

anuario de
psicología

The UB Journal of Psychology

Volumen 44
Número 1
Abril 2014

facultad de psicología
universidad de barcelona

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EDITORIAL

ISSN: 0066-5126

ISSN: 1988-5253

Development and reliability of the Russian version of “The Sport Imagery Questionnaire”*

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The purpose of this study was to investigate the psychometric properties of the Russian version of the “The Sport Imagery Questionnaire” (SIQ). The SIQ is directed on measuring frequency of use of images of various types by athletes. Participants were 253 athletes competing in 6 different sports. The results proved that the scale is a reliable instrument for the measurement of imagery use in Russian athletes and can be used in further imagery research in Russia. Age, gender and sport differences in types of imagery usage were found.

Keywords: Sport psychology, young athletes, imagery, SIQ.

Desarrollo y fiabilidad de la versión rusa del “Sport Imagery Questionnaire”

El objetivo de este estudio fue investigar las propiedades psicométricas de la versión rusa del “Sport Imagery Questionnaire” (SIQ). El SIQ está destinado a medir la frecuencia de uso de varios tipos de imágenes en atletas. Los participantes fueron 253 atletas competidores en 6 deportes distintos. Los resultados demostraron que la escala es un instrumento fiable para la medición del uso de imágenes en atletas rusos y puede ser utilizada en posteriores

investigaciones sobre este ámbito en Rusia. Se encontraron diferencias en edad, género y deporte en relación al tipo de uso de estas imágenes.

Palabras clave: psicología del deporte, jóvenes atletas, imágenes, SIQ.

Introduction

Athletes have employed imagery more than any other performance-enhancement technique over the last 15 years (De Francesco & Burke, 1997; Gould, Tammen, Murphy, & May 1989; Hall & Rodgers, 1989). Many studies have been conducted on athletes' imagery use and sport psychology practitioners have demonstrated the effects of mental imagery on sport performance (*for review see* Morris, Spittle, & Watt, 2005).

Researchers consider imagery in the context of sport as the creation or re-creation of an experience generated from memorial information, involving quasi-sensorial, quasi-perceptual, and quasi-affective characteristics, that is under the volitional control of the imager and that may occur in the absence of the real stimulus antecedents normally associated with the actual experience (Vealey & Greenleaf, 2001).

Understanding the role of imagery in the sport area requires the use of appropriate measurement techniques. In this connection the need for specialized instruments development that evaluate athletes' spontaneous use of imagery is obvious and valuable (Morris, Spittle, & Watt, 2005).

Nowadays the most frequently applied instrument (Bernier & Fournier, 2010) for the measurement of imagery use in sport psychology is "The Sport Imagery Questionnaire" (SIQ). The SIQ is originally developed by Hall, Mack, Paivio, and Hausenblas (1998) on the basis of Paivio's (1985) analytical framework and used worldwide in imagery researchers. Paivio argued that sport imagery plays both a cognitive and a motivational role in influencing behavior. Each role operates on a general or specific level. Hall *et al.* (1998) and Martin, Moritz, and Hall (1999) summarized and extended Paivio's original four categories into five classes of imagery use:

1. Cognitive general (CG)—imagery related to competitive strategies.
2. Cognitive specific (CS)—imagery directed toward skill development or production.
3. Motivational general arousal (MG-A)—imagery related to arousal, relaxation, and competitive anxiety.
4. Motivational general mastery (MG-M)—imagery representative of effective coping and confidence in challenging situations.
5. Motivational specific (MS)—imagery that represents specific goals and goal-oriented behavior.

The model indicates that in various sport situations the function of imagery to be used should match the desired outcome. For example, if athletes wish to improve particular skill, they should employ CS imagery.

Since Hall constructed the SIQ many studies have supported psychometric properties of this test (Abma, Fry, Li, & Relyea, 2002; Hall *et al.*, 1998; Hall, Stevens, & Paivio, 2005; Weinberg, Butt, Knight, Burke, & Jackson, 2003; Watt, Jaakkola, & Morris 2006; Watt, Spittle, Jaakkola, & Morris, 2008). In 2011 Hall and colleagues (Gregg, C. Hall, McGowan, & N. Hall, 2011) working with a large sample athletes ($n = 432$) from different sports and age groups proved strong indicators of reliability of the SIQ once again. In addition, adapted versions of the SIQ have been developed; for instance, Finnish version (Watt *et al.*, 2006) and the Spanish version of the SIQ (Ruiz & Watt, 2012). The SIQ is recognized as the most acceptable instrument in the measurement of spontaneous imagery use. Although imagery interventions have been widely used by Russian sport psychologists since the seventies (i.e., Alekseev, 2003; Belkin, 1983), no Russian versions of measures of sport imagery currently exist.

Accordingly, the main purpose of this study was to develop and examine Russian version of the SIQ. Furthermore, given the results of other foreign researchers (see, for example, Bernier & Fournier, 2010) we expected that Russian athletes would differentially use imagery based on gender, age and sport type.

Methods

The research was carried out in compliance with Code of Ethics of the Russian Psychological Society.

Participants

Participants were 246 athletes aged 8–20, representing 6 different sports; 122 female and 124 male athletes. Athletes were from both team and individual sports including soccer ($n = 116$), alpinism ($n = 64$), volleyball ($n = 21$), competitive diving ($n = 19$), track and field athletics ($n = 17$) and rhythmic gymnastics ($n = 9$). All these young athletes were members of Moscow, Omsk, and Kazan regional teams and were regular participants in regional and national competitions.

These types of sports were chosen because of the need to comprehensively verify the assumption that there are differences in the use of images by athletes engaged in sports that are different in their characteristics. According to typical sports classification, we organized our results in two main groups: team and individual sports. Each group involved the following sports (respectively): game sports (soccer and volleyball), complex coordination (rhythmic gymnastics and competitive diving), and endurance sports (track and field, alpinism) (Dgamangarov, 1982; Matveev, 1977).

Additionally, in compliance with D. El'konin's theory (El'konin, 1989) of levels of human mental development, participants were also notionally divided

into three age groups: before age 12 ($n = 81$), athletes aged 13-16 years ($n = 109$) and athletes aged 17-20 years ($n = 63$).

Measures

"The Sport Imagery Questionnaire" (SIQ) (Hall, Stevens, & Paivio, 2005) is a self-report questionnaire that assesses athletes' use of the five cognitive and motivational functions of imagery. The SIQ includes 30 questions with seven items corresponding to the CS subscale, six items representing the CG subscale, five items correlating with the MS subscale, six items representing the MG-A subscale, and six items comprising the MG-M. Each item is rated against a 7-point Likert-type scale with anchors of 1 = rarely use that function of imagery and 7 = often use that function of imagery. An average frequency score for the athletes' use of each of the five functions is then calculated. SIQ can be administered to athletes at any competitive level and in any sport. In 2009 C. Hall, Munroe-Chandler, Fishburne, and N. Hall (2009) developed a version for young athletes, the Sport Imagery Questionnaire for Children. The SIQ-C comprises 21 questions with four items corresponding to the CS, CG, MS, and MG-A subscales, and five items representing the MG-M. Each item is rated on a scale from 1 (do not use such imagery at all) to 5 (use such imagery very often).

Although Hall *et al.* (2009) showed that this special methodology can be used to study youth athletes' use of images, our pilot work with athletes revealed that the Russian-language version of the original SIQ, if used individually, is applicable not only for adult but also for studying youth athletes. In this connection, the present research was based on the original "adult" version of the SIQ.

Procedure

The Russian-language version of the questionnaire needed slight rearranging of the text and the form of its presentation. Russian-language analogues were found for a number of items. Their formulation remained true to the original representation of each subscale, but the items were made clearer than they had been for the Russian athletes. The original version of the SIQ was translated by three experts - professional psychologists, who had an experience in sport psychology domain, and whose first language was Russian, highly competent in both written and spoken English.

Results

Means, standard deviations, alpha coefficients and inter-correlations between each SIQ subscale for the present and two corresponding researches are shown in table 1.

TABLE 1. MEANS, STANDARD DEVIATIONS, ALPHA COEFFICIENTS AND INTER-CORRELATIONS BETWEEN EACH SIQ SUBSCALE FOR THE PRESENT AND TWO CORRESPONDING RESEARCHES.

<i>Imagery Type</i>	<i>Russian SIQ data (n = 253)</i>		<i>Inter-correlations (for the Russian version of the SIQ)</i>				<i>Spanish version of the SIQ (Ruiz & Watt, 2012) (n = 81)</i>		<i>Finnish version of the SIQ (Watt et al., 2006)(n = 231)</i>	
	<i>Mean ± s</i>	<i>α</i>	<i>1 (CS)</i>	<i>2 (CG)</i>	<i>3 (MS)</i>	<i>4 (MG-A)</i>	<i>Mean ± s</i>	<i>α</i>	<i>Mean ± s</i>	<i>α</i>
CS	4.62 ± 1.13	.72					4.72 ± 1.15	.83	4.60 ± 1.07	.80
CG	4.48 ± 1.14	.71	.556**				5.27 ± 1.28	.90	4.24 ± 0.96	.64
MS	4.02 ± 1.30	.74	.423**	.485**			4.66 ± 1.35	.88	3.83 ± 1.24	.83
MG-A	4.52 ± 1.62	.71	.325**	.325**	.334**		2.66 ± 1.19	.80	3.84 ± 1.06	.76
MG-M	4.41 ± 1.14	.80	.598**	.603**	.437**	.336**	2.28 ± 1.20	.86	4.93 ± 1.00	.76

Reliability scores (values of alpha coefficients) of the Russian version of the SIQ vary from 0.7 (CG, MG-A) to 0.8 (MG-M) indicating acceptable levels of internal consistency. The data of correlation analysis indicated significant positive correlations ($p < 0.01$) for all subscale associations. Alpha coefficients for the Russian version were slightly lower than those drawn from a Spanish study (Ruiz & Watt, 2012), and on the same level with data found in a Finnish study (Watt *et al.*, 2006). These differences are clarified upon closer examination of the sample specifics of these studies. The Finnish version of the SIQ was examined on a sample approximately equal to ours, whereas the Spanish study was conducted on much smaller sample. The authors themselves (Ruiz & Watt, 2012) pointed out that limitations of their study were related to the small sample size ($n = 81$) and the examination of imagery use characteristics in athletes from only two sports (soccer and roller skating). Thus, a comparative analysis generally confirms appropriateness of the Russian version of the "adult" SIQ even when working with athletes aged 8–20.

Data representing differences in the use of images by Russian athletes depending on the sport, age and gender are presented in table 2 and table 3.

TABLE 2. AN AVERAGE FREQUENCY SCORE FOR THE ATHLETES' USE DIFFERENT TYPES OF IMAGERY.

Scale	CS	CG	MS	MG-M	MG-A	Friedman χ^2	Sig.
<i>Sport events</i>							
Individual sports	4.35	4.43	3.70	4.22	4.12	41.656	< 0.001
Complex coordination sports	4.9	4.6	3.4	4.5	3.7	40.617	< 0.001
Endurance sports	4.47	4.39	3.2	3.97	4.11	15.482	0.004
<i>Team sports</i>							
game sports	4.9	4.5	4.3	4.6	4.9	40.596	< 0.001
game sports	4.9	4.5	4.3	4.6	4.8	38.087	< 0.001
<i>Gender</i>							
Female	4.6	4.6	3.7	4.2	4.0	34.509	< 0.001
Male	4.7	4.6	4.2	4.6	4.6	29.328	< 0.001
<i>Age</i>							
before age 12	4.9	4.6	4.5	4.7	4.6	5.238	0.264
13-16 years	4.42	4.25	3.83	4.25	4.44	39.372	< 0.001
17-20 years	4.75	4.84	3.81	4.45	4.51	32.481	< 0.001

TABLE 3. RESULTS OF MANN-WHITNEY CRITERIA IMPLEMENTATION.

<i>Scale</i>	<i>Individual vs. team sports</i>	<i>Complex coordination sports vs. endurance sports</i>	<i>Female vs. male</i>	<i>Before 12 years vs. 12-16 years</i>	<i>13-16 years vs. 17-20 years</i>	<i>Before 12 years vs. 17-20 years</i>
<i>CS</i>	< 0.001	0.2	0.483	0.008	0.044	0.717
<i>CG</i>	0.488	0.868	0.727	0.111	0.001	0.066
<i>MS</i>	< 0.001	0.692	0.009	< 0.001	0.774	0.004
<i>MG-M</i>	0.002	0.03	0.013	0.016	0.27	0.237
<i>MG-A</i>	< 0.001	0.25	0.026	0.504	0.918	0.759

Clear statistical differences across five types of imagery within each sport, age range and gender were obtained using the Friedman test. Thus, as it is shown in table 2, results reveal that athletes from both team and individual sports use MS images significantly less frequently than other imagery types. At the same time, no preference was found between other imagery types (CS, CG, MG-A, MG-M) within those groups of athletes. These observations are confirmed by the results of Wilcoxon criteria implementation (when comparing differences between paired indices of images' use frequency within each sport group): statistical clear differences were only found between index of frequency of MS' use and indices of frequency of use of other imagery types ($p < 0.01$). On the other hand, the implementation of Mann-Whitney criteria reveals that athletes participating in team sports use all images (apart from MS type) more frequently than their counterparts from individual sports (see table 3).

Results of a Friedman test implemented to data within subgroups of athletes again addresses the sport specificity of imagery use (see table 2). Thus, it is shown that athletes participating in complex coordination sports significantly more frequently use cognitive (CS and CG) and MG-M images than other imagery types. Athletes from endurance sports also more frequently use cognitive images. In addition, as represented in table 2, the results obtained for game sports are almost similar to those for team sports group as a whole. This fact can be explained by limitations of the sample: game sports (e.g., soccer, basketball, volleyball, etc.) prevail in the team sports' part of the sample, whereas team but not game sports (e.g., team rowing) take in a very small part of it.

As for gender, a Friedman test revealed that female athletes use cognitive imagery significantly more frequently than motivational imagery; whereas male athletes use of all imagery types equally (apart from MS type). At the same time, using a Mann-Whitney criterion, the results of a comparative analysis showed that male athletes use motivational imagery significantly more frequently than sportswomen, while the frequency of cognitive imagery use does not differ statistically (see table 3).

The results supported the fact that there was an age-related imagery usage by Russian athletes. Athletes aged 8-12 years use all imagery types equally (there are no statistical differences according to Friedman test results); athletes aged 13-17 years also use all imagery types equally, except MS-type; whereas athletes aged 18-20 years more frequently use cognitive types of imagery. The results of comparative analysis for this set of data reveal that 8-12 year-old athletes use CS, MS, and MG-M imagery types significantly more frequently than athletes aged 13-17 years. At the same time, 8-12 year-old athletes use MS imagery more frequently than athletes aged 18-20 years. The latter ones, in their turn, use CS and CG imagery more frequently than athletes aged 13-17 years; and CG imagery more frequently than 8-12 year-old athletes. Therefore, there is a tendency for decreasing the frequency of MS-type usage with aging; as well as for a slight reduction of the use of other types of imagery by older teens (athletes aged 13-16 years), which is more pronounced with age (for the athletes aged 18-20 years).

The results of comparative analysis for sport specificity in imagery usage (using Mann-Whitney criteria for subgroups divided by sport kinds) demonstrates (see Table 3) that athletes participating in complex coordination sports use cognitive imagery and MG-M imagery significantly more frequently than their counterparts from endurance sports.

Discussion

The article presents the psychometric analysis of the Russian version of the "The Sport Imagery Questionnaire" (SIQ) directed at measuring the frequency of imagery use of various types by athletes. The research was conducted using a sample of 253 athletes from 6 different sports and revealed that all subscales of the Russian version had acceptable levels of internal consistency.

In addition, age, gender and sport differences all influenced imagery usage by Russian athletes were found. Athletes from both team and individual sports employed significantly less imagery associated with specific goals and goal-oriented behavior than other imagery types. At the same time, those athletes demonstrated equal use of the other imagery types without any preference between them. However athletes from team sports (when comparing team to individual sports) used all types of imagery (apart from goal-oriented type) more frequently than their counterparts from individual sports.

In regard to the specificity of imagery use among each sport individually, our results showed the following. Athletes competing in complex coordination sports use cognitive types of imagery and imagery that represent effective coping and confidence in challenging situations more frequently than other imagery types. Athletes from endurance sports also more frequently use cognitive imagery. Results obtained for game sports were similar to those for the team sports group as a whole.

The results of a comparative analysis for sport specificity in imagery usage demonstrated that athletes participating in complex coordination sports more frequently use cognitive imagery and imagery connected with effective coping than their counterparts from endurance sports.

The analysis of gender showed that female athletes more frequently use cognitive images than motivational imagery; whereas male athletes use of all imagery types equally (apart from goal-oriented type). Also, male athletes (when comparing them to female ones) more frequently use motivational imagery than sports-women, while their frequency of cognitive imagery usage does not differ.

Finally, age-related specificity demonstrated the following. Athletes aged 8-12 years used all imagery types equally, athletes aged 13-17 years most rarely used goal-oriented imagery (the other types – equally), and athletes aged 18-20 years more frequently used cognitive types of images. Moreover, there was a tendency for a constant decreasing of goal-oriented imagery type usage with aging, as well as for a slight reduction of other types of imagery use by older teens (athletes aged 13-16 years) especially with increasing age (after the age of 17).

Conclusions

Although it was shown that that the Russian version of the SIQ is a reliable instrument for the measurement of imagery use by Russian athletes and can be used in further imagery research in Russia, future examination of test-retest reliability and prognostic validity of this version of the SIQ are still necessary. Furthermore, only a limited number of sports were examined, therefore future research should prove psychometric properties of the Russian version of the SIQ using a larger sample of athletes.

Practical Implications

Nowadays, imagery is considered as one of the most commonly used psychological technique when working with athletes. Based on the results of the presented research, Russian sport psychologists will have the possibility of using the specific instrument when working with imagery and mental trainings. Age, gender and sport differences are key points of correct and effective imagery usage by athletes. Namely, the knowledge of the specificity of imagery use helps in creating and implementing personalized imagery training plans.

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