TECHNICAL-TACTICAL DEVELOPMENT: VALIDITY EVIDENCE OF MEASUREMENT SCALES FOR PEDAGOGICAL CONTENTS IN SPORTS

DESENVOLVIMENTO TÉCNICO-TÁTICO: EVIDÊNCIAS DE VALIDADE DE ESCALAS DE MEDIDA DE CONTEÚDOS PEDAGÓGICOS NO ESPORTE

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RESUMO

O objetivo desta pesquisa foi demonstrar as primeiras evidências de validade de duas escalas de favorecimento ao desenvolvimento de conteúdos pedagógicos no esporte infantojuvenil (desenvolvimento de habilidades motoras e estratégico-tático). Para tanto, foram estimadas suas estruturas internas, testadas suas estabilidades e avaliadas suas consistências internas. Uma amostra de 210 treinadores e professores de Educação Física de 20 a 75 anos, de ambos os sexos, respondeu às escalas referentes ao desenvolvimento de habilidades motoras e estratégico-tático, as quais apresentaram estruturas compostas por três fatores, com saturações significativas ($Sat_f > 0,40$) e explicando respectivamente 70,19% e 74,29% da variância total dos construtos. Os resultados relativos ao ajuste do modelo foram, de forma geral, satisfatórios ($\chi^2/gl < 1,567$; AGFI = 1,000; RMSEA < 0,052; CFI > 0,995). Os resultados do estudo de consistência interna (0,736 < α < 0,908 para os fatores; $α_{HM} = 0,869$; $α_{ET} = 0,921$) asseguram a precisão das medidas e a confiabilidade de sua utilização aos objetivos a que se propõe. Os resultados respondem aos objetivos central e específicos da pesquisa e indicam a possibilidade da segura utilização das duas escalas.

Palavras-chave: Estudo de validação. Pedagogia. Criança. Adolescente.

ABSTRACT

The objective of this research was to show the first pieces of evidence on the validity of two scales for favoring the development of pedagogical contents in sports among children and youths (development of motor and strategic skills). To do so, their internal structures were estimated, their stabilities were tested, and their internal consistencies were assessed. A sample of 210 coaches and Physical Education teachers aged between 20 and 75 years old, both males and females, answered the scales referring to development of motor and tactical-strategic skills, whose structures were composed of three factors, with significant saturations ($Sat_f > 0.40$) and respectively explaining 70.19% and 74.29% of the total variance of the constructs. Results for model goodness-of-fit were overall satisfactory ($\chi^2/gl < 1.567$; AGFI = 1.000; RMSEA < 0.052; CFI > 0.995). Results concerning internal consistency analyses (0.736 < α < 0.908 for factors; $α_{MS} = 0.869$; $α_{TS} = 0.921$) ensure the accuracy of the measurements and the reliability of their use as to the purposes for which they are intended. The results meet the research general and specific objectives and indicate the possibility of a safe use of both scales.

Keywords: Validation study. Pedagogy. Children. Adolescents.

Introduction

Sports in general may have different objectives and lead to different outcomes. Remarkable ones are performance, participation and personal development[1,2]. Traditionally, sport initiation has been developed with a focus on performance, to the detriment of participation in sports long term and one's own personal development. Côté and Hancock[1], however, state that these different outcomes can be sought simultaneously, especially in early stages. For this reason, different pedagogical contents must be developed during the sport-related formation of young individuals.

Based on these assumptions, Gonçalves[3] designed a multidimensional theoretical-explanatory model for favoring the development of pedagogical contents in (competitive) sports among children and youths (Figure 1). Said model is justified considering the

understanding that: (1) sports are, by nature, a competitive practice; and (2) training and competition must not be the ultimate purposes. Therefore, sport competition, especially that intended for children and youths, must follow the purposes and assumptions of Sport Pedagogy in order to give meaning and continuity to a child's comprehensive development. A training-competition continuum is thus created, which must not fear a possible disfigurement of traditional sport practice[4] to guarantee teaching and training goals meant for different stages.
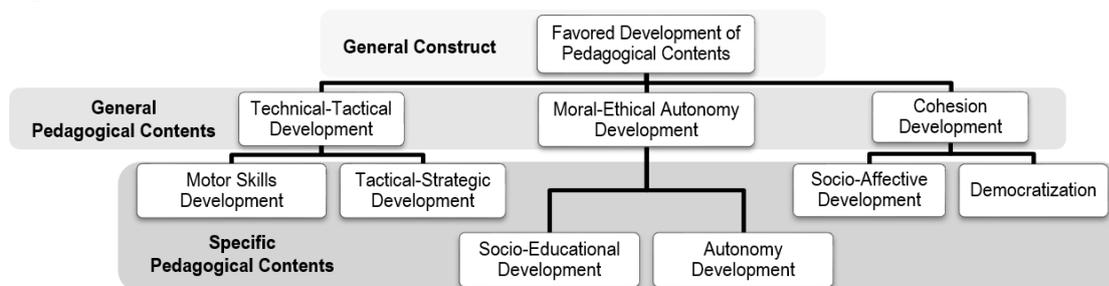
Figure 1. Multidimensional Theoretical-Explanatory Model for Favoring the Development of Pedagogical Contents in Sports Among Children and Youths
Source: Adapted from Gonçalves[3]

The proposed model (Figure 1) is initially configured at three levels: (1) General Construct; (2) General Pedagogical Contents; and (3) Specific Pedagogical Contents. The General Construct is divided into three General Pedagogical Contents, composed of two Specific Pedagogical Contents each. In this model, Technical-Tactical Development is subdivided into Motor Skill Development and Tactical-Strategic Development; Moral-Ethical Development is divided into Socio-Educational Development and Autonomy Development; and Cohesion Development is composed of Social-Affective Development and Democratization. In their turn, the General Pedagogical Contents were identified by Gonçalves[3] through the review of specialized literature, including pieces of work most frequently mentioned by authors in the Sport Pedagogy field. These six Specific Pedagogical Contents relate to the conceptions used in international studies[5-7].

New models of formal sport competitions for children and youths have been recently adopted by several sport federations[8]. However, these propositions/orientations of pedagogical contents by federations are not guarantees that their objectives will materialize. It seems fundamental, therefore, that assessments are conducted so as to check if adopted strategies are meeting their goals.

For such a purpose, the Gonçalves-Balbinotti Test Battery for Favoring the Development of Pedagogical Contents in Sports Among Children and Youth (GBTB-PC) was designed. The GBTB-PC is made up of six independent scales relative to each one of the Specific Pedagogical Contents established in the model. These instruments aim to identify orientations and possible pedagogical limitations concerning sport practices from the opinion of sport coaches and Physical Education teachers with experience in training children and youths engaged in sports.

In this way, the present study has as general objective to show the first pieces of evidence on the validity of two scales that compose the GBTB-PC – those relative to Technical-Tactical Development: The Gonçalves-Balbinotti Scale for Favoring Motor Skill Development in Sports Among Children and Youths (GBS-MS-10) and the Gonçalves-Balbinotti Scale for Favoring Tactical-Strategic Development in Sports Among Children and Youths (GBS-TS-11). To do so, three specific objectives (SO) were set: (SO1) estimate the internal structure of GBS-MS-10 and GBS-TS-11, according to available data; (SO2) test the stability of the internal structure of GBS-MS-10 and GBS-TS-11, according to available data;

and (SO3) estimate the internal consistency of GBS-MS-10 and GBS-TS-11, as well as of their respective dimensions. So that such goals were achieved, methodological procedures were employed, which will be presented below.

Methods

Sample

The sample was made up of 210 Brazilian sport coaches, both males and females (men = 145; women = 65), aged between 20 and 75 years old ($\bar{x}$ = 38.87; SD = 10.49) and with Experience Time ranging from six months to 55 years ($\bar{x}$ = 16.67; SD = 10.85). A total of 19 different sport modalities were covered in the coaches' answers. Those with the highest frequencies were: Judo (34), Rhythmic Gymnastics (28), Tennis (26), Football (19), Volleyball (18), Artistic Gymnastics (18) and Indoor Football (16). Other coaches, representing less frequent sport modalities in this study, totaled 51 answers. All assessed coaches participated in institutionalized competitions (school and/or federate). This sample was chosen according the individuals' availability, and accessibility to institutions. It is a non-random sample, recommended for studies and researches in education[10] and deemed an adequate source of information[11].

Instruments

The participants answered three different instruments: 1) a bio-sociogemographic questionnaire, for control of variables such as Sex, Age, Experience Time as a coach, and Sport Modality; 2) the Gonçalves-Balbinotti Scale for Favoring Motor Skill Development in Sports Among Children and Youths (GBS-MS-10); and (3) the Gonçalves-Balbinotti Scale for Tactical-Strategic Development in Sports Among Children and Youths (GBS-TS-11). The documents of the scales handed out to the respondents had a paragraph explaining the instrument objective: "[…] identify the strengths and weaknesses of sport competitions for children and youths with respect to motor skill/tactical-strategic development, from the point of view of sport pedagogy. This information is important for those who conceive (competitive) sport practices targeting children and youths, as they can be enhanced, as well as for coaches, who can select the ideal events for their athletes according to their goals". Then, the instructions suggested that, based on the observation of competitive practice and/or knowledge about its regulation, the individuals answered each one of the items on a 6-point Likert-type scale ranging from (1) "Strongly disagree [that the assessed practice…]" to (6) "Strongly agree [that the assessed practice…]". Each scale is respectively composed of 10 and 11 items that are short and positively formulated (with around 5 minutes being spent on each). These statements describe simple contents, of easy understanding and typically discussed in the respondents' contexts (coaches and Physical Education teachers), such as "… stimulates the development of varied motor skills" and "… stimulates the use of different tactical solutions". High scores indicate a greater perception, on the part of respondents, that the assessed practice favors the development of the pedagogical content in question within the context of sport competitions for children and youths.

Collection Procedures and Statistical Analysis

Procedures regarding data collection complied with all principles required by the Research Ethics Committee of the Federal University of Rio Grande do Sul, which analyzed and approved this study under reference number 1.856.606. First, the coaches who met the criteria (sport coaches experienced in training children and youths for competitive events) were contacted; the study objectives were explained to them; then, if they wanted to, a meeting was scheduled, according to their available time, for them to answer the instruments.

The signing of the Free and Informed Consent Form and data collection were carried out before or after training sessions or events, always individually. At that moment, when necessary, other details relative to the study were explained to the coaches so that all their doubts were clarified.

All statistical procedures were carried out with the aid of software Factor 10.5.3 for Exploratory Structural Equation Modeling (ESEM). According to Ferrando and Lorenzo-Seva[12], this type of analysis prevents certain problems presented by the traditional Confirmatory Factor Analysis (which considers that all items must behave as markers of one single factor), for instance: (1) poor goodness-of-fit resulting from the number of items; and (2) biased estimates of parameters, particularly inter-factor correlations. Moreover, internal consistency was checked by calculating Cronbach's standardized alpha[13]. It is worth highlighting that all analyses were based on polychoric matrices, because the latter are deemed the most adequate ones to compute and interpret analyses on ordinal measurement scales[14].

Before the analyses, the factorability of correlation and covariance matrices was verified by means of the following procedures: (1) Kaiser-Meyer-Olkin (KMO) sample adequacy test; (2) verification of the determinant of the correlation matrix; and (3) Bartlett's sphericity test. Finally, as recommended[15], the resulting model was tested by means of the ESEM, and its results (χ^2/df, AGFI, RMSEA and CFI) will be presented according to what Kline[16] and Brown[17] recommend.

Results

So that the first specific objective of this study was properly achieved, relative to the internal structure of the scales, it was necessary to estimate, first, the Kaiser-Meyer-Olkin coefficient, the Determinant of the Correlation Matrix, and Bartlett's sphericity test, in order to ensure the proper interpretation of factor analyses. Their results indicate that the correlations between the items are very adequate for proceeding with the factor analyses[13,18]. Additionally, it has been shown that results for information redundancy measurement was different from zero (($|R| \neq 0$)), indicating the absence of any type of repetition or linearity relations (indicative of absence of collinearity) between the items. All these results ensure the pertinence of factor calculations (see Table 1)[14,19,20].

Table 1. Correlation matrix adequacy

Scale	KMO	Determinant of the Correlation Matrix	Bartlett's Sphericity Test (gl)
GBS-MS-10	.820	.0353	684.6* (45)
GBS-TS-11	.905	.0033	1164.4* (55)

Note: *$p < .001$
Source: The authors

Thus, robust diagonally weighted least squares (RDWLS) followed by a Promax rotation (with Kapp = 4) tested the exploratory factor structure of both scales individually. It is worth noting that there are several methods for identification of number of factors, including Kaiser's method and Parallel Analysis, with some divergence in the literature[21-23] as to which is the most adequate one for a certain situation. Besides, it is important to point out that this type of estimate is purely statistical, that is, it considers only analysis data and their limitations, thus disregarding theories that might explain the phenomenon in a more complete and comprehensive way. This study considered the theoretical conceptions used for designing the instruments, with the choice of defining *à priori* the number of extracted factors. Thus, the scales relative to the analysis of aspects that favor motor skill and technical-tactical strategy

development explains, respectively, 70.19% and 74.29% of the total variance of their constructs, when said scales are explained by three factors (see Tables 2 and 3). This initial result is highly satisfactory, as a small number of items (10 and 11 items)[19,24] is proven to be sufficient to explain a good portion of the analysis constructs, when assessed by the proposed scales.

Considering that all commonalities (h^2) relative to the items of the scales are adequate ($h^2 > 0.30$) and greater after rotation, that the factorial solutions are pure, that is, have no significant double saturations ($Sat_f > 0.40$), and that each measured item saturates significantly[25] ($Sat_f \geq 0.407$) in its respective factor, the proposed dimensional solutions seem satisfactorily adequate (see Tables 2 and 3)[19,20,25].

Table 2. Factorial solution and reliability indexes of GBS-MS-10

MSRL	Item	Brief Description	h^2 Rotation no	h^2 Rotation yes	1st Order PeO	1st Order EvO	1st Order CfO	2nd Order MSRL
PeO	1	Minimizes early specialization…	.660	.809	.677			.714
	4	Respects development…	.442	.617	.656			.538
	7	Suits the motor stage…	.487	.663	.585			.601
EvO	2	…Varied motor skills.	.866	.903		.919		.689
	5	…Technical foundations.	.795	.910		.833		.696
	8	…Specific skills	.411	.479		.717		.368
	10	…Useful skills.	.382	.621		.520		.501
CfO	3	Proposes smaller spaces…	.683	.822			.876	.533
	6	Stipulates dynamics…	.540	.672			.654	.554
	9	Uses adapted materials…	.508	.645			.546	.586
					PeO	EvO	CfO	Total
Variance after rotation					46.8	13.9	9.4	70.2
Standardized Cronbach's Alpha					.746	.827	.783	.869

Note: PeO = Pertinence Orientation; EvO = Evolution Orientation; CfO-Conformation Orientation, h^2 = Commonality
Source: The authors

Table 3. Factorial solution and reliability indexes of GBS-TS-11

TSRL	Item	Brief Description	h^2 Rotation no	h^2 Rotation yes	1st Order CfO	1st Order PeO	1st Order CgO	2nd Order TSRL
CfO	1	Proposes tactical variations.	.723	.792	.833			.693
	4	Proposes dynamics…	.723	.840	.741			.729
	7	Stimulates different solutions…	.569	.749	.608			.659
	10	Uses adapted materials…	.354	.475	.407			.526
PeO	2	It is adequate to knowledge…	.488	.561		.775		.414
	5	It is adequate to develop…	.630	.737		.708		.609
	8	… apply tactical knowledge.	.682	.759		.699		.660
CgO	3	…Perception and analysis of the situation	.766	.918			.818	.848
	6	… Mental solution capacity.	.621	.840			.743	.762
	9	…Stimulates tactical intelligence.	.784	.911			.724	.862
	11	…Tactical creativity.	.711	.871			.713	.820
					CfO	PeO	CgO	Total
Variance after rotation					57.0	11.1	6.2	74.3
Standardized Cronbach's alpha					.837	.795	.908	.921

Note: CfO = Conformation Orientation; PeO = Pertinence Orientation, CgO = Cognition Orientation, h^2 = Commonality.
Source: The authors

Having partially achieved the first specific objective of this study, the resulting factors must be named. This is a fundamentally qualitative process in which authors choose, according to the contents of the items, the names for the factors. To make sure that the chosen names actually correspond to the contents of the items, four evaluator judges were invited to contribute with their individual opinions. The result of the agreement between the judges, through Kappa calculation (k = 0.92)[26,27], is unquestionable: the judges agreed on the suggested nomenclatures. The GBS-MS-10 is composed of three factors, named Pertinence Orientation (PeO), Evolution Orientation (EvO) and Conformation Orientation (CfO). The GBS-TS-11 is also composed of three factors, named Conformation Orientation (CfO), Pertinence Orientation (PeO) and Cognition Orientation (CgO).

Having identified which and how many intrinsic factors the constructs had, it was verified whether the suggested models fit the available data – according to the specific objective of this research. Thus, the second part of the ESEM was conducted, and its results are displayed in Table 4, according what Kline[16] and Brown[17] recommend: present at least one absolute fit index (in this case, the ratio between chi-squared and degree of freedom – χ^2/gl; and the Adjusted Goodness-of-Fit Index – AGFI) –, which allows assessing how statistically similar the observed variance-covariance matrix is to the estimated matrix; a parsimony correction index (in this case, the Root Mean Square Error of Approximation – RMSEA) – which is similar to the previous index but integrates a statistical correction that allows correcting a possible initial poor goodness-of-fit of the model; and a comparative fit index (in this case, the Comparative Fit Index – CFI) –, which allows assessing the fit of the hypothetical model by the bias of the null model, that is, covariances equal to zero.

Table 4. Fit indexes for the tested tridimensional models

	Fit Indexes				
	absolute		parsimonious	comparative	
	χ^2/gl	AGFI	RMSEA	CFI	NNFI
GBS-MS-10	1.567	1.000	.052	.995	.988
GBS-TS-11	1.141	1.000	.026	.999	.998

Source: The authors

The results displayed in Table 4 show satisfactory absolute fit indexes for the 2nd Order models. These results revealed chi-squared/degree of freedom relations and satisfactory AGFI indexes ($\chi^2/gl < 2.0$; AGFI > 0.95), indicating that the data, indeed, fit the hypothetical model by the bias of the estimated and calculated covariance matrices[16]. Analyzing parsimonious fit indexes, the RMSEA presented satisfactory index (RMSEA < 0.05) for GBS-TS-11, and boundary index for GBS-MS-10, without statistical differences when compared to the suggested parameter ($RMSEA_{MS} = 0.052$; $PCLOSE_{MS} = 0.871$). Finally, results relative to comparative fit indexes (CFI > 0. 95; NNFI > 0. 95) show that the assessed data properly fit the hypothetical model of the assessed construct.

The third specific objective of this research, relative to the measurement of accuracy of each one of the scales and their respective factors, can be achieved by the bias of internal consistency, by calculating standardized Cronbach's alpha coefficients. All results, by studied dimension and for total scale, are displayed in Tables 2 and 3. They varied from 0.736 to 0.908 when the dimensions were assessed separately, and from 0.869 to 0.921 for the complete scales. These results are satisfactory indicators of the accuracy of each one of the scales and their factors, and it is possible to state that the results for each one of the items, for each one of the dimensions, are mutually consistent, representing an accurate measurement of orientations individually.

Discussion

According to results found, it can be stated that the constructs, as they are measured on these two scales (GBS-MS-10 and GBS-TS-11), are more complex than the common sense. Thus, it would be inaccurate, at least, to argue that a sport competition favors (in general) the development of motor or tactical-strategic skills. For a more accurate approach of the subject, it is therefore necessary to indicate which one guides it.

The Favored Motor Skill Development construct can be subdivided into three factors: (1) Pertinence Orientation (PeO); (2) Evolution Orientation (EvO); and (3) Conformation Orientation (CfO).

Pertinence Orientation (PeO) is the dimension that assesses whether competition is adequate to its participants, taking into special consideration their respective motor stages, that is, if the assessed practice develops that which is expected in the proper phase, preventing prematurely specialized practices, for instance. The main assumption is long-term sport training, as it is expected that, from seven to 12-13 years old, individuals go through the initiation and general basic formation step and, from 13 years of age, comes the stage for training modality-specific gestures[28,29].

As for Evolution Orientation (EvO), it basically assesses which type of motor skill the practice favors. Stimulating experience with and practice of varied motor skills can be an alternative of this dimension. For instance: encouraging children to participate in different track-and-field races (using rules or other strategies)[30].

Lastly, Conformation Orientation (CfO) is the dimension that assesses structural and functional adaptations in the making of competition rules, such as use of materials and spaces adapted to children, or creation of special rules and dynamics. In basketball, for instance, using smaller balls, mini courts and lower baskets may contribute to a better development of shooting techniques. Likewise, the establishment of a rule to have all children taking all positions in volleyball (attacker, setter, libero, etc.) may stimulate the development of several skills, also preventing early motor specialization[31].

The GBS-MS-10, therefore, is intended to measure aspects that favor motor skill development by means of sport competition from a perspective similar to Rost's conception[30], who states that, to have a sport competition that is more adequate to the reality of children and youths, the contents, rules and evaluation criteria, as well as instruments, equipment and materials employed, must change (CfO). The author also points out that, for the child's multilateral development, multiple events must be promoted with traditional and non-traditional contents, especially in the form of collective competitions, as well as participation in competition of other modalities (EvO), stimulating the development of different motor skills and preventing early motor specialization. With these measures, it is believed that competition becomes more pertinent to children and young athletes, mainly when it comes to their respective motor development (PeO).

The Favored Tactical-Strategic Development construct can likewise be subdivided into three factors: (1) Conformation Orientation (CfO); (2) Pertinence Orientation (PeO); and (3) Cognition Orientation (CgO).

Conformation Orientation (CfO) is the dimension that assesses structural and functional adaptations[8] in the making of competition rules. Thus, a competition for children that uses the same materials, spaces and rules as in professional sports may cause the game to be no longer possible. The challenge faced by children during a tennis match, for instance, then becomes that of managing to execute a movement that makes the ball reach the other side of the court. From this perspective, their actions no longer coincide with the logics of the game (hitting the ball toward the other side so as to hinder the opponent's response). By adjusting structures and rules, allowing the game to happen, children are stimulated to play

according to the logics of the game and, consequently, solve tactical problems that are inherent of each modality[32].

As for Pertinence Orientation (PeO), it assesses whether the competition suits its participants, taking into special consideration the level of tactical knowledge of its participants and their ability to put what they know into practice[33]. For instance, the tactical complexity of a 11x11 match in football is greater than that of a smaller one because the number of possible decisions in the first case is way higher.

Finally, Cognition Orientation (CgO) is the dimension that assesses aspects related to the development of perception and decision making as to tactical-strategic actions. For such a purpose, the assessed practice should stimulate tactical intelligence development, and the game, in this context, is a possible strategy for this to happen[29]. Therefore, competitions that provide different problems – be them playing against different opponents, or the proposition of alternative dynamics – allow a larger number of moments for participants to experience a variety of situations concerning perceptions and decision making. For instance, proposing that points scored on the net (volley or smash) are worth double could stimulate the development of new tactical solutions in a tennis match.

This model, in its turn, is linked to the Teaching Games for Understanding (TFfU) proposal[32]. Its authors, just as many others[34,35], argue that sports and, consequently, sport competition, should somehow stimulate the development of perception and tactical situation analysis, capacity of mentally solving problems resulting from disputes, in addition to stimulating intelligence and tactical creativity – structures of cognitive processes related to tactical-strategic development (CgO).

Despite the fact that each sport modality requires different cognitive components, there are authors[32,36,37] pointing out that tactical understanding is of uttermost importance not only for adequate performance on the modality in question, but also because it is possible to transfer acquired knowledge to other modalities. In this context, besides cognitive requirements, it is also important, especially in childhood, that the games make sense and are pertinent to those who play them. Tactical requirements above the comprehension capacity of players do not represent adequate means for tactical-strategic development (PeO). Playing aimlessly becomes unproductive because, in this age group, understanding the game and its internal logics is extremely important[32,38,39]. Adapting the game, in different ways, is an alternative to achieve goals related to tactical-strategic development (CfO). Changes to the structure or operation of the game, such as the proposition of game variations, different dynamics and use of adequate materials, are suggested by many authors[4,32,37].

Conclusions

After applying the instruments to a varied sample of sport coaches and physical education teachers and carrying out the analyses and interpretations pertinent to the presentation of the first pieces of evidences on the validity of these instruments, it is possible to state, about the specific objectives (SO) to be achieved in this study, that both scales (GBS-MS-10 and GBS-TS-11) are composed of three second-order dimensions (SO1), with stable internal structures (SO2), which reveals the complexity of these constructs in the context of sport competitions for children and youths. The factors found, and respectively named according to the contents of the items, proved to be accurate, and so did the complete scales; therefore, it is possible to rely on these results for future applications of said scales (SO3). Thus, it can be concluded that this study indeed presented the first pieces of evidence on the validity of the scales referring to aspects that favor tactical-technical development in the Multidimensional Theoretical-Explanatory Model for Favoring the Development of Pedagogical Contents in Sports Among Children and Youths.

The employment of these scales can be particularly useful for coaches and teachers, as they can help identify pedagogical orientations for sport practices, verifying the adequacy of the latter to the capabilities, interests and needs of their athletes. Likewise, it can contribute to the pedagogical management of competitive events, since these instruments are capable of assessing and, consequently, identifying possible pedagogical limitations in these competitions. Nevertheless, just as in all validation processes involving psychometric instruments, further researches should keep showing validity evidence for the scales herein presented, as well as for the other scales belonging to the GBTB-PC, whether with larger samples or other methods, since every new use of the instrument, regardless of context, represents progress in the sense of improving the theoretical value of the studied concept. As a suggestion for new studies, the invariance of each one of the scales could be measured, and the relations between them could be investigated from the multidimensional explanatory model.

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