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Validity evidences of two Sports-Pedagogy-related scales: socio-educational and autonomy development in youth sports

Evidências de validade de duas escalas relacionadas à Pedagogia do Esporte: desenvolvimento socioeducativo e de autonomia no esporte infantojuvenil

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Abstract – Competition is the essence of sports and, when conceived having participants as references, it can contributes to the development of different pedagogical contents, among them, socio-educative aspects and autonomy. The purpose of this research was to demonstrate the first validity evidences of two scales for supporting socio-educational and autonomy development in youth sports; both are part of the Battery of Tests Gonçalves-Balbinotti of Pedagogical Contents' Development Support in Youth Sports. We aim to estimate their internal structures, test their stabilities and estimate their internal consistency. A sample of 210 coaches answered the scales related to socio-educational and autonomy development, which presented second order two-factor structures with significant factor loadings (> 0.40) and explaining 80.6% and 73.2% of the constructs' total variance, respectively. The results related to the model fit were satisfactory (X^2/df < 2.00; AGFI > 0.95; RMSEA < 0.05; CFI > 0.95; TLI > 0.95). The results regarding the internal consistency (0.786 < α < 0.913 for the factors; α_{SE} = 0.889; α_{Au} = 0.870) assure the precision of the measures and the reliability of their uses according to their purposes. The results answer the main and specific purposes of this research and indicate the safe use of these two scales.

Key words: Education; Personal Autonomy; Psychometrics; Teaching.

Resumo – *A competição é a essência do esporte e, quando concebida tendo como referência o praticante, pode contribuir para o desenvolvimento de diferentes conteúdos pedagógicos, dentre eles, aspectos socioeducativos e autonomia. O objetivo deste estudo foi demonstrar as primeiras evidências de validade de duas escalas de favorecimento ao desenvolvimento socioeducativo e de autonomia no esporte infantojuvenil; ambas compondo a Bateria de Testes Gonçalves-Balbinotti de Favorecimento ao Desenvolvimento de Conteúdos Pedagógicos no Esporte Infantojuvenil. Objetiva-se estimar as estruturas internas, testar suas estabilidades e estimar suas consistências internas. Uma amostra de 210 treinadores respondeu as escalas relacionadas ao desenvolvimento socioeducativo e de autonomia, as quais apresentaram estruturas de segunda ordem com saturações fatoriais significativas (> 0,40) e explicando 80,6% e 73,2% da variância total dos construtos, respectivamente. Os resultados relacionados ao ajuste do modelo foram satisfatórios (X^2/df < 2,00; AGFI > 0,95; RMSEA < 0,05; CFI > 0,95; TLI > 0,95). Os resultados relativos à consistência interna (0,786 < α < 0,913 para os fatores; α_{SE} = 0,889; α_{Au} = 0,870) asseguram a precisão das medidas e a fidedignidade dos seus usos de acordo com o proposto. Os resultados respondem aos objetivos geral e específicos da pesquisa e indicam o uso seguro destas duas escalas.*

Palavras-chave: *Educação; Autonomia; Psicometria; Ensino.*

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INTRODUCTION

When established in a context of intentional guidance/teaching, sport pedagogy embraces the development of different Pedagogical Contents (PC) in both contexts – practice sessions and competition; being the sporting competition one of the most important pedagogical environment when developing these elements[1]. Many authors[1-3] have argued that the same premises applied to youngsters' sports training and development could be applied to competitive events. In this sense, several sports federations around the world, such as ITF, IAAF, and German Football Federation have adopted new competitive models for children and teenagers. However, these new proposals not necessarily guarantee the success of these practices. Therefore, it seems essential that systematic evaluations are made in order to identify whether the strategy adopted by these events meet the expectations of those who conceived them, as well as whether they meet the expectations, needs and interests of the other stakeholders (athletes, coaches, parents etc.).

To this end, it was developed the Battery of Tests Gonçalves-Balbinotti of Pedagogical Contents' Development Support in Youth Sport (BTGB-CP)[4]. The BTGB-CP is based on a multidimensional theoretical-explanatory model of pedagogical contents' development support in (competitive) youth sport[5] (see Figure 1 for more detail), which supports the possibility of a single sport activity to embrace a wide range of PC's and goals, and lead to several outcomes at the same time, corroborating with Côté and Hancock[6]. The battery is composed by a set of six independent scales, related to each of the Specific PC's established in the model. Therefore, these scales propose to measure how much sporting competitions support the development of a given PC, identifying orientations and potential pedagogical flaws or limitations of sports practices based on coaches' perceptions.

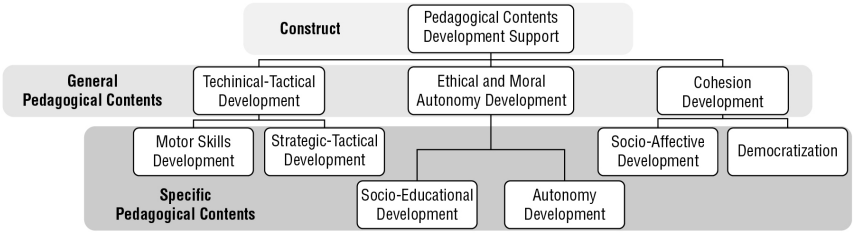

Figure 1. Multidimensional Theoretical-Explanatory Model of Pedagogical Contents' Development Support in Youth Sport. Source: Gonçalves[5].

Thus, this study aims to demonstrate the first validity evidences of the scales related to Ethical and Moral Autonomy Development: the Gonçalves-Balbinotti Scale of Socio-Educational Development Support in Youth Sport (EGB-SE-8), and the Gonçalves-Balbinotti Scale of Autonomy Development Support in Youth Sport (EGB-Au-10). Three specific objectives (so) were drawn up: (so1) estimate the internal structure related to both scales, according to the available data; (so2) test the internal structures' stabilities of the scales, obtained with the available data; and (so3) estimate the internal consistency of the scales and their respective factors.

METHODS

Participants

The sample comprised 210 coaches, being 145 men, and 65 women, with ages ranging from 20 to 75 years old ($\overline{x}$= 38.87; DP= 10.49). The sample had on average 16.67 years of experience as coaches (DP= 10.85). Coaches were from 19 different sports, being Judo (34), Rhythmic gymnastics (28), Tennis (26), Soccer (19), Volleyball (18), Artistic Gymnastics (18), and Futsal (16) those with higher frequencies. Other sports had, in total, 51 answers. All coaches took part in institutionalized events, and were selected according to their availability and accessibility to their institutions (clubs, schools, academies etc.). This is a non-random sample, highly recommended for this type of research, and considered as an adequate source of information.

Instruments

The Gonçalves-Balbinotti Scale of Socio-Educational Development Support in Youth Sport (EGB-SE-8), and the Gonçalves-Balbinotti Scale of Autonomy Development Support in Youth Sport (EGB-Au-10) comprise 8 and 10 items, respectively, positively formulated. These statements describe simple elements frequently discussed in the context of the respondents (sports coaches and PE teachers). For example, "The analyzed event values honesty", and "The analyzed event stimulates decision making". Such items were meant to be responded according to a Likert type scale ranging from "I strongly disagree" (1), to "I strongly agree" (6). By indicating a high score, the respondent indicates that the analyzed event supports the development of the evaluated PC.

Statistical analysis

Initially, we verified the factorability of the correlation and covariance matrices through the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy, the Bartlett's test of sphericity, and the determinant of the correlation matrix verification. Following these procedures, we performed an Exploratory Structural Equation Modeling (ESEM) for each scale – as recommended by Ferrando and Lorenzo-Seva[7]. Moreover, we tested the fittings of the obtained models, and their results (X^2/df, AGFI, RMSEA, CFI and TLI) will be displayed according to the specialized literature recommendations[8]. Furthermore, we computed the internal consistency of each scale as well as their dimensions' according to standardized Alpha coefficients. Lastly, we computed the correlation between the scales. All analyses were performed based on polychoric matrices, as these are considered the most adequate when using ordinal data[9]. Statistical procedures were performed with the software Factor 10.5.3.

RESULTS

In order to verify the matrices factorability, we estimated the Kaiser-Meyer-Olkin coefficient (KMO_{SE} = 0.855; KMO_{Au} = 0.850), the determinant of the correlation matrix ($det(R)_{SE}$ = 0.0338; $det(R)_{Au}$ = 0.0317) and performed the Bartlett's test of sphericity ($p < 0.001$ for both scales). Their results indicated that the items correlations are adequate to proceed to the factor analyses and the result of the redundancy of information measurement was different from

zero ($|R| \neq 0$), indicating the absence of collinearity among all items. These results assure an appropriate interpretation of the factor analyses[9].

Answering research's first specific objective (so1) – the one related to the scales' internal structure – we performed a Robust Diagonally Weighted Least Squares (RDWLS) with Promax rotation (Kappa = 4), testing individually both scales' factor structures. It was decided to set them à priori (two factors on each scale) considering the theoretical conceptions used in the development of the instruments. The analyzed scales explain 80.6% and 73.2% of the total variance of their respective constructs – satisfactory results given the reduced number of items (8 and 10 items)[10].

The second order two-factor solutions proposed are satisfactorily adequate considering: the scales' items communalities (h^2> 0,30) before and after rotation; the pure factorial solutions (except for the item 5 of the EGB-SE-8); and the significant factor loadings (> 0,40) in their respective dimensions (see Tables 1 and 2)[11].

Table 1. EGB-SE-8 factorial solution and reliability indices.

Factor	Item	Brief description	Exploratory Structural Equation Modeling				
			h2		Factor Matrix		
			Rotation		1st order		2nd order
			no	yes	OCo	OEt	SE
OCo	1	… Experiences of winning for everyone.	.635	.666	.861		.426
	3	... Experiences of defeat for everyone.	.622	.723	.812		.470
	5	... Teaches how to win and how to lose.	.644	.719	.468	.443	.684
	7	... Values the effort.	.420	.574	.460		.525
OEt	2	... Encourages respect for the opponent.	.747	.784		.920	.742
	4	... Encourages respect for the partner.	.708	.827		.888	.726
	6	... Values honesty.	.735	.790		.872	.525
	8	… promotes loyalty.	.728	.800		.782	.763
					OCo	OEt	TOTAL
Factor variance after rotation					63.6	17.0	80.6
Standardized Alpha					.815	.913	.889

Note. OCo: Orientation to Competition; OEt: Orientation to Ethics; h^2: Communality.

Table 2. EGB-Au-10 factorial solution and reliability indices.

Factor	Item	Brief description	Exploratory Structural Equation Modeling				
			h2		Factor Matrix		
			Rotation		1st order		2nd order
			no	yes	OFE	ODM	Au
OFE	1	… Allows contributions to reffereeing.	.444	.798	.725		.373
	3	... Allows participants to create rules.	.399	.473	.715		.313
	5	... Develops free will.	.621	.648	.599		.631
	7	... Allows participants to conduct their own practice.	.336	.384	.526		.419
	9	… Encourages freedom of choice.	.467	.817	.509		.553
ODM	2	… Encourages self-government. .	.739	.771		.962	.721
	4	... Encourages contribution with decisions.	.683	.820		.895	.710
	6	... Responds to their actions.	.551	.697		.681	.669
	8	... Allows free will.	.587	.674		.617	.692
	10	... Encourages decision making.	.415	.561		.568	.582
					OFE	ODM	TOTAL
Factor variance after rotation					56.1	17.1	73.2
Standardized Alpha					.786	.868	.870

Note. OFE: Orientation to Freedom of Expression; ODM: Orientation to Decision Making; h^2: Communality.

Naming EGB-SE-8 and EGB-Au-10 factors was an essentially qualitative process that went through an agreement evaluation held by four invited raters. The inter-rater agreement result was "almost perfect" (K = 0.90)[12], which indicates

that the raters do agree with the suggested names. The construct's intrinsic factors (orientations) and their brief description are presented on Chart 1.

Chart 1. Orientations and brief descriptions.

Scale	Orientation	Brief description
EGB-SE-8	Orientation to Competition (OCo)	Evaluates how much an event supports the development of educational aspects related to winning and losing.
	Orientation to Ethics (OEt)	Evaluates how much an event supports the development of values related to fair play, such as respect, honesty and loyalty.
EGB-Au-10	Orientation to Freedom of Expression (OFE)	Evaluates how much an event supports aspects related to manifestation of opinions, ideas, and thoughts.
	Orientation to Decision-Making (ODM)	Evaluates how much a competition supports the development of aspects related to volitional choice processes, both in-game situations and in attitudinal terms.

With the factors once identified, we verified whether the second order two-factor models suggested do fit the available data – second specific objective (so2) of this research. Thus, the second part of the ESEM was conducted and its results are displayed according to Kline's[8] recommendations (see Table 3).

Table 3. Fit indices for the second order two-factor models.

Scale	Absolute fit indices		Parsimony fit index	Comparative fit indices	
	X2/df	AGFI	RMSEA	CFI	TLI
EGB-SE-8	1,357	0,996	0,041	0,997	0,994
EGB-Au-10	1,067	0,992	0,018	0,999	0,998

Note. X^2: Chi-squared; df: degrees of freedom; AGFI: Adjusted Goodness of Fit Index; RMSEA: Root Mean Square Error of Aproximation; CFI: Confirmatory Fit Index; TLI: Tucker-Lewis Index.

The results displayed on Table 3 show satisfactory indices of absolute fit for the second order two-factor models. They indicate that the data, indeed, fit the hypothetical model through the estimated and calculated covariances matrices' bias ($X^2/df < 2.0$; $AGFI > 0.95$); we verified that the RMSEA presented satisfactory indices ($RMSEA < 0.05$) for both scales; and regarding the comparative fit indexes (CFI and $TLI > 0.95$), the evaluated data do adequately fit to the evaluated construct's hypothetical model.

Furthermore, we measured the precision of each scale and their respective factors through the internal consistency bias (Standardized Alpha) – third specific objective (so3) of this research. All indices displayed on Tables 1 and 2 ranged from 0.786 to 0.913 when the dimensions were evaluated independently and from 0.870 to 0.889 when evaluated both complete scales. These results satisfactorily indicate both scales precision, being items and dimension mutually consistent, representing a liable measure of each orientation individually.

Finally, we computed the polychoric correlation between the EGB-SE-8 and the EGB-Au-10. The result indicates a strong correlation between the scales ($r_p = 0.602$). This may indicate that both scales could be part of a greater dimension, as theoretically assumed.

DISCUSSION

According to the results, the constructs are more complex than the common sense; considering the way they are measured by these two scales. Thus, it would be at least imprecise to simply affirm that a sporting competition supports (generally speaking) the development of one of these studied PC's. In order to have a proper approach to this matter, it is therefore necessary to indicate which specific orientation is being addressed.

The construct "Socio-educational Development Support" can be compartmentalized into two factors: (1) "Orientation to Competition" (OCo), and (2) "Orientation to Ethics" (OEt). OCo addresses Marques'[1] theoretical proposal, which supports sporting competitions as an educational and character building model for children and teenagers. According to the author[1], opposition and competition (against others or against oneself) is a fundamental pedagogical tool, which should conduct every sports practice. In this context, sporting competition's pedagogical potential is only achieved if the individual tries his best[13]. Thus, both, the victory and the loss, and their associated feelings, will be enriching. On the other hand, the dimension OEt is related to conceptions that deal with values and attitudes within sports, such as friendship, honesty, cooperation, tolerance, and respect[14]. Respect the rules, opponents, partners, and so on, is an essential exercise in sports. Despite of being part of sports' code of conduct, sometimes these values and attitudes are unjustifiably neglected for the sake of success. In fact, during childhood and adolescence these standards should be reinforced, as both dimensions are strongly related intrinsic values associated with sport[15]. In this sense, authors suggest strategies such as the adoption of ethics contracts or prizes and awards for attitudes of respect[16,17].

On the other hand, the construct "Autonomy Development Support" can be explained by two different factors: (1) "Orientation to Freedom of Expression" (OFE), and (2) "Orientation to Decision-Making" (ODM). This two-factor conception is similar to the one adopted by Reinboth and Duda[18] while developing the Perceived Sport Autonomy Scale (PSAS), a subscale of the Perceived Motivational Climate in Sport Questionnaire-2. The major difference between these two scales is that the PSAS measures the construct from the athlete's perception ("I feel free to express my ideas and opinions"), while the EGB-Au-10 evaluates coaches' perceptions regarding the subject ("The analyzed event stimulates the athletes to contribute to decision making"). According to some authors[19,20] the development of autonomous attitudes in sports is obtained through freedom for decision-making and by facing challenges. Thus, autonomy contributes so the athletes can discover their own paths, making decisions based on their wills. When autonomous, children are capable to make safe decisions as they have previously developed the ability to do so[21,22]. Therefore, the freedom to create rules, contributing to refereeing; and the incumbency of taking responsibility for attitudes and decisions taken, contribute to autonomy development and allow children and youngsters to be spontaneous during the activity. This exchange of ideas and suggestions among participants, co-learning and establishing new ways of play, is undoubtedly development of culture; a form of culture named by Brougère[23] of ludic culture – directly related to pleasure and personal satisfaction. As being a basic psychological need, autonomy reinforces individual's engagement, stimulating intrinsic motivation and thus becoming a key factor to the permanence in the sport[24]. By satisfying autonomy need,

the children develop greater self-esteem and competence perception in the cognitive domain[25].

Finally, the results associated to the correlation between the scales may indicate that these constructs, the way they are measured, are part of a greater dimension – a third order factor. As theoretically suggested by Gonçalves[5], Socio-Educational Development and Autonomy Development comprise a factor named "Ethical and Moral Autonomy Development", which may be linked to the conception of educational sports and outcomes related to Personal Development[6].

The values and beliefs that coaches hold play a significant role in understanding why they act in certain ways. Lyle and Cushion[26] noted that coaching actions are influenced either consciously or unconsciously by the coach's personal values. However, the coach's personal values may not always be congruent with public or organizational values and situational constraints[26]. Therefore, there is potential for a coach to verbalize values that align with the social situation but are not consistent with his or her coaching actions, which are guided by personal values[27]. Furthermore, Gomes et al.[28], highlights an imbalance between male and female coaches because they seem to interact differently with athletes. Overall, in the present study, to demonstrate the validity of two scales for supporting socio-educational and autonomy development in youth sports based on male and female coaches' perceptions is important to consider that what they say is not necessarily the way they act.

CONCLUSIONS

In summary and answering precisely the three specific objectives of this study, we can assure that both scales are satisfactorily explained by second order two-factor models (so1), which present also satisfactorily indices when we compared the behavior of the available data with the theoretical model; they are models with stable internal structure (so2). Both complete scales and their factors (properly named according to the items' content) proved to be accurate; so that, we can trust the results obtained in future research (so3). Therefore, we conclude that this study did present, in fact, the first evidences of validity of the two scales related to Ethical and Moral Autonomy Development, components of the Battery of Tests Gonçalves-Balbinotti of Pedagogical Contents' Development Support in Youth Sport (BTGB-CP).

The use of these scales may be particularly useful for sports coaches and PE teachers, as they can contribute to the identification of sports practices that best suit the interests and needs of their athletes. Still, they may contribute with the pedagogical management of those who conceive these events, as they will have new tools for evaluation and consequent identification of possible limitations of their events.

However, as in all validation processes of psychometric instruments, further research should continue to demonstrate evidences of the BTGB-CP's validity, as each new use of the instrument represents new progress in the sense of improving the theoretical value of the studied concept. Furthermore, qualitative research is needed to explore how sports events and coaches can support the socio-educational and autonomy development in youth sports. In that way, the sports participants and athletes' perceptions of their own sports experiences should be considered.

COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

Ethical approval was obtained from the Research Ethics Committee – Federal University of Rio Grande do Sul and protocol (No. 2.572.259) was written in accordance with standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors report no conflict of interest.

Author Contributions

Conceived and designed experiments: GHTG, MAAB, CAAB. Performed experiments: GHTG, RTK. Analyzed data: GHTG, MAAB, CAAB. Contributed with reagents/materials/analysis tools: GHTG, MAAB. Wrote the paper: GHTG, MAAB, GG, RTK, VZB. All authors read and approved the manuscript final version.

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