Personal Study Strategies" and "Perceptions of Instrumentality" (students that perceive education as important for future success), implying that the variance of the FPM variable (from the perspective of the evaluation tool) can be explained, at least in part, by a more circumstantial dimension (since "personal study strategies" occur in the present moment) and another more extended dimension (as already explained)²². In a study of students²³, the authors used the Zimbardo Time Perspective Inventory-ZTPI¹⁴, which evaluates three separate, though related, dimensions: (1) perspective of future time, (2) present hedonistic perspective, and (3) present fatalistic perspective. Lastly, it can thus be seen that, from the studies conducted in the 1980s up to the present day, the FPM variable has been regarded as multidimensional, at least in the educational context, usually with samples of students. And what about those who participate in physical and sporting activities? Only one study could be found.

As for motivation of future perspective in the ranks of junior tennis players, the conclusions of various studies show that motivational significance, in the context of future perspectives, is characterized in the behavior in a series of organized time-sequences⁵. They

explain that perseverance (dedication, enthusiasm for practicing sports, etc.) represents an essential component without which sporting success is inconceivable, being a volitional quality of the athlete. They also explain that volitional preparation represents the education of desire, the trainer having the function of using sports training in the sense of managing the athletes' volitional qualities: pleasure, tenacity, courage and, principally, dedication and perseverance in the quest for medium to long-term objectives. They also conclude that the sport of tennis, when oriented towards attaining increasingly better results, almost always goes hand in hand with the perspective of a career as an athlete. Objectives of this kind presuppose that many years' dedication will be required.

Central Questions of this research study

Beginning with the importance that the variable "FPM" occupies in the sporting context⁵ and the manifest content that should be evaluated by the orientations of this construct, it was possible to formulate the four central questions that drive this study: (1) What and how many are the latent factors to the "FPM" construct of individuals (aged between 12 and 33) practising physical or sporting activities on a regular basis, when evaluated by the Balbinotti Scale of Motivation of Future Perspective for Athletes (EBMPFA-15)? (2) Does the three-dimensional model inherent to the EBMPFA-15 fit the available data? (3) Is the measurement of each of the dimensions evaluated by EBMPFA-15 sufficiently accurate as to be able to have faith in the results, considering the target population? (4) Is the measurement model proposed by the EBMPFA-15 capable of evaluating individuals of each sex in an equivalent manner, permitting a comparison of the results obtained by these groups? To answer these questions, ethical and methodological procedures are employed, and these will be presented below.

Methods

Ethical procedures and introduction of the subjects.

The Research Ethics Committee at the University of Quebec at Trois-Rivières, Canada, analyzed and approved this study, under reference no. CER-12-182-04-02.02, which featured the participation of 707 individuals involved in regular physical or sporting activities in Brazil, of both sexes (males 58.4%), aged between 12 and 33 ($\bar{x} = 16.36$; $SD = 3.21$). All of these subjects regularly took part in institutionalized competitions (school or federated games). This sample was chosen according to the availability of the individuals concerned and accessibility in the institutions (clubs and teams). It is a non-random sample, as recommended for studies and research into education and psychology, being regarded as a good source of information, in spite of having a number of limitations²⁵. A total of 27 different sporting categories were covered, practiced by the subjects in this study, the most common being: soccer (16%); volleyball (14.6%); handball (12.3%), basketball (11.5%), futsal (10%), gymnastics (7.5%), swimming and paralympic swimming (7.3%), horse riding (3%). The remaining 18 categories, those sports practised less frequently, made up the remaining 17.8%.

Instruments

All participants answered two instruments: a Biodemographic Questionnaire (simply for the control of the following variables: Sex, age and sporting category) and the Balbinotti Scale of Motivation of Future Perspective for Athletes (EBMPFA-15)⁵. The latter has 15 positively formulated items, corresponding to an adapted version based on the following instruments: IMPRAFE-126 (Inventory of Motivation for Regular Participants of Physical

and Sporting Activities)²⁶ and the EMS (*Échelle de Motivation dans les Sports*) or SMS (*The Sport Motivation Scale*)²⁷. This adaptation is considered viable since the EBMPFA-15 is a short scale (only 15 items), quickly completed (around 5 minutes), the fundamental aim of which is to evaluate three specific motivational dimensions: (1) Orientation to Pleasure through Learning (evaluated through the first group of five items); (2) Orientation to Dedication and Enthusiasm (evaluated through the second group of five items); and, (3) Orientation to Circumstantial Motivation (evaluated through the third group of five items). The items belonging to each of these dimensions are displayed in Table 1. These 15 statements, related to the “FPM” construct, describe simple content, are quick to understand and typically found in the words of regular participants in physical/sporting activities. Thus, to evaluate the response behavior of the participants, a five-point Likert-type scale is used, ranging from “This Motivates Me Very Little” (1) to “This Motivates Me A Lot” (5). A high score in any of the orientations indicates that the subject perceives himself to be more motivated in regard to the orientation in question, from this standpoint, revealing a facet of his/her own personality. The absence of empirical studies explains the failure to present its psychometric qualities and justifies the importance of this study.

Statistical procedures

Proof of validity based on the internal structure of inventory-type psychometric instruments, questionnaires and scales usually emanates from the results of studies of their factorial structures. The aim of cross-validation is to ascertain the stability of an instrument in terms of its factorial structure given different samples or population groups²⁸. Accordingly, the sample in the present study will be randomly divided into two subsamples, each of which will comprise around 50% of the total number of respondents (Sample 1 = 354 subjects; Sample 2 = 353 subjects). Each subsample will be analyzed independently, following a predetermined logic: on the first subsample, the following will be carried out: Exploratory Factorial Analysis (EFA), method for estimating unweighted least squares (ULS) and oblique rotation²⁹, while on the second subsample a Confirmatory Factorial Analysis (CFA) will be performed with the Weighted Least Square (WLSMV) estimation method³⁰. However, prior to carrying out these analyses (EFA and CFA), an overall descriptive analysis of the items will be carried out as well as a check of the factorability of the correlation matrices and covariance through an analysis of the following procedures: (1) calculation of the Kaiser-Meyer-Olkin (KMO) sampling adequacy index; (2) check of the correlation matrix determinant; and (3) Bartlett’s sphericity test. For the retention of the number of factors, the Kaiser method will be employed (sum of squared loadings), based on a polychoric correlation matrix, considering the method’s best fit for estimating latent variables from ordinal variables^{31,32}.

In addition, the precision of each factor (each dimension) will be calculated via the coefficients of the standardized Alpha³³, Omega³⁴ and GLB methods³⁵, all of them based on polychoric matrices, as these are regarded as the most appropriate for calculations of internal structure with ordinal scales of measurement³⁶.

As recommended³⁰, the model obtained in the EFA will be tested in the CFA based on the following modification indices: WLSMV χ^2 , df, χ^2 /df, CFI, TLI and RMSEA. Lastly, the invariance of the measurement model will be evaluated considering the different sampling extracts (sex). All the analyses will be carried out with the help of the following statistical packages: Factor 9.3³⁶ and Mplus 7³⁰.

Results, interpretations and discussions

In order to respond adequately to the core issues of this study, a descriptive exploration of the scores obtained through the EBMPFA-15 was initially addressed, according to the generally accepted guiding principles in the literature. Having laid the foundations, the results obtained through the overall item analysis, the factorial analyses (EFA and CFA), the precision calculations and the invariance analyses, will be presented successively and systematically. It should be emphasized that the aim of the initial, formal presentation of the “overall descriptive analysis of the items” in this study, is to demonstrate the reliability of the mean values observed, as these can be negatively impacted by the presence of aberrations and, therefore, may not be representative of the catalogued behaviors, thus detracting from the value of the overall conclusions^{37,38}.

Exploratory and Confirmatory Factorial Analyses

In order to be able to answer adequately the first of the four central questions of this study (what and how many factors are latent to the FPM variable?) it is necessary to explore the available data with the help of calculations of factorial analyses. Firstly though, to ensure proper interpretation of these analyses, the Kaiser-Meyer-Olkin coefficient (KMO = 0.93), Correlation Matrix Determinant (0.003) and Bartlett’s test for sphericity ($p < 0.01$) were estimated. The respective results indicate that correlations between the items are adequate, in fact more than adequate, to proceed to the factorial analysis^{37,39}. Moreover, it having been demonstrated that the result of the measurement of information redundancy ($|R|$) is other than 0 (zero), this indicates the absence of any type of repetition of linear relationships (indication of absence of collinearity with the data). All these data guarantee the pertinence of the factorial calculations^{12,37,36}.

Thus, a ULS (Unweighted Least Squares) analysis, followed by a Promax rotation (with $Kappa = 4$), served to examine the exploratory factorial structure of the EBMPFA-15. Taking the Kaiser results into consideration, three factors were extracted (without determining a priori the number of factors) that explain 61.1% of the total variance of the measured construct. This initial result is extremely satisfactory, since only 15 items^{37,40} would be enough to provide a significant explanation²⁹ of the FPM variable, when evaluated through the EBMPF-15. From the standpoint of the explanation of the construct variance⁴⁰, it can be inferred that the content explored through the EBMPF-15 is in agreement with the cognitive response grid of the individuals evaluated⁴⁰, in addition, of course, to being in agreement with the empirical theoretical content explored here^{5,7,8,10,22}.

Considering that the communalities of the items are all adequate (above 0.40), that the factorial solution is presented in pure form (without significant double saturations > 0.40) and that, for any of the items measured, the items saturate in a significant manner ($Sat_f \geq 0.40$) in their particular factorial origins (see Table 1), a three-dimensional factorial solution is shown to be perfectly satisfactory^{12,37,38,41}. Even though the dimensions may not have been identical, even comprising fewer items, the three-dimensionality of the FPM variable was confirmed here²³. It is believed that this outcome is a significant advance, since in the study by Bilde, Vansteenkiste and Lens²³, the three dimensions found do not appear to correspond exactly to a short-term, medium-term or long-term future perspective. As for the three theoretical dimensions of the EBMPF-15⁵, they satisfactorily follow this temporal logic.

Table 1. Exploratory Factorial Analysis, results obtained with the EBMPFA-15 applied to sample 1.

Dimension	Item	Brief description	h^2	Factorial matrix		
				In three factors		
				Factor 1	Factor 2	Factor 3
OPA ¹	1	Discovering new forms of training	0.89	0.918		
	3	Deepening my understanding in the activity	0.75	0.829		
	9	Discovering new training techniques	0.58	0.680		
	10	Learning new moves (or tactics)	0.74	0.584		
	13	Practising is a pleasurable form of learning	0.56	0.451		
ODE ²	4	Through the positive emotions I feel when practising	0.69		0.718	
	6	Dedicating myself to the activity to remain competitive	0.80		0.673	
	14	“Diving headlong” into the practice of my sport	0.72		0.479	
	7	Feeling enthusiastic when I improve my skills	0.66		0.433	
	11	Feeling excited when I practise my activity	0.60		0.401	
OMC ³	2	Keeping fit (with better quality of life)	0.58			0.802
	15	I miss it when I don't practise	0.55			0.782
	8	Seeing healthy, active people around me	0.52			0.751
	5	Practising to feel good about myself	0.63			0.532
	12	Practising to use my time well	0.44			0.496
Variance by factor: Initial eigenvalues (Kaiser method)				6.08	3.04	1.45
Variance by factor: Eigenvalues after rotation				3.14	1.36	1.12
Variance by factor: Percentage explained after rotation				44.58	9.76	6.75
Standardized Cronbach's Alpha				0.84	0.84	0.71
McDonald's Omega				0.82	0.81	0.70
Woodhouse & Jackson's GLB method (Greatest Lower Bound)				0.89	0.89	0.82

NB.: ULS (Unweighted Least Squares) extraction method. Loadings less than 0.40 were omitted.

Inter-factor correlation $0.74 < r < 0.51$.

¹Orientation to Pleasure through Learning;

²Orientation to Dedication and Enthusiasm;

³Orientation to Circumstantial Motivation.

Source: Authors.

The important indices obtained through calculations of commonality and the exploratory factorial saturations, show that the model evaluated via the EBMPFA-15 is in agreement with the theoretical perspective of the three-dimensional structure. The three factors obtained (“Orientation to Pleasure through Learning”, “Orientation to Dedication and Enthusiasm” and “Orientation to Circumstantial Motivation”), without any kind of prior checks (to force the results to fit the three factors), make it clear that the “Motivation” construct (when evaluated via the EBMPFA-15) cannot be reduced to a single interpretation such as: “feeling motivated when learning new moves or new techniques”. The variable

“Motivation”, as measured by the EBMPFA-15, is not one-dimensional. Therefore, it is not prudent to interpret this variable in a general sense, for example: “...this youngster is motivated as he practises his sport on a regular basis, regardless of possible day-to-day problems”. It is not this alone that would classify him as “a motivated youngster”. Observations/interpretations like this are reductionist and could also, at worst, represent a significant lack of precision. Considering the results in Table 1, it seems that it would be more appropriate to specify the type of orientation of the motivation under discussion.

By classifying someone as “Motivated” (when evaluated by the EBMPFA-15), in truth it could be construed that the individual in question is someone with a high level of this characteristic, in all three possible orientations: (1) the one oriented towards Pleasure and Learning (which could be represented by the pleasure the athlete feels by learning new moves); (2) the one oriented towards Dedication and Excitation (which could be represented by the athlete’s feeling of excitement by improving his skills); and, (3) the one oriented towards Circumstantial Motivation (which could be represented by the will of the individual to keep physically fit). Could it be that such an interpretation, albeit common, is consistent with reality?

Well it could be that the classification/interpretation of someone like a motivated athlete (when evaluated by the EBMPF-15), is not naturally wrong in essence or in special cases, however it seems difficult to accept that, on average, these individuals get the same level of motivation with all three orientations (this hypothesis should be tested in future studies). Moreover, satisfied with this general question, one might fail to formulate other important questions that should be particularly interesting to sports psychologists, trainers and even others responsible for the development of athletes, such as: Could he be an individual with a motivation more oriented towards pleasure and learning (in the future) or more oriented towards circumstantial motivation (in the present)? Or perhaps, could this youngster be using his motivation fundamentally as a way to obtain a better quality of life and, therefore, “thrusting himself” into practising sports comes to be interpreted as a “springboard” to attaining this objective?

These questions are important insofar as sports psychologists may, for example, wish to analyze the motivational behavior of their athletes^{1,42} and, among other factors, seek to evaluate the (positive or negative) influence of pressure exerted by parents, teachers and even trainers on the athlete’s orientation to motivation. When this influence serves to overvalue results in an actual competition (present motivation), the consequences could tend to be negative with regard to the sporting involvement of this individual⁴³, mainly when the orientation of the individual is towards improving his/her skills (future motivation) and performance indicators. As a result of this pressure, the authors state that a drop in the athlete’s self-esteem and self-concept could occur, even where there has been a significant improvement in the athlete’s or individual’s technical skills and strategies. More precisely, considering a motivational approach of future perspective^{5,8}, it is sometimes better to work or reinforce the individual’s limits (improving physical indicators, skills, etc.) in order to, at a later point in time, and with greater consistency, reap the more lasting pleasures originating from learning new techniques, including a little more acceptable indices of stress (including limiting the probability of abandoning the practice of physical activity or sport). Clearly these interpretative observations should be properly tested in new studies using appropriate longitudinal models. In any case, it should be stressed that these results have already provided a platform for these hypotheses to be raised.

After defining which and how many are the latent dimensions of the FPM variable, when evaluated by the EBMPF-15 and, consequently, having answered the first of the three central questions of this research, it is now time to test if this exploratory model is sustainable,

i.e. if the data available from sample 2 are adequate for the proposed (three-dimensional) theoretical model (the second central question of this study). To this end, a confirmatory factorial analysis (CFA) was used and different models tested: one dimensional, three-dimensional, and a second-order three-dimensional model. The results are shown in Table 2.

Table 2. Modification indices for the different measurement models in the EBMPF-15.

Models	χ^2 ($\gamma\lambda$)	CFI	TLI	RMSEA	I. C. RMSEA 90%
One-dimensional	944.552 (90)	0.906	0.89	0.166	0.109-0.123
Three-dimensional	407.381 (87)	0.965	0.957	0.072	0.065-0.079
Three-dimensional (second order)	407.289 (87)	0.965	0.957	0.072	0.065-0.079

Source: Authors.

The results displayed in Table 2 demonstrate poor modification indices in the one-dimensional model. However, good modification indices can be observed with the three-dimensional model, which was corroborated by the *dif-test* procedure which showed that the three-dimensional model is significantly different from the one-dimensional model $p < 0.001$. However, no significant differences were observed between the three-dimensional model and the second order three-dimensional model. It should be stressed that both had identical modification indices. These procedures leave us in no doubt as to the validity of the three-dimensional model of correlated factors, since in this case it should opt for the less generous measurement model⁴⁴. In a more general interpretation of these data, it can be confirmed that the cognitive functioning of the group of athletes studied, when required to answer about their motivations (through the EBMPF-15) that lead them to practise physical or sporting activities⁴⁰, may be compartmentalized into three distinct, though reportable, dimensions. It can, therefore, be clearly demonstrated that this three-dimensional model was sustainable, as shown in Figure 1.

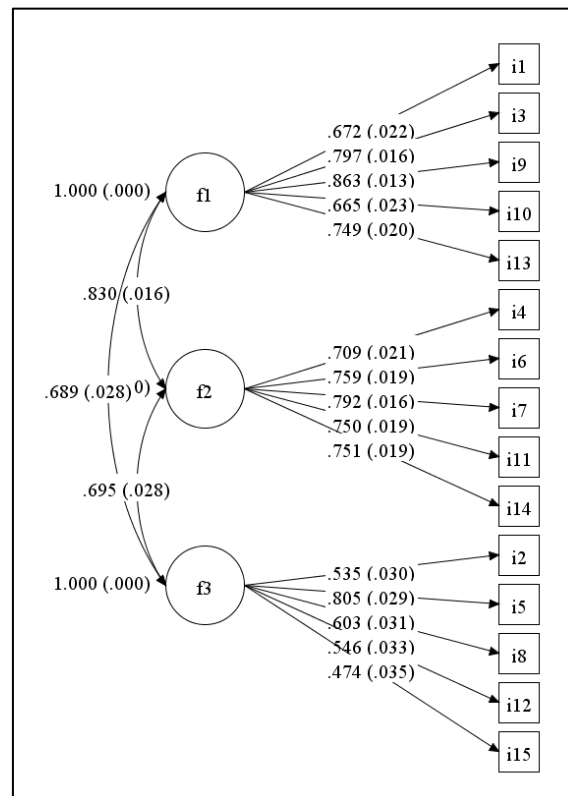


Figure 1. Three-dimensional model of the EBMPFA-15 applied to sample 2, standardized values.

Source: Authors.

Calculation of Internal Consistency

There is a variety of coefficients for evaluating the precision of dimensions (or factors) of psychometric measurement instruments, and their combined use seems to be a coherent strategy at the present time³⁶. This strategy may seem justified when one considers the advantages and limitations of each one individually. For instance, Cronbach's Alpha, a measurement that should not be overlooked since, among other advantages and conditions of use³³, it is the most popularly used measure for evaluating internal consistency of psychometric instruments. However, it only provides more precise results when the prerequisites are attained and, according to other studies^{45,46}, they rarely are. Moreover, typical special conditions of large samples (large variability) may cause inflation or reduction of the Alpha value, among several other reasons that make their use inadvisable, at least as the sole criterion for analyzing precision. As for the GLB Method (Greatest Lower Bound), contrary to its aim of being the "highest lower limit" of reliability, systematically produces less important results than the Omega method, which, according to the most recent advances in psychometry⁴⁶, has proved to be the best index of precision at the present time.

Accordingly, the third central question of this study, concerning the precision of the measurement of each of the "Motivation of Future Perspective" construct's three dimensions, could be answered from the standpoint of internal consistency based on a series of 4 groups of specific coefficients: (1) Cronbach's Alpha; (2) Woodhouse and Jackson's GLB Method (Greatest Lower Bound); (3) McDonald's Omega Method. All of the results of these coefficients, per dimension studied, are described in Table 1, ranging from 0.70 to 0.89, regardless of dimension and the method in question. These results are satisfactory indicators of the precision of each of the three orientations evaluated by the EBMPFA-15, and it may be said that the results of each of the five items of each dimension are mutually consistent,

representing a precise measurement of the orientations, individually.

Invariance of the model's parameters between the sexes

Once the internal structure of the EBMPFA-15 is established, the invariance of the measurement model was evaluated^{47,48} between the groups formed by female and male individuals participating in physical/sporting activity. The investigation into the invariance of the model used for measuring psychological instruments versus different groups, has been shown to be increasingly essential to psychology, considering that these procedures provide information in respect of the equivalence of the factorial structure of the instrument among the different groups of interest. Thus, having empirical evidence that these variables are related to the latent constructs in the same way for the different groups, guarantees greater accuracy when comparing them given the raw results of a particular psychological instrument^{47,48}. In this sense, the equivalence of the configural, metric and scalar models was evaluated between the groups formed by men and women, the results being displayed in Table 3.

Table 3. Invariance of the three-dimensional model in terms of the evaluation of men and women.

Models	χ^2 ($\gamma\lambda$)	CFI	TLI	RMSEA	I. C. RMSEA 90%
Men	286.448 (87)	0.962	0.954	0.705	0.065-0.084
Women	261.839 (87)	0.953	0.944	0.083	0.071-0.094
Configural	543.013 (174)	0.959	0.951	0.078	0.070-0.085
Metric	538.982 (186)	0.961	0.956	0.073	0.066-0.0081
Scalar	574.122 (228)	0.962	0.965	0.066	0.059-0.072

Source: Authors.

As shown in Table 3, the results suggest good levels of fit for the groups when evaluated separately, moreover they demonstrate a strict level of invariance of the measurement model since the imposition of restrictions did not adversely affect the analyzed modification indices. It should be stressed that the differences in CFI between the metric and scalar models were less than 0.01 when compared to the (less restrictive) configural models. These results show that, for the three-dimensional model, the factorial structure, factor loadings and residual variance did not vary between men and women⁴⁹.

Conclusions, Limitations and Prospects for fresh studies

This work enabled us to demonstrate the three-dimensional model evaluated via the EBMPF-15, at the same time as demonstrating the theoretical nuances of the "Motivation of Future Perspective" (FPM) variable, by means of empirical data. The three FPM orientations evaluated by EBMPF-15 help us to understand the area of sports psychology, in the sense that it enhances its interpretation/classification, which is one of the most important concepts in sports science⁵⁰. The recently used empirical model²³ in which the FPM variable is evaluated from the standpoint of three factors, seems to have broadened with the results of this study, at least in the sense of logical temporality⁵.

One of the sampling limitations encountered, for example the disparity in respect of participants' ages, where the majority were younger than 21, making it impossible to evaluate the invariance of the measurement model parameters between participants of different age brackets. It is recommended that these characteristics be evaluated in future studies. Lastly, it

is felt that the results presented here could be useful for sports psychologists, trainers and other professionals interested in the development of models that explain the FPM phenomenon of individuals participating in regular physical and sporting activity, such as athletes, in a more specific sense as well as in sports training models in a broader sense. Therefore, elements such as “Orientation to Pleasure Through Learning” (OPA), “Orientation to Dedication and Enthusiasm” (ODE) and “Orientation to Circumstantial Motivation (OMC), seem to be an important source of information, enabling these professionals to better understand how these elements fit into the overall dynamics of the personality of these athletes. Lastly, it should be pointed out that other evaluation measures (self-concept, self-esteem, interests, etc.) are particularly interesting when used within a wider context, mainly when these professionals are interested in helping the individual with the complex preparation of his/her future professional life as an athlete.

References

01. Keegan RJ, Harwood CG, Spray CM, Lavallee D. A qualitative investigation of the motivational climate in elite sport. *Psychol Sport Exerc* 2014;15(1):97–107.
02. Vink K, Raudsepp L, Kais K. Intrinsic motivation and individual deliberate practice are reciprocally related: Evidence from a longitudinal study of adolescent team sport athletes. *Psychol Sport Exerc* 2015;16(3):1–6.
03. Harwood CG, Keegan RJ, Smith JMJ, Raine AS. A systematic review of the intrapersonal correlates of motivational climate perceptions in sport and physical activity. *Psychol Sport Exerc* 2015;18(1):9-25.
04. Mascret N, Elliot AJ, Cury F. Extending the 3 × 2 achievement goal model to the sport domain: The 3 × 2 Achievement Goal Questionnaire for Sport. *Psychol Sport Exerc* 2015;17(1):7–14.
05. Balbinotti MAA, Balbinotti CAA. Motivação e perspectiva futura no tênis infanto-juvenil. *Rev Bras Psicol Esporte* 2008;2(2):1-20.
06. Vissoci JRN, Nascimento Junior JRA, Oliveira LP, Vieira JLL, Vieira LF. Suporte parental percebido, motivação autodeterminada e habilidades de enfrentamento: validação de um modelo de equações estruturais. *Rev Educ Fís UEM* 2013;24(3):345-358.
07. Nuttin J. *Théorie de la motivation humaine*. Paris: Presses Universitaires de France ; 1985.
08. Lens W. La signification motivationnelle de la perspective future. *Rev québec psychol* 1993;14(1):69-83.
09. Super DE. The life-span, life-space approach to career development. In Brown D, Brooks L & Associates (Orgs.). *Career choice and development*. 2.ed. San Francisco: Jossey-Bass; 1990, p. 197-261.
10. Ruel PH. Motivation et représentation de soi. *Rev scienc l'éduc* 1987;13(2):239-260.
11. Deci EL, Ryan RM. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press; 1985.
12. Dassa C. *Analyse multidimensionnelle exploratoire et confirmative*. Montreal: Université de Montreal; 1999.
13. Ryan RM, Deci EL. Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemp Educ Psychol* 2000;25(1):54–67.
14. Vallerand RJ, Thill EF. Introduction au concept de motivation [Introduction to the concept of motivation]. In: Vallerand RJ, Thill EF, Editors. *Introduction à la psychologie de la motivation [Introduction to the psychology of motivation]*. Laval, Canada: Éditions Études Vivantes; 1993, p. 3-39.
15. Balbinotti MAA, Balbinotti C, Barbosa MLL. A teoria da significação motivacional da perspectiva futura e suas aplicações no contexto do tênis infanto-juvenil. In: Balbinotti CO. *Ensino do Tênis: Novas Perspectivas de Aprendizagem*. Porto Alegre: Artmed; 2009.
16. Janeiro IN. O Inventário de Perspectiva Temporal: Estudo de validação. *Rev Iberoam Diagn Eval Psicol* 2012;34(2):117-132.
17. Van Calster K, Lens W, Nuttin J. Affective attitude toward the personal future: Impact on motivation in high school boys. *Am J Psychol* 1987;100(1):1-13.
18. Lens W, Decruyenaere M. Motivation and de-motivation in secondary education: Student characteristics. *Learn Instr* 1991;1(2):145-159.

19. Cretens H, Lens W, Simons J. The role of perceived instrumentality in student motivation. In: Anastasia A, Kuhl J, Sorrentino RM, Editors. Trends and prospects in motivation research. Dordrecht, Netherlands: Kluwer Academic; 2001, p. 37-45.
20. Husman J, Lens W. The role of the future in student motivation. *Educ Psychol* 1999;34(2):113-125.
21. Zusho A, Pintrich PR. Motivation in the second decade of life: the role of multiple developmental trajectories. In: Urdan T, Pajares F, Editors. Adolescence and education: general issues in the education of adolescents. Greenwich, Conn: IAP; 2001, p. 163-200.
22. Locatelli ACD, Bzuneck JA, Guimarães SÉR. A motivação de adolescentes em relação com a perspectiva de tempo futuro. *Psicol Reflex Crít* 2007;20(2):268-276.
23. Bilde J, Vansteenkiste M, Lens W. Understanding the association between future time perspective and self-regulated learning through the lens of self-determination theory. *Learn Inst* 2011;21(3):332-344.
24. Zimbardo PG, Boyd JN. Putting time in perspective: a valid, reliable individual-differences metric. *J Pers Soc Psychol* 1999;77(6):1271-1288.
25. Corbière M, Larivière N. Méthodes qualitatives, quantitatives et mixtes: Dans la recherche en sciences humaines, sociales et de la santé (French Edition). Presses de l'Université du Québec. Kindle Edition; 2014.
26. Balbinotti MAA, Barbosa MLL. Análise da consistência interna e fatorial confirmatório do IMPRAFE-126 com praticantes de atividades físicas gaúchos. *Psico-USF (Impr.)* 2008;13(1):1-12.
27. Brière NM, Vallerand RJ, Blais MR, Pelletier LG. Développement et validation d'une mesure de motivation intrinsèque, extrinsèque et d'amotivation en contexte sportif: L'Échelle de Motivation dans les Sports (EMS). *Int J Sport Psychol* 1995;26(4):465-489.
28. Laros JA, Puente-Palacios KE. Validação cruzada de uma escala de clima organizacional. *Estud Psicol* 2004;9(1):113-119.
29. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*, 6. ed. Pearson/Allyn & Bacon; 2012.
30. Muthen LK, Muthen BO. *Mplus User's Guide*. Seventh Edition. Los Angeles:CA ; 2012.
31. Holgado-Tello F, Chacón-Moscoso S, Barbero-García I, Vila-Abad E. Polychoric versus Pearson correlations in exploratory and confirmatory factor analysis of ordinal variables. *Qual Quant* 2010;44(1):153-166.
32. Osborne JW. What is Rotating in Exploratory Factor Analysis? *Pract Assess, Res Eval* 2015;20(2):1-7.
33. Cronbach LJ, Shavelson RJ. My current thoughts on coefficient alpha and successor procedures. *Educ Psychol Meas* 2004;64(3):391-418.
34. McDonald RP. *Test theory: A unified treatment*. Hillsdale: Erlbaum; 1999.
35. Ten Berge JMF, Socan G. The greatest lower bound to the reliability of a test and the hypothesis of unidimensionality. *Psychometrika* 2004;69(4):613-625.
36. Lorenzo-Seva U, Ferrando PJ. Factor: A computer program to fit the exploratory factor analysis model. *Behav Res Methods* 2006;38(1):88-91.
37. Balbinotti MAA. Para se avaliar o que se espera: reflexões acerca da validade dos testes psicológicos. *Aletheia* 2005;21:43-52.
38. Pestana MH, Gageiro JG. *Análise de dados para ciências sociais: a complementaridade do SPSS*. Lisboa: Sílabo; 2008.
39. Olsson U. On the robustness of factor analysis against crude classification of the observations. *Multivariate Behav Res* 1979;14(4):485-500.
40. Furr RM, Bacharach VR. *Psychometrics: An Introduction*. Thousand Oaks, CA: Sage, 2013.
41. Hair JF, Black WC, Babin BJ, Anderson RE. *Multivariate Data Analysis*, 7. ed. Prentice Hall; 2009.
42. Hodge K, Henry G, Smith W. A Case Study of Excellence in Elite Sport: Motivational Climate in a World Champion Team. *Sport Psychol* 2014;28(1):60-74.
43. Reinboth M, Duda JL. The Motivational Climate, Perceived Ability, and Athletes' Psychological and Physical Well-Being. *Sport Psychol* 2004;18(3):237-251.
44. Marôco J. *Análise de equações estruturais: fundamentos teóricos, software e aplicações*. Pêro Pinheiro: ReportNumber; 2010.
45. Revelle W, Zinbarg RE. Coefficients alpha, beta, omega and the glb: comments on Sijtsma. *Psychometrika* 2009;74(1):145-154.

46. Dunn TJ, Baguley T, Brunsten V. From alpha to omega: A practical solution to the pervasive problem of internal consistency estimation. *Br J Psychol* 2014;105(3):399–412.
47. Borsboom D. The attack of the psychometricians. *Psychometrika* 2006;71(3):425–440.
48. Milfont TL, Fisher R. Testing measurement invariance across groups: Applications in cross-cultural research. *Int J Psychol Res* 2010;3(1):111-121.
49. Cheung GW, Rensvold R. Evaluating goodness-of-fit indexes for testing measurement invariance. *Struct Equ Modeling* 2002;9(2):233–255.
50. Deci EL, Ryan RM. The “what” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychol Inq* 2000;11(4):227-268.

Received on Mar, 17, 2015.

Reviewed on May, 22, 2016.

Accepted on Aug, 14, 2016.

Author address: Leonardo Pestillo de Oliveira. Av. Guedner, 1610, Jardim Aclimação, Maringá, PR, CEP. 87005-390. E-mail: leonardo.oliveira@unicesumar.edu.br