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Measurement Invariance of the Youth Behavioural Regulation in Sport Questionnaire across Five European Countries and Languages.

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Measurement Invariance of the Youth Behavioural Regulation in Sport Questionnaire (YBRSQ) across Five European Countries and Languages.

Abstract

The purpose of this study was to contribute to the factorial validity of the Behavioural Regulation Sport Questionnaire (BRSQ) by providing (1) an adaptation of the BRSQ to the young competitive athletes (YBRSQ) targeted in the PAPA project (i.e., 9-15 years old) in five European countries (France: n=1248, Greece: n=1507, Norway: n=1397, Spain: n=2245, United Kingdom: n=1372), and (2) evidence of measurement invariance of its latent factors across these countries.

Mplus was used to test for invariance of the YBRSQ. First, we tested the exploratory structural equation model (ESEM) factor analyses, allowing cross-loadings between factors, against the traditional independent clusters confirmatory factor analysis model (ICM-CFA), with all cross-loadings constrained to zero. The ESEM showed very good fit indices, whereas the ICM-CFA was not tenable across countries. Second, the ESEM model was used as the baseline model for the tests of factor loading (metric) invariance and factor loading plus thresholds (scalar) invariance. The five factors obtained from the analysis were scalar invariant and interpretable across the five languages as intrinsic motivation, identified, introjected and external regulations, and amotivation, in line with the tenets of self-determination theory.

This study contributes to methodological advances in sport psychology, as it is the first time an adaptation of the BRSQ for young participants has been factor analyzed comparing the more flexible ESEM to the usual independent clusters factor analysis model ICM-CFA. Our data clearly favour using the more flexible weak dimensionality model (ESEM) and suggest a fresh interpretation of previous results may be required.

Keywords: motivation, self-determination theory, youth sport, exploratory structural equation modelling, categorical data

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For several decades, motivation has been one of the most studied topics within sport psychology. Self-determination theory (SDT; Deci & Ryan, 2000) has been prominent in progressing conceptualisation of sport motivation as a qualitative continuum. That is, an important consideration when considering the role of motivation in sport endeavours is the degree to which motivation regulations for a targeted behaviour are self-determined, controlled, or lack motivation altogether. Several studies attest to the role of self-determined forms of motivation for young peoples' cognitions, affect and behaviours in the sport domain (e.g., Alvarez, Balaguer, Castillo & Duda, 2009;Ntoumanis, 2012; Ommundsen, Lemyre, Abrahamsen, & Roberts, 2010; Ommundsen, Løndal, & Loland, in press; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). Indeed, there is evidence that young athletes' quality of motivation affects their psychological well-being (e.g., Blanchard, Amiot, Perreault, Vallerand, & Provencher, 2009; Gagné, Ryan, & Bargmann, 2003; Smith, Ntoumanis, Duda, & Vansteenkiste, 2011) as well as their intention to dropout and actual dropout (Sarrazin et al., 2002).

Recent advances in understanding self-determined motivation in sport have been possible due to the development of the Behavioural Regulation in Sport Questionnaire (BRSQ) (Lonsdale, Hodge & Rose, 2008). The BRSQ is a self-report measure of three broad types of motivation advanced by SDT (Deci & Ryan, 2002). According to Deci and Ryan (1985, 2000) motivation regulations that underpin behavioural engagement in activities such as sport are considered to lie on a continuum. This continuum reflects variations in the degree to which the purpose of behavioural engagement is internalised. Intrinsic motivation describes the motivation that lies at the most autonomous end of the continuum. Intrinsically motivated behaviours are undertaken for reasons such as the inherent enjoyment, interest and satisfaction derived from engagement in the behaviour, and other reasons that might be considered authentic to the individual. In contrast, when the motivation to engage in sport is fully or partially derived from something or someone separable from task participation, the regulation is described as extrinsic. However, the degree to which the behaviour's value and purpose has been internalised may vary (Ryan & Deci, 2000). According to SDT, this variability in internalisation can be categorised into four types of extrinsic motivation, which are labelled as integrated, identified, introjected and extrinsic. Deci and Ryan (1985,

2000) conceptualise integrated regulation as the most self-determined of the extrinsic regulations, lying closest to intrinsic motivation on the continuum. Integrated regulation describes when the athlete's behavioural engagement is brought into congruence with personally endorsed needs, values and goals. Next on the continuum is identified regulation. When an athlete fully accepts, identifies with, and personally endorses the reasons to perform the behaviour, engagement is described as identified (Ryan & Deci, 2000). In contrast to integrated and identified regulations which are considered autonomous forms of extrinsic motivation, introjected behaviours are regulated by psychological contingencies and thus represent a controlled form of extrinsic motivation. Introjected behaviours are undertaken in order to avoid undesirable psychological responses such as guilt or shame, or because experiencing desirable psychological responses (such as self-worth) are dependent on performing the behaviour. When sporting behaviours are motivated by introjected regulations one is likely to feel that one "should" play or train.

At the far end of the continuum from intrinsic motivation lies the least autonomous of the extrinsic regulations, labelled as external motivation. Externally regulated behaviours are motivated by reasons that have not been internalised at all. This may be to avoid punishment or to gain praise or rewards. Lastly, amotivation essentially describes a lack of motivation. Amotivated actions are passive and lack any intentional aim (Deci & Ryan, 1991). Amotivated players cannot identify any good reason to continue their training and are likely to stop engaging in their sport.

The six motivations proposed within SDT are considered to exist along a continuum representing increasing levels of autonomy and self-determination. Questionnaires such as the BRSQ are designed to measure the degree to which these behavioural regulations underpin sport participation. Individuals scoring higher on the subscales measuring the regulations at the relatively self-determined end of this continuum (i.e., intrinsic, identified, integrated) are expected to score lower at the other end of the continuum (i.e., introjected, external and amotivated) and vice versa. Moreover, the inter-correlations between adjacent motivation regulations along the continuum (e.g., introjected and external) are expected to be higher than the associations with the regulations that are more distal (e.g., introjected and intrinsic), thus contributing to a quasi-simplex pattern (Ryan & Connell, 1989). Deci and Ryan (1985) and Ryan and

Deci (2007) proposed that more self-determined motivation regulations are related to positive outcomes (e.g., enjoyment, vitality), whereas motivations lower in self-determination relate to maladaptive outcomes (e.g., anxiety, intention to drop-out) (for a summary, see Ntoumanis, 2012).

Initial studies on the BRSQ show evidence of factor validity, internal reliability, and test-retest reliability in elite and non-elite samples of athletes (Lonsdale et al., 2008; Lonsdale, Hodge, & Rose, 2009). Lonsdale and colleagues (2008) also reported that factor validity and internal consistency scores of the BRSQ were at least equal, or in some cases superior, to other self-determination-related measures of motivation in sport (i.e., SMS, SMS-6). There is also evidence for the nomological validity of the BRSQ related to self-reported measures of flow and athlete burnout (Lonsdale et al., 2008, 2009). Since its publication, the BRSQ has been translated to Dutch (Assor, Vansteenkinste, & Kaplan, 2009), Greek (Mouratidis, Lens, & Vansteenkiste, 2010), Spanish (Viladrich, Torregrosa, & Cruz, 2011) and Chinese (Chan, Hagger, & Spray, 2011) among other languages (Iranian, Japanese and Swedish, C. Lonsdale, personal communication, May 30, 2012), sometimes with amendments to the scale.

Despite these advances in the use of the scale, some psychometric issues remain. In data collected with young and adult athletes (i.e., from 12 to 58 years of age, mean ranging from 14.04 to 25.9 years) support for the discriminant validity between the external and introjected regulations and between the identified and integrated regulations was inconsistent. Some results showed lack of discrimination or poor fit of the model to the data (Londsdale et al., 2008, 2009; Holland, Woodcock, Cumming & Duda, 2010; Mouratidis et al., 2010), whereas some others showed good discriminant validity (Assor et al., 2009; Viladrich et al., 2011). Moreover, the BRSQ's development was oriented toward young adult sport participants (i.e., items meaningful for competitive athletes of 20 years old) and, consequently, it is not well documented whether the BRSQ is an age-appropriate measure of younger athletes' motivation. Thus, the degree to which younger participants are able to understand the BRSQ items needs further consideration.

Therefore, the main purpose of this present study was to further contribute to the instrument's factorial validity by providing (1) an adaptation of the BRSQ to the young competitive athletes targeted in the PAPA project (i.e., 9-15 years old) in five different European countries (i.e., France, Greece, Norway, Spain, and United Kingdom), and (2) evidence of measurement invariance of its latent factors across these countries.

Method

Participants

Participated 7769 football players (13% female) aged between 9 and 15 years (mean = 11.76, SD = 1.42) from five European countries (France = 1248, Greece = 1507, Norway = 1397, Spain = 2245, United Kingdom = 1372). The participants belonged to 19 regions in these countries, played for 619 teams at grassroots level, reported to have been playing for their teams between the present season and the last 10 seasons (median = 3 seasons, interquartile range= 4), and to train between 0.5 and 10 hours a week (median = 4, interquartile range = 1.5). The greatest proportion of girls was included in the Norwegian sample (42%), modest proportions of girls came from the United Kingdom (14%) and Spanish (9%) samples, whereas very few girls were present in French (3%) and Greek (1.6%) samples.

Measures

The **Youth Behavioural Regulation in Sport Questionnaire (YBRSQ)** was initially developed from the BRSQ-6 (Lonsdale et al., 2008) in English. Based on (1) the results from the literature indicating that the identified and integration regulation subscales did not separate clearly (Lonsdale et al., 2008; Mouratidis et al., 2010) and (2) Lonsdale et al's (2008) suggestion that a questionnaire format was not well suited for assessing integrated regulation, and (3) Vallerand's (1997) assertion that this type of motive was not prevalent until adulthood, the integrated regulation subscale was excluded from the YBRSQ. The 20 remaining items from the BRSQ-6 were scrutinized by a committee of researchers familiar with both the SDT framework and the development of questionnaires for young participants. Some items were reworded to make the reading level more appropriate for children and adolescents (e.g., the item "*but the reasons why are not clear to me anymore*" tapping amotivation, was reworded as "*but I really don't know why anymore*"; the item "*because the benefits of sport are important to me*" tapping identified regulation was presented with the addition of examples (e.g., "*developing as a player, getting* *fit, playing with my teammates*”). The final result was a 20-item questionnaire measuring amotivation (4 items), external (4 items), introjected (4 items) and identified (4 items) intrinsic (4 items) regulations. The response scale was modified from seven to five points (1 = *strongly disagree*, 5 = *strongly agree*) and the order of items were also adapted. The items were preceded with the instructions: "Indicate how well each of the reasons below reflects why you play football for this team", and the stem: "I play football for this team…". The YBRSQ was translated into French, Greek, Norwegian, and Spanish taking into account the guidelines from the International Test Commission (Hambleton, 2005; see Duda et al, this edition). The full scale in the five languages is available from the corresponding author upon request.

Procedure

The PAPA project procedure protocol (see Duda et al, this edition) informed data collection securing a standardised set of procedures followed in all countries. All data utilised in this study were collected during the first part of the sport season, in spring 2011 in Norway and between fall and winter 2011/12 in the other countries.

Data management and analysis

YBRSQ data were cleaned and screened for patterns of missing values prior to the creation of an international file for main analysis. In order to test for measurement invariance, M*plus* (Muthén & Muthén, 1998-2012) was used. We followed the recommendations proposed by Millsap and Yun-Tein (2004) for categorical variables, and Marsh, Nagengast and Morin (2012) for exploratory structural equation models (ESEM). This process involved testing four nested models. First we tested the ESEM model (model 1) against the independent clusters factor analysis model (ICM-CFA, model 2). The ICM-CFA stands for the traditional confirmatory factor analysis, which allows a researcher to test the hypothesis that a specific number of factors are represented by certain indicators, with all cross-loadings constrained to zero (Skrondal & Rabe-Hesketh, 2004). ESEM relaxes this restriction and factor loadings in all factors are estimated for each item, obtaining parameter estimates similar to those obtained by classical exploratory factor analysis plus the standard errors and goodness of fit indices usually associated to CFA (Asparouhov & Muthén, 2009). The relaxed factor cross-loadings are the reason why ESEM is also called weak dimensionality model whereas the ICM-CFA is called strong dimensionality model. The comparison of both models provides a test of the hypothesis about cross-loadings being zero or non-zero (Skrondal & Rabe-Hesketh, 2004).

In order to identify the ESEM solution, a decision should be taken among a variety of possible rotations. Due to the previous theoretical and empirical knowledge about the internal structure of the BRSQ (Lonsdale et al., 2008), we deemed the target rotation (Asparouhov & Muthén, 2009; Marsh et al., in press) to be the most appropriate. Target rotation estimates all cross-loadings with the restriction that their values are as close as possible to zero, which is the closest option of ESEM to the ICM-CFA.

Irrespective of ESEM or the ICM-CFA, the model that showed better fit in the first step was taken as the configural model and was used as the baseline model for the tests of factor loading [analogous to item discrimination parameters] invariance (model 3) and factor loading plus thresholds [item location parameters analogous to category difficulty parameters] invariance (model 4). In other words, we tested configural (models 1 and 2), metric (model 3) and scalar (model 4) measurement invariance of the five latent factors measured by the YBRSQ.

Due to the categorical nature of the data and the presence of missing values (see Results section), the weighted least squares mean and variance adjusted (WLSMV) estimator was used with pairwise deletion for missing values, both of them being the Mplus defaults for categorical data. We deemed this approach to be appropriate based on Graham (2009) and Asparouhov and Muthén (2010), who judge that when the percentage of missing data is low, the biases and loss of power attributable to pairwise deletion can be considered inconsequential and better than using listwise deletion of cases. The goodness of fit indices were χ^2, comparative fit index (CFI), Tucker-Lewis Index (TLI), and root mean square error of approximation (RMSEA). In an ICM-CFA analysis with quantitative indicators, CFI and TLI values > .95 and RMSEA < .06 are considered as indicators of excellent fit (Hu & Bentler, 1999), and CFI and TLI values > .90 and RMSEA < .08 are considered as indicators of acceptable fit (Marsh, Hau, & Wen, 2004). Little simulation data are available on the behaviour of these cut-off values in categorical data ESEM analysis, but Yu (2002) suggested using a CFI > .96 for categorical data and most papers using ESEM, including categorical data ESEM (e.g., Myers, Chase, Pierce, & Martin, 2011) rely on them with some caution. All these recommendations were considered in this paper.

In order to compare nested models, two indicators were evaluated; the chi-square difference as computed in Mplus for categorical variables, and the difference in CFI (ΔCFI). As a cut-off value, a ΔCFI < .01 (Cheung & Rensvold, 2002) was considered the more appropriate evidence of increasing invariance, due to the sensitivity of chi-square to the sample size. Standard errors and goodness of fit indexes were calculated taking into account that players' responses were clustered within their teams.

Results

The YBRSQ showed 2.5% of missing responses, with 236 different patterns of missing data. The item distributions (see Table 1) showed sizeable floor or ceiling effects across countries, with skewness being between 0.39 and 2.99 in absolute value, and kurtosis between 0.20 and 10.09 in absolute value.

The item distributions shown in Table 1 justify the treatment of data as categorical. Besides their skewness and kurtosis, the items showed a consistent pattern of results across countries (not displayed, but available upon request), with low values for amotivation and external regulation items, high values for identified regulation and intrinsic motivation items and intermediate values for introjected regulation.

Goodness of fit statistics for all the measurement invariance analyses can be seen in Table 2. Except for χ^2 values, the weak dimensionality model (ESEM) shows very good indexes of fit (CFI = .987, TLI = .976, RMSEA = .035, CI95% = 0.033 ÷ 0.037), whereas the strong dimensionality model (ICM-CFA) was not tenable across countries (CFI = .892, TLI = .872, RMSEA = .080, CI95%= 0.078÷0.081, ΔCFI = -.105). This result was replicated in all data analyses conducted separately by country (results not shown). Thus, the weak dimensionality model (model 1) was tested for subsequent invariance across countries. Results showed good indexes of fit both for factor loadings invariance (model 3, CFI = .972, TLI = .967, RMSEA = .041, CI95%=0.039÷0.042) and factor loadings plus thresholds invariance (model 4, CFI = .964, TLI = .967, RMSEA = .041, CI95%=0.039÷0.042) favouring the conclusion of strong measurement invariance across countries. Model comparison indexes were only marginally favourable to this conclusion due to the ΔCFI value of -.015 when comparing configural invariance versus factor loadings invariance. Modification indexes suggested that the item "*Because I feel I must continue*", the third item tapping introjected regulation (IN3), contributed largely to this value, but we decided not to run a partial invariance because the mixture of invariant and not invariant factor loadings do not have a clear interpretation in the ESEM context (Millsap, 2011). This issue is elaborated upon in the discussion section.

Estimated factor loadings and correlations between factors are displayed in Table 3. The pattern is mostly coherent with the expectations, and factor loadings expected to be high, are generally higher than the cross-loadings expected to be low. With the sole exception of item IN3 from the introjected regulation factor, all indicators showed factor loadings higher than .35 on their intended factors. Moreover, each item's factor loading on its intended factor was higher than its estimated cross-loading on non-intended factors, and these cross-loadings were below .30 in absolute value with only two exceptions (i.e., IN4 tapping introjected regulation, and ID1 tapping identified regulation, both cross-loading into the external regulation factor). Item IN3 cross-loaded onto the identified and external regulation factors. Less noteworthy, the external regulation factor showed the lowest factor loadings in this context (from .393 to .512). The values of the correlation between factors, ranging from -.34 to .62, provide evidence of good discriminant validity between the measured five factors. Moreover, their pattern, changing from higher positive values for adjacent constructs to negative values for distal constructs, is compatible with the simplex-like hypothesis of SDT.

Discussion

The purpose of the present study was to further contribute to the development and validation process of the BRSQ (Lonsdale et al., 2008) by adapting this instrument to youth sports participants (i.e., 9-15 years old) and exploring measurement invariance across five European countries. ESEM analyses indicated that the five YBRSQ subscales showed metric invariance across samples of young European athletes. In spite of using ESEM – an estimation method which allows cross-loadings between factors – the five factors obtained from the analysis are interpretable as intrinsic motivation, identified, introjected and external regulations, and amotivation, as most of the items tapping these concepts loaded clearly on content-coherent factors. The exception is the item IN3 from the introjected regulation subscale, which demonstrated sizeable cross-loadings with the external regulation factor and the identified regulation factor. Furthermore, the correlations between these factors showed good discriminant power (an advantage of ESEM is that it lowers factor correlations by allowing cross-loadings) and produced a simplex-like structure as proposed by SDT.

Collectively, the results from this study provide evidence that the five subscales from the YBRSQ, with the exception of one item (IN3, *I feel I must continue*), represent a good operationalization of the continuum of behavioural regulations, as hypothesized by the tenets of SDT across five of the languages spoken in five European countries. According to SDT, the measured factors were expected to be identifiable and ordered on a continuum from intrinsic motivation to amotivation (Ryan & Connell, 1989); this assumption was supported in this study.

This study also contributes to methodological advances in sport psychology as it is the first time an adaptation of the BRSQ for young participants has been factor analyzed comparing the more flexible ESEM to the usual ICM-CFA factor analysis. Our data clearly favour using the more flexible weak dimensionality model and suggest a fresh interpretation of previous results may be required. The factor analyses published to date on the BRSQ have been ICM-CFA based, and have showed acceptable fit indexes and good factor interpretability (Assor et al., 2009; Lonsdale et al., 2008, 2009; Mouratidis et al., 2010; Viladrich et al., 2011). However, the results from ICM-CFA have sometimes failed to support the discriminant validity between external and introjected regulations and between identified and integrated regulations (Lonsdale et al., 2008; Mouratidis et al., 2010). The implications of a lack of discriminant validity is that tests of process models including motivation regulations will be limited to more general factors of autonomous versus controlled motivation, such as the analysis included in Chan et al. (2011), or a single self-determination index constructed by aggregating scores of all factors (Vallerand, 2001). The results presented in this paper suggest the lack of discriminant validity identified in previous studies could be attributable to the fact that the ICM-CFA model usually produces overestimated correlations between factors as a consequence of factor cross-loadings being unrealistically fixed to zero (Asparouhov

& Muthén, 2009; Marsh et al., 2012). In this study, the more realistic ESEM analysis with target rotation showed that item cross-loadings could be an alternative explanation for the lack of discriminant validity found in previous research.

In our samples, item IN3 was not interpreted as an indicator of the same factor as other introjected items, suggesting that endorsing the item "*I feel I must continue*" could be due to a sense of guilt, contingent self-worth (as per introjection), but it might also be because participating in sport is personally important to oneself (as per identified regulation), or because one wants to receive praise from others (as per external regulation). These alternative interpretations of this item are not age-dependent and thus raise questions about the validity of this item in the original BRSQ.

Despite the advantages offered by ESEM, one limitation of this analytical approach is the difficulty to manage the differential item functioning attributable to partial non-invariance of factor loadings. In our analysis, we accepted marginal statistical gain and decided not to run partial invariance analysis in spite of the fact that some indicators suggested that item IN3 could have not perfectly invariant factor loadings and cross-loadings across countries. Myers et al. (2011) discussed a similar decision in an ESEM analysis using geomin rotation. Aligned with their rationale, we propose that in the context of an ESEM model with target rotation, it does not make sense to freely estimate for each group one factor loading that we suspect not to be invariant. This is because all factor loadings targeted to zero are simultaneously calculated according to the rotation criterion established, thus they are not independent from each other and freeing one of them across groups induces changes in the estimation of all other targeted parameters. In our opinion, this is compatible with Millsap's (2011) warning that some cases of partial invariance are very difficult to interpret in an ESEM context and also with the position taken by Asparouhov and Muthén (2009) that in this framework, only full invariance can be estimated.

Conclusions

Overall, the findings from this study provide initial evidence for the YBRSQ as a measure of motivation regulations and should allow future research to be conducted on the motivation of children and adolescents participating in sport from an SDT perspective. For example, the YBRSQ could be used to assess changes in children's sport motivation over time in intervention studies such as the PAPA project. Future research can also now test process models posited by SDT that include the five regulations measured by the YBRSQ, and such research would also contribute to the nomological validity of the questionnaire. Further evidence of psychometric properties of YBRSQ in European youth athletes could also be obtained by checking for stability over time and comparing factor means across countries controlling for socio-demographic variables such as gender, age and years playing.

In addition to forwarding a sport-specific measure of motivation regulations for children and adolescents, the present study also contributes to methodological advances in sport psychology. The findings from this study demonstrate the considerable promise for the application of ESEM for motivation regulations scales in sport, and suggest a fresh interpretation of previous results from studies in this area that have relied on the more traditional ICM-CFA.

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Table 1. *Item Distributional Characteristics of BRSQ.*

	N	% floor	% ceiling	*M*	*SD*	*Sk*	*K*
AM1 question why I continue	7243	62	6	1.78	1.199	1.469	1.046
AM2 question why I play	7558	64	6	1.71	1.156	1.661	1.765
AM3 don't know why anymore	7523	59	6	1.79	1.171	1.429	1.062
AM4 wonder what's the point	7604	62	5	1.73	1.121	1.524	1.411
EX1 push me	7591	67	5	1.67	1.143	1.686	1.782
EX2 satisfy people	7605	44	10	2.22	1.356	0.787	-0.640
EX3 pressure from others	7594	60	6	1.81	1.216	1.404	0.830
Ex4 others will not be pleased	7610	55	6	1.87	1.185	1.271	0.606
IN1 guilty	7564	35	15	2.56	1.459	0.415	-1.203
IN2 ashamed if quit	7607	52	10	2.04	1.346	1.054	-0.200
IN3 must continue	7590	20	33	3.35	1.520	-0.388	-1.309
IN4 feel like a failure if quit	7589	41	14	2.38	1.455	0.641	-0.994
ID1 benefits important	7582	2	56	4.35	0.895	-1.545	2.401
ID2 value benefits	7616	2	59	4.40	0.882	-1.655	2.768
ID3 self discipline	7575	7	35	3.75	1.216	-0.736	-0.334
ID4 learn useful things	7578	6	38	3.88	1.140	-0.877	0.081
IM1 enjoy	7609	2	74	4.61	0.794	-2.616	7.506
IM2 like it	7622	1	79	4.69	0.711	-2.986	10.086
IM3 fun	7600	3	64	4.43	0.950	-1.902	3.353
IM4 exciting	7609	4	51	4.17	1.076	-1.384	1.350

Note: % floor: percentage of players who picked category 1 (minimum); % ceiling: percentage of players who picked category 5 (maximum); Sk: Skewness; K: Kurtosis

Table 2. *Goodness of Fit Indexes for the Measurement Invariance Models of BRSQ Factors across Countries.*

Model	χ^2	df	$\Delta\chi^2$	Δdf	CFI	ΔCFI	TLI	RMSEA	95%CI RMSEA
ESEM weak dimensionality (model 1)	1445.541	500			.987		.975	.035	.033-.037
ICM-CFA strong dimensionality (model 2)	8616.484	800	5902.181	300	.892	-.105	.872	.080	.078-.081
ESEM invariant FL (model 3)	2827.201	800	1544.583	300	.972	-.015	.967	.041	.039-.042
ESEM invariant FL, TH (model 4)	3625.252	1020	646.865	220	.964	-.008	.967	.041	.039-.042

Note: df: degrees of freedom; Δ: difference with model 1; CFI: comparative fit index; TLI: Tucker-Lewis index; RMSEA: root mean square error of approximation; 95%CI: 95% confidence interval; ESEM: exploratory structural equation model; ICM-CFA: independent clusters factor analysis model; FL: factor loadings; TH: thresholds.

All chi-square values in the table are statistically significant with $p < .004$.

Table 3. *Standardized Factor Loadings and Correlations Between the Factors of the BRSQ (whole sample).*

ITEM	AMOTIVATION	EXTERNAL	INTROJECTED	IDENTIFIED	INTRINSIC
AM1	**.801**	.005	-.012	.026	-.048
AM2	**.910**	-.016	-.017	.024	-.006
AM3	**.646**	.138	-.001	.031	-.090
AM4	**.616**	.220	.010	-.018	-.071
EX1	.271	**.393**	.154	-.080	.021
EX3	.257	**.359**	.262	-.067	.214
EX5	.260	**.512**	.067	.024	-.141
EX7	.066	**.503**	*.359*	-.164	-.013
IN1	-.041	.024	**.679**	.069	-.002
IN2	.129	.019	**.739**	-.056	-.019
IN3	.033	*.297*	**.133**	*.545*	-.093
IN4	-.163	*.315*	**.570**	.111	-.154
ID1	.041	-*.324*	.170	**.586**	.125
ID2	-.023	-.260	.123	**.635**	.148
ID3	.033	.247	-.051	**.641**	.030
ID4	-.007	.146	.048	**.439**	.244
IM1	-.037	-.083	.048	.121	**.622**
IM2	-.189	-.045	-.080	.235	**.525**
IM3	-.008	.140	-.105	-.089	**.919**
IM4	.019	.050	-.001	.099	**.687**
AMOTIVATION	1.000				
EXTERNAL	.620	1.000			
INTROJECTED	.493	.486	1.000		
IDENTIFIED	-.162	.082	.168	1.000	

INTRINSIC	-.344	-.248	-.070	.465	1.000

Note: boldface: factor loadings freely estimated, all other targeted to be zero; italics: factor loadings with estimated values ≥ |.30| in spite of being targeted to be zero.