Frequency of sport dreams in Japanese college athletes

Daniel Erlacher[1], Masato Fujii[2], Shunichi Tazuke[3], Tetsuji Sugiyama[4], Florian Ganzert[5], and Michael Schredl[6]

[1]Institute of Sport Science, University of Bern, Switzerland
[2]Fukuoka University, Japan
[3]Doshisha University, Kyoto, Japan
[4]Japan Women's University, Tokyo, Japan
[5]Tokyo, Japan
[6]Central Institute of Mental Health, Medical Faculty Mannheim/Heidelberg University, Germany

Summary. In a previous study with German athletes we could show that the amount of time spent with sport activity in wakefulness is related to the percentage of corresponding dreams about one's own sport. The present study applied a Japanese translation of the same questionnaire to a Japanese sample of college athletes to explore cultural differences for the frequency of sport dreams. Results showed that Japanese athletes dream about sports as often as German athletes. Furthermore, the duration of sport career, the amount of competitions and the practice hours during wakefulness was related to the frequency of sport dreams, thus supporting the continuity hypothesis of dreaming. The findings indicated that cultural differences are rather small and that other factors like competitions in addition with the emotional involvement might explain better the relationship between waking sport activity and sport dreams.

Keywords: dream content, continuity hypothesis, sport activities, athletes, competitions

1. Introduction

The continuity hypothesis in dream research suggests that dream content reflects waking activities (Schredl, 2003), e.g. the amount of time spent in different waking behaviors (e.g. sport) is related to the occurrence of the corresponding activity in dreams. In a dream diary study by Erlacher and Schredl (2004) it was shown that sport students dream more often about sports (active participation and general sport themes) than do psychology students (reflecting sport students' engagement in sport activities and sport theory). In a questionnaire study, Schredl and Erlacher (2008) showed that the percentage of sport dreams of sport students was directly related to the amount of time spent with waking sport activities. In another questionnaire study with professional German athletes the amount of practice hours per week and the number of competitions were linked to the percentage of corresponding dreams about one's own sport (Erlacher & Schredl, 2010). However, so far systematic research in sport-related dreams in athletes from different cultures is still lacking.

The present study was designed to investigate whether the frequency of sport dreams in Japanese college athletes differ from their German counterparts. Based on the continuity hypothesis we expected that amount of practice hours per week and the number of competitions were also related to sport dream frequency in the Japanese sample like in the German athletes. The effect of other factors like duration of sports career and practicing individual vs. team sports on the frequency of sport were studied in an exploratory fashion.

Corresponding address:
Daniel Erlacher, Institute of Sport Science, University of Bern, Bremgartenstrasse 145, 3012 Bern, Switzerland.
Email: daniel.erlacher@ispw.unibe.ch

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2. Methods

2.1. Participants

The sample included 1323 Japanese College athletes: 595 questionnaires from students of Fukuoka University (Fukuoka, Japan) and 728 questionnaires from students of Doshisha University (Kyoto, Japan). Table 1 depicts the participants' characteristics (for details regarding the German sample see Erlacher & Schredl, 2010). Ethical approval for the original study was granted by the Ethics Committee of the Faculty of Behavioural and Cultural Studies at the University of Heidelberg and data collection was done in accordance with the institutional ethical guidelines of Fukuoka University and Doshisha University.

2.2. Materials

For this study, a self-developed questionnaire titled "Competitive Sports, Sleep, and Dreams" (Erlacher, Ehrlenspiel, Adegbesan, & Galal El-Din, 2011), was translated from German to Japanese by a Japanese native speaker (SK, see acknowledgment) and a German person who studied Japanese language (FG) as well as semantically validated

Table 1. Participants characteristics of the Japanese College athletes compared to a sample of German athletes (Erlacher & Schredl, 2010).

	Japanese athletes (n = 1323)	German athletes (n = 632)	[a]*t* =; [b]χ^2 =	p =	d =
age	19.7 (± 1.3)	21.9 (± 6.8)	[a]8.04	<.001	0.45
Male / female	1000 / 323	379 / 253	[b]50.20	<.001	0.40
Years active	7.9 (± 4.3)	11.5 (± 5.9)	[a]13.9	<.001	0.71
Practice hours per week	16.7 (± 7.6)	11.0 (± 6.4)	[a]17.2	<.001	0.81
Number of competitions/games during the last 12 months	3.2 (± 3.3)	17.8 (± 15.8)	[a]23.0	<.001	1.34
Team/Individual sports	679 / 640[c]	225 / 407	[b]43.3	<.001	0.30

Note. [c]4 participants with missing values

by another Japanese native speaker (MF). The first part of the questionnaire asked questions about demographic data and several questions about the participants' sport: Which sport are you practicing? (Disciplines were categorized in either team sport or individual sport), How long have you been practicing this sport? (years), and How much time do you practice per week on average? (hours per week). Afterwards, we measured participants' dream recall frequency using a 7-point scale ranging from 0 = *never* to 6 = *almost every morning* developed by Schredl (2002a). Its retest reliability is high (*r* = .85; Schredl, 2004). The scale was recoded by class means to obtain units of mornings per month (0 = *0*, 1 = *0.5*, 2 = *1.0*, 3 = *2.5*, 4 = *4.0*, 5 = *14.0*, 6 = *26.0*). Then participants were asked how often they dream about their sport using an 8-point scale ranging from 0 = *never* to 7 = *several times a week* (all categories are presented in Table 2). Again, the scale was recoded to units of mornings per month (0 = *0*, 1 = *0.042*, 2 = *0.083*, 3 = *0.25*, 4 = *1.0*, 5 = *2.5*, 6 = *4.0*, 7 = *18.0*). Athletes had to specify in the next question during which period the number of sport dreams increases: "over periods of competition", "over periods of intensive training", and/or "over periods without training or competition".

2.3. Design and Analysis

After giving informed consent, athletes completed the questionnaire with the assistance – if needed – of the officials or one of the authors. If the hypothesis was directed one-tailed test were performed; two-tailed tests were performed for exploratory analyses. An ordinal regression (cumulative logit analyses) was applied for analyzing factors associated with the frequency of sport dreams. To compute the effect sizes d for mean differences and χ^2 the online calculators from the web site *psychometrica.de* were used. All other statistical analyses were done with the SPSS for Windows (Version 26.0) software package.

3. Results

Table 2 presents the frequency of sport dreams for the Japanese College athletes (mean = 1.85 ± 4.06 mornings per month) and German athletes (mean = 1.67 ± 3.54 mornings per month). With a mean frequency of 6.20 ± 7.02 mornings per month with dream recall (German athletes: 6.37 ± 7.48 mornings per month) the rough estimate is that 29.8% dreams in relation to the total amount of recalled dreams included sport topics (German athletes: 26.2%).

Table 2. Frequency of sport dreams for the Japanese college athletes compared to a sample of German athletes (Erlacher & Schredl, 2011).

	Japanese athletes (n = 1314[a])		German Athletes (n = 632)	
Category	**Frequency**	**Relative frequency (%)**	**Frequency**	**Relative frequency (%)**
Never	378	28.8	69	10.9
Less than once a year	83	6.3	75	11.9
About once a year	96	7.3	58	9.2
About 2 to 4 times a year	213	16.2	136	21.5
About once a month	187	14.2	127	20.1
About 2 to 3 times a month	166	12.5	89	14.1
About once a week	120	9.1	53	8.4
Several times a week	71	5.4	25	4.0

Note. [a]9 participants with missing values

Table 3. Summary of logistic regression analysis for variables predicting the occurrence of sport dreams for the Japanese College athletes compared to a sample of German athletes (Erlacher & Schredl, 2010).

	Japanese athletes[a] (n = 1314)				German athletes[b] (n = 632)			
	estimates	Wald χ^2	p	d	estimates	Wald χ^2	p	d
Age	-.104	6.2	.013	0.14	-0.030	4.6	.033	0.17
Gender	-.458	13.8	<.001	0.21	0.016	0.01	.919	0.01
Sport group (individual vs. team sport)	-.329	9.7	.002	0.17	.0.167	0.9	.351	0.07
Years active	.083	46.6	<.001	0.38	-0.002	0.02	.887	0.01
Practice hours per week	.023	11.5	.001	0.19	0.046	11.0	.001	0.27
Number of competitions or games during the last 12 months	.060	15.4	<.001	0.22	0.014	7.8	.005	0.22
Dream recall frequency	.390	182.8	<.001	0.80	0.413	95.1	<.001	0.84

Note. [a]For the Japanese sample: adjusted R^2 = .203; [b]For the German sample: adjusted R^2 = .197

The ordinal regression analysis with both sample (including all variables presented in Table 3 and nationality) showed a non-significant effect for nationality (*estimate* = 0.171, χ^2 = 1.9, p = .171). In order to compare the pattern of factors affecting sport dreams in the Japanese and the German sample we performed ordinal regressions analysis entering all variables simultaneous (see Table 3). The data for the German athletes can also be found in Erlacher and Schredl (2010). Duration of sport career, the number of competitions, number of practicing hours and sports type (individual vs. team sport) were statistical significant variables regarding athletes´ sport (in order of their effect sizes, see Table 3). Furthermore, dream recall frequency, sex and age reached statistical significance (in order of their effect sizes, see Table 3) whereas younger athletes and female athletes tend to experience more sport dreams.

Of all 1308 Japanese athletes (15 missing data), 44.8 % stated that they experience more sport related dreams "during periods of competition" (n = 333; 25.2%; German athletes: 47.3%) or "during periods of intensive training" (n = 259; 19.6%, German athletes: 30.9%). And 24.7% reported that they experience more sport dreams "during periods without training or competition" (n = 327, German athletes: 10.3%). In addition, 243 of 1313 athletes (18.4%; 10 missing data) stated that they had the impression, that a dream about sport somehow influenced their performance in wakefulness (German athletes: 12.2%).

3.1. Discussion

The findings of the present study indicate that Japanese athletes dream about sports as often as German athletes. In both groups, the number of competitions per year, and the amount of practice hours per week are linked to the percentage of corresponding dreams about one's own sport. Furthermore, for the Japanese sample athletes with a longer sport career, younger athletes, female athletes, and athletes from team sport tend to experience more sport dreams.

Before interpreting the results, some methodological issue should be discussed. A rough questionnaire measure was utilized to assess the frequency of sport dreams, however this retrospective data might be biased by memory effects which has been demonstrated by Schredl (2002b). However, the validity of retrospective measures was emphasized by the questionnaire study of Erlacher and Schredl (2010) which found similar frequencies of sport dreams compared to the diary study by Erlacher and Schredl (2004). Additionally, the results of this study highlight that it is important to control the analysis for general dream recall frequency because this is the strongest factor correlating with the frequency of sport dreams. This seems plausible because the chance of recalling a sport dream is heightened by overall higher dream recall.

Interestingly, sport dream frequency was comparable between the two sample - if all variables like sport group (individual vs. team sport), years active, actice hours per week, number of competitions or games during the last 12 months, dream recall frequency, gender, and age were statistically controlled. That is, in regards to the frequency of sport dreams no cultural differences were found. The findings of Erlacher and Schredl (2010), that for German athletes the amount of practice hours in wakefulness was related to the frequency of sport dreams have been confirmed in college athletes from Japan, thus supporting the continuity hypothesis of dreaming (Schredl, 2003). This finding is also shown by the result that about 45% of the athletes reported to have more sport dreams during periods of competitions and intensive training.

However, there were also differences. The Japanese athletes had a much lower number of competitions or games compared to the German athletes. However, the effect size in the regression analysis was almost equal for this factor that might be point to the importance of emotional factors (e.g. worries about performance) which are connected to competitions. This line of thinking is also supported by the result that about 25% of athletes reported to have more sport dreams during periods of competitions. It will be interesting to carry out a longitudinal study using dream diaries in order to test whether upcoming important sport events increase the probability of sport dreams or nightmares (e.g. Erlacher, Ehrlenspiel, & Schredl, 2011). In addition, it would be inter-

esting to measure the emotional involvement in sport activities psychometrically (e.g. competitive state anxiety) and relate these measures with the incorporation rate of sport themes into subsequent dreams (cf. Ehrlenspiel, Erlacher, & Ziegler, 2016). In the German sample mainly professional athletes on an international level participated and whereas the Japanese sample included College athletes. Therefore it might be an additional influence of thinking about sports which might be more often in members of national supported team system than in non-members on dreams – in addition to the time spent with practicing.

Interestingly, about 25% of the athletes also stated that they experience more sport related dreams during periods without training or competition which might be explained that during those times athletes maybe think more about their sport. However, for the German athletes only about 10% of the athletes stated that during free sport times they experience more sport dreams and therefore other factors should be considered. One factor might be the finding that the Japanese athletes from team sports have more sport dreams which might be linked to the Social Simulation Theory of dreaming (Revonsuo, Tuominen, & Valli, 2015). That is, that the dreams not only reflect sports but social interactions with teammates.

Whereas the negative effect of dreams on subsequent waking has been well documented (Köthe & Pietrowsky, 2001), it would be interesting to study systematically whether positive sport dreams enhance performance because examples of positive effects of dreams on performance were reported quite often by the athletes. It might even be possible to deliberately practice sports during dreams especially in lucid dreams (Schädlich & Erlacher, 2018).

To summarize, the study demonstrated that there is no difference between Japanese athletes and German athletes with respect to their sport dreams frequency. In both groups, the quantity of competitions per year, and the training volume in hours per week are related to the percentage of corresponding dreams about one's own sport. Different to the German athletes, the Japanese athletes with a longer sport career and athletes from team sport tend to experience more sport dreams. Future studies using longitudinal designs will shed more light on this relationship and will help to derive a more precise formulation of the continuity hypothesis. In addition, investigating the question whether sport dreams are markers for procedural memory consolidation taking place in REM sleep (cf. Wamsley & Stickgold, 2019) is of theoretical as well as practical interest. Future studies should test whether having sport dreams are related to higher performance gains in sport students

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