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Measuring dual career motivation among German student-athletes using the Student Athletes' Motivation Toward Sports and Academics Questionnaire

Challenges and failures of linguistic and cultural adaptations

Supplementary Information

The online version of this article (<https://doi.org/10.1007/s12662-021-00723-9>) contains supplementary material, which is available to authorized users.

Introduction

In 2013, the European Commission highlighted the necessity of supporting student-athletes in identifying their motivation as an essential criterion for a successful dual career (DC) (European Commission, 2013). Although numerous studies deal with athletic motivation in DCs (Clancy, Herring, MacIntyre, & Campbell, 2016), few investigate athletic and academic motivation simultaneously. The Student Athletes' Motivation toward Sports and Academics Questionnaire (SAMSAQ) is the most prominent instrument in this research area (Gaston-Gayles, 2004, 2005). The instrument aims "to measure student athletes' motivation toward sports and academics using an expectancy-value framework" (Gaston-Gayles, 2005, p. 320). Besides this framework, Gaston-Gayles (2005) included self-efficacy and attribution

theory in the instrument's construction. The SAMSAQ comprises 30 items directed at US student-athletes in higher education aiming for two subscales: academic and athletic motivation. However, statistical analysis resulted in three subscales: student athletic (SAM), career athletic (CAM), and academic (AM) motivation. All items were rated in self-assessment on a six-point Likert scale. Gaston-Gayles (2005) declared a successful implementation based on good internal consistency and acceptable factor loadings in the exploratory factor analysis (EFA) and an RMSEA value of 0.069. No further fit indices have been discussed.

Following its successful implementation, the SAMSAQ has been frequently translated (Fortes, Rodrigues, & Tchanchane, 2010; Guidotti et al., 2013; Kerstajn & Topic, 2017; Lupo et al., 2015; Park & Lee, 2015; Quinaud, Fernandes, Goncalves, & Carvalho, 2019). The Italian working group added nine items replacing those inapplicable to Italian student-athletes (Guidotti & Capranica, 2013). This expanded 39-item version was used in a pan-European study (Lupo et al., 2015). The factor structure of the

Italian and European SAMSAQ differ in comparison to the original SAMSAQ (see electronic supplements). Lupo et al. (2015) claimed a successful implementation of the SAMSAQ-EU based on confirmatory factor analysis, although not all fit indices exceeded commonly known thresholds (see "Data acquisition and samples" section).

Based on the SAMSAQ's appropriateness for European countries, this instrument seems suitable for the German context, since no instrument measures DC motivation among German student-athletes. Moreover, instruments measuring DC motivation in adolescent student-athletes depicting DC developments and transitions have been repeatedly demanded (Park & Lee, 2015; Stambulova & Wylleman, 2019). The present investigation documents the unsuccessful attempt to adapt and evaluate a German SAMSAQ pre-version. The study aimed to (1) adapt the SAMSAQ for the German context and adolescent student-athletes in secondary Elite Sport Schools (ESS), and (2) evaluate this adapted pre-version with two subsamples using a multistaged statistical procedure.

	Total sample (N = 208)	Subsample 1 (N = 76)	Subsample 2 (N = 132)
Age (years)	M (SD)	M (SD)	M (SD)
	17.42 (1.36)	16.05 (0.51)	18.21 (1.04)
Gender	n (%)	n (%)	n (%)
Male	99 (47.6)	30 (39.5)	69 (52.3)
Female	109 (52.4)	46 (60.5)	63 (47.7)
Elite squad level	n (%)	n (%)	n (%)
A & B squad (international level)	8 (3.8)	0 (0.0)	8 (6.1)
C squad (national level)	16 (7.7)	5 (6.6)	11 (8.3)
D/C squad (regional level)	35 (16.8)	14 (18.4)	21 (15.9)
D squad (regional level)	44 (21.2)	26 (34.2)	18 (13.6)
No squad level	105 (50.5)	31 (40.8)	74 (56.1)
Groups of Olympic sport disciplines	n (%)	n (%)	n (%)
Endurance sports	49 (23.6)	20 (26.3)	29 (22.0)
Team sports/sports games	67 (32.2)	29 (38.2)	38 (28.8)
Strength and speed-strength sports	29 (14.0)	9 (11.8)	20 (15.2)
Combat sports	34 (16.3)	8 (10.5)	26 (19.7)
Multidiscipline sports	10 (4.8)	4 (5.3)	6 (4.5)
Others/anonymus	19 (9.2)	6 (7.9)	13 (9.9)

M mean, SD standard deviation

Materials and methodology

Study design

This investigation was split into two parts with two substages each. Part one demonstrates the SAMSAQ-EU's adaption to the German context and evaluation using EFA in a structural–relational approach. The factor structure was explored in two substages, removing items based on previously determined criteria (see “Data acquisition and samples” section). Due to unsatisfactory results, the first pre-version was revised in the second part and evaluated in two substages using EFA.

Procedure for translating and adapting the SAMSAQ

Although back-translations have been identified as the gold standard in translating instruments, this method was inappropriate for this adaptation. The method “ignores cultural aspects ... and exclusively focuses on the actual content of the items” (Iliescu, 2017, p. 375). Moreover, the SAMSAQ had

to be adapted to adolescent student-athletes. Hence, a guided forward translation approach with parallel translations was applied. Two native German-speaking researchers who are cultural and linguistic experts after having studied in various English-speaking countries translated the instrument independently. The translation process followed the guidelines put forth by Iliescu (2017).

To ensure that the validity was upheld between the original and target versions, equivalences were needed (Iliescu, 2017). Brandl-Bredenbeck (2005) formulated four equivalences. The translated German pre-version was reviewed for these equivalences to verify that the same quality was achieved in the adaptation process. The functional equivalence was mostly upheld. Both cultural backgrounds see achievement motivation theory as an essential one among theories of human behaviour (Elbe, 2019; Gill & Williams, 2008; Urhahne, 2008). Although the linguistic meaning of achievement and the German translation *Leistung* are not equivalent, both cultures use similar definitions of the theory. Therefore, conceptual equivalence was mostly

maintained. Linguistic equivalence was confirmed following Iliescu's (2017) recommendations. The sample equivalence was limited. Although the German participants were in a DC, they were younger in comparison to other studies using the SAMSAQ.

After evaluating the first pre-version's results, the factor structure replication was identified as unsuccessful. Three main issues were determined. In avoidance of (1) ceiling effects, extreme formulations were used (e.g. item 3). (2) The mixture of motivational aspects from different theory traditions (expectancy-value, goal, self-efficacy, etc.) was problematic. Therefore, all items were formulated according to expectancy-value theory (e.g. item 6). (3) The blending of academic and athletic aspects required items to be split into two (e.g. items 36a and 36b), and items 40 and 41 were added as counterparts to existing items. Inevitably, these changes led to linguistic and semantic adaptations. Nevertheless, equivalence was maintained. This revision process resulted in the second German SAMSAQ pre-version. Both German pre-versions were added to the electronic supplements.

Data acquisition and samples

Student-athletes answered the SAMSAQ in self-assessment in their schools. Participation was voluntary. The first acquisition was conducted in 2017 (subsample 1), the second in 2019 (subsample 2). All participants were transitioning from the developmental to the mastery stage in terms of their athletic careers. The sample details are described in [Table 1](#).

The study was approved by the local school ministries and the ethics committee of the University of Potsdam (Germany). All research procedures were in line with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Data analysis

SPSS Statistics (version 26.0; IBM Corp., Armonk, NY, USA) was used to process the data and perform descriptive analyses. EFA with oblique rotation

(GEOMIN) was conducted with Mplus (version 8.4; Muthén & Muthén, Los Angeles, CA, USA). The number of factors was limited to two to four, following Gaston-Gayles' (2005) procedure. The first adapted pre-version was analysed using subsample 1 in the first part of the statistical analysis with two substages. The second part of the study consisting of two substages followed the analysis of the revised pre-version using subsample 2.

In substage 1.1, fit indices were calculated for two- to four-factor models. Thresholds of Standardized Root Mean Square Residual (SRMR) ≤ 0.05 , Comparative Fit Index (CFI) ≥ 0.95 , and Root Mean Square Error of Approximation (RMSEA) ≤ 0.08 indicated good model fits (Hooper, Coughlan, & Mullen, 2008). High η^2 values and degrees of freedom referred to poor models.

In substage 1.2, factor loadings were retrieved. Items not loading on any factor were removed based on the following three aspects: (1) each factor was comprised of at least five items; (2) if an item loaded on a single factor, the loading had to be ≥ 0.40 ; and (3) if an item loaded on more than one factor, a 0.32 acceptability threshold was set for the values (Costello & Osborne, 2005). After removal, fit indices and factor loadings were calculated and models were compared.

Substages 2.1 to 2.2 constituted the second part of the statistical analysis based on the revised pre-version. The last two substages resembled the same procedures as described in substages 1.1 and 1.2.

The data set included 0.2% missing values. Participants with missing values were excluded from the analysis.

Results

■ **Table 2** lists the results of the study's first part with models 1.1 to 1.2. The EFA did not produce a meaningful solution for a three- or four-factor model. In substage 1.1, model 1.1.a was unacceptable, since CFI, RMSEA, and SRMR did not meet the thresholds. Substage 1.2 considered the factor loadings. After removing all nontarget loading items, the model still did not present good fits.

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Measuring dual career motivation among German student-athletes using the Student Athletes' Motivation Toward Sports and Academics Questionnaire. Challenges and failures of linguistic and cultural adaptations

Abstract

With the 2012 EU guidelines on dual careers (DC), DC research gained increasing awareness in Europe focussing particularly on student-athletes' motivation. The Student Athletes' Motivation toward Sports and Academics Questionnaire (SAMSAQ), arguably the most prominent instrument in this research area, has been used in various cross-cultural studies assessing DC motivation. The present investigation contributes to the cross-cultural discourse aiming to (1) adapt the SAMSAQ for the German context and adolescent secondary school student-athletes, and (2) evaluate the German pre-version. A sample of 208 student-athletes (52.4% females, mean age = 17.4 years, 49.5% at squad level) at three German Elite Sport Schools participated in the study. The investigation was split into two parts. First, the SAMSAQ was adapted to the German context and tested. In the second part, the first pre-version was revised. A series of exploratory factor analyses were

applied to verify the factor structure of both German SAMSAQ pre-versions. Eight different factor models based on item removal were compared. Neither model demonstrated good results for the replication of previous findings or a meaningful solution in terms of content. Reasons for the deviations between the original and target SAMSAQ factor structures can be found in the different target groups and the culturally different approaches to career assistant programmes as well as in the theoretical background of the instrument. Since neither model was identified as acceptable, the findings indicate that a new instrument needs to be developed for assessing student-athletes' DC motivation along their pathways in different cross-cultural contexts.

Keywords

SAMSAQ · Factor-analysis · Expectancy-value · Translation · Cross-culture · Elite sport

Following the revision, fit indices were calculated for models 2.1 to 2.2 in the second part of the study (■ **Table 2**). In substage 2.1 (models 2.1.a–c), the RSMEA value identified models 2.1.b and 2.1.c as good, with model 2.1.c showing the better fit. The SRMR value was good for model 2.1.c. Substage 2.2 (models 2.2.a–c) considered the factor loadings of the models by removing all nonloading items, but no model met the CFI value threshold. Model 2.2.c fits best according to the SRMR and RMSEA values. Even after removing nontarget loading items, no model was identified as most suitable.

Discussion

The results indicated the unsuccessful cross-cultural adaptation of the SAMSAQ to the German context. No model met the standards for a suitable instrument. Overall, fit indices and factor loadings were better for the re-

vised pre-version. The factor loadings (see electronic supplements) favoured a two-factor model, which is in line with Gaston-Gayles' (2005) assumption that the SAMSAQ constitutes two subscales. The three-factor model as suggested by the US, Italian, and European SAMSAQ models was not reproduced with the German pre-version. The subscales SAM and CAM could not be differentiated, suggesting only one subscale for athletic motivation in the German pre-version possibly due to a younger target group. A four-factor model in the German pre-version was best suitable according to the fit indices. However, four factors were incoherent, since one factor would have comprised one item only. Consequently, no model proved to be satisfactory.

There are several reasons for these unsatisfactory results. Firstly, to maintain conceptual equivalence, a guided forward translation was chosen as opposed to a back-translation because the

Table 2 Statistical values for all factor models based on the exploratory factor analysis (EFA) of the German SAMSAQ versions

	Model	Analysis	CFI	RMSEA	SRMR	η^2 value	Degrees of freedom	p-Value	Explanation of measures taken
Part 1	1.1.a	EFA 2-factor (39 items)	0.515	0.150	0.088	1794.24	664	< 0.001	Stage 1.1: EFA with the first German pre-version using subsample 1
	1.2.a	EFA 2-factor (31 items)	0.528	0.182	0.084	1417.37	404	< 0.001	Stage 1.2: EFA with the first German pre-version using subsample 1, removing items 6, 9, 11, 16, 18, 31, 37, and 38
Part 2	2.1.a	EFA 2-factor (44 items)	0.770	0.095	0.065	1881.73	859	< 0.001	Stage 2.1: EFA with the revised German pre-version using subsample 2
	2.1.b	EFA 3-factor (44 items)	0.848	0.079	0.051	1495.24	817	< 0.001	
	2.1.c	EFA 4-factor (44 items)	0.877	0.073	0.044	1325.67	776	< 0.001	
	2.2.a	EFA 2-factor (36 items)	0.812	0.102	0.058	1237.92	559	< 0.001	Stage 2.2: EFA with the revised German pre-version using subsample 2, removing items 10, 17, 18, 21, 29, 31, 37a, and 37b
	2.2.b	EFA 3-factor (36 items)	0.895	0.079	0.044	905.65	525	< 0.001	
	2.2.c	EFA 4-factor (36 items)	0.924	0.069	0.036	765.92	492	< 0.001	

CFI Comparative Fit Index, RMSEA Root Mean Square Error of Approximation, SRMR Standardized Root Mean Square Residual

focus was on psychological significance instead of linguistic meaning (Iliescu, 2017). This focus was particularly important, since the SAMSAQ had to be adapted to a different cultural context and the age group of secondary school student-athletes. Nevertheless, the absent back-translation might have led to other results than in previous studies using the SAMSAQ. Despite this absence, equivalences between the original and target versions were predominantly present, ensuring the validity of the adapted instrument (Brandl-Bredenbeck, 2005; Iliescu, 2017).

Secondly, cultural differences need to be discussed. In the US, elite sports development is delegated to sport organisations (Sparvero, Chalip, & Green, 2008), whereas the German government acts as a facilitator for sports development (Aquilina & Henry, 2010). Consequently, German student-athletes are supported by governmental structures. The absence of tuition fees required for German higher education does not create an urgency to win a scholarship, and academic demands interfere with athletic perspectives (Conzelmann & Nagel, 2003), explaining why the AM subscale was depicted well in the German pre-version. US student-athletes are highly motivated toward sports to gain scholarships for higher education (Simons, Van Rhee, and

& Convington, 1999). Hence, it is not surprising that the US version separated the SAM and CAM subscales, whereas the German pre-version favoured one combined athletic motivation subscale. Different DC policies appear even within Europe. For example, the Italian policies are described as “laissez faire” (Aquilina & Henry, 2010). Arguably, certain motivational structures cannot be verified in every country due to cultural differences and DC support policies (Lupo et al., 2015).

Thirdly, the theoretical background of the SAMSAQ played a crucial role. Brandl-Bredenbeck (2005) specifies that cross-cultural comparison must be theory-guided. Since the SAMSAQ is based on various motivational patterns, the theoretical basis seems vague and ambiguous. The revised German pre-version that was solely based on the expectancy-value framework yielded better results. Arguably, combining different motivational frameworks carries the risk of limiting the cross-cultural usage of an instrument.

Lastly, the German student-athletes were younger than in all other samples. The age difference and the specific context of an ESS might explain why the German student-athletes did not differentiate between the SAM and CAM subscales, ruling out the possibility of reproducing the original three-factor structure.

Despite the unsuccessful adaptation, the German pre-version contributes significantly to cross-cultural DC motivation research. The present study is the only investigation to date attempting to use a DC motivation instrument in the German context, adding value to other contexts and informing the international discourse. Moreover, the study is the first to assess the SAMSAQ focussing on adolescent student-athletes. Understanding motivation patterns in critical developmental stages is imperative for empirical background knowledge, supporting student-athletes in DC decision-making processes, and providing appropriate support measures (Wylleman & Reints, 2010).

Besides these strengths, limitations should be considered. The sample size may not be sufficient to replicate the factor structure. However, de Winter, Dodou, and Wieringa, (2009, p. 168) argue that when the data are conditioned well, “EFA can yield reliable solutions for sample sizes well below 50”. High factor loadings, a low number of factors, and a high number of variables are present in the current study. Moreover, only half of the German student-athletes were at squad level. Nevertheless, the sample quality was not restricted as an absent squad level does not provide reliable information on whether the student-

athletes are (pre-)elite (Güllich & Cobley, 2017). All students attending an ESS strive for a squad level, since sports federations nominated these student-athletes for a DC at the ESS.

Conclusion

The results showed that the German adaptation for adolescent student-athletes was unsuccessful. Nevertheless, the study contributes to cross-cultural research in demonstrating that what works well in one culture may not be suitable to another (Stambulova & Alfermann, 2009). Hence, a new instrument is required to measure academic and athletic motivation among adolescent student-athletes. This instrument is urgently needed to understand the motivational patterns in DC transitions across cultures. Based on this understanding, guidance for transitions in the academic and athletic settings, as well as support measures for adolescent student-athletes, can be developed. Thus, it is recommended to (1) specify a theoretical basis for an instrument that measures motivation especially in DC transitions, and (2) develop an instrument measuring DC motivation in secondary school student-athletes.

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Declarations

Conflict of interest. M. Niehues, E. Gerlach and J. Sallen declare that they have no competing interests.

The study was approved by the local school ministries and the ethics committee of the University of Potsdam (Germany). All research procedures were in line with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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