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Physical Load During Recreational Activities in Kinesiology Students

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ABSTRACT

Recreational activities are important in physical activity because they are healthier than competitive sports. Outdoor leisure activities (in nature) are crucial because, in addition to the physical benefits, we also have mental benefits. The activities are very diverse, as are the participants, and the problem is to determine in detail which activity is suitable for whom. 47 kinesiology students participated in 5 recreational trips (two mountaineering trips, rafting, kayaking, and canyoning). After each tour, they completed the Rate of Perceived Exertion - RPE questionnaire. Students perceived Mosor and Canyoning as the most difficult. Women did not differ from men in terms of perceived exertion, but they perceived kayaking as more difficult (MWU, $Z=1.7$, $p=0.09$). The most difficult section (mountaineering Mosor) was the easiest for active athletes, while non-athletes and ex-athletes perceived it significantly harder (MWU, $Z=103.5$, $p<0.01$). Climbing Mosor is the longest tour and canyoning the most demanding, and the respondents perceived them as such. Kayaking is more strenuous for women because of the frequent changes in aerobic and anaerobic energy systems and because of the strong endurance of the upper body. Unlike sports, recreation should be in the comfort zone, and when choosing an activity, care should be taken that the activity is appropriate for the participants.

Keywords: Borg scale, Athletes, Recreationists, Mountain climbing, Rafting

INTRODUCTION

Recreation is an important part of physical activity, especially because competitive, elite or commercial sports bring more health problems than benefits (Dohlsten, Barker-Ruchti, & Lindgren, 2021). Recreational activities related to nature are particularly interesting because, in addition to numerous physical benefits, they also have a positive impact on an individual's mental health (Thomsen, Powell, & Monz, 2018). The group of such activities includes various hiking or biking tours, kayaking, rafting, canyoning, various forms of rowing and sailing. Given the breadth of this content, different skills are required of participants depending on the type of leisure activity. It is very important that the content suits the participants, as research shows that exertion is closely linked to motivation for leisure activities (Balamutova, 2014). Additionally, the health aspect of physical activity is most pronounced in moderate-intensity physical activity (Lee & Paffenbarger, 2000). The question arises as to what would be the optimal loads during recreational activities.

Kinesiology students are a specific sample, they should be associated with sports, but they come from different sports and play sports at different levels (beginners, active, former, elite...). This problem was noticed way back in 1977 when the standards of recreational activities were being developed in the USA (Carter, 1977). The question arises as to which recreational activities would be suitable for students and whether this could apply to all students. Measuring load in sports activities is very complex, there are numerous sophisticated methods (Gómez-Carmona, Bastida-Castillo, Ibáñez,

& Pino-Ortega, 2020; Nigg, Denoth, & Neukomm, 1981). Most of these methods are expensive or cannot be carried out in nature, but they can be successfully replaced by a subjective assessment of the perceived load, the so-called Borg scale (Foster et al., 2021) or Rate of perceived exertion - RPE.

Borg's scale is a very simple tool in which, on a scale from 6 to 20, participants have to circle the exact number that best corresponds to the perceived load. The smallest number 6 corresponds to 60 heartbeats, which is otherwise the frequency at rest (without effort), on the other hand, the number 20 is equivalent to 200 heartbeats per minute (maximum effort). The scale is very reliable for different types of exertion (Katsanos & Moffatt, 2005), it has been used on various samples, from athletes to recreational people (Lagally, McCaw, Young, Medema, & Thomas, 2004). The Perceived Effort Scale was designed in 1970 and is a good indicator of physical stress and work capacity (Borg, 1970). The scale is highly reliable for activities such as walking (Katsanos & Moffatt, 2005), hiking (Hagiwara & Yamamoto, 2011), and rowing (Connolly & Janelle, 2003; Marriott & Lamb, 1996). Borg's scale can easily be completed on a mountain, in a canyon, at sea or on a river. This paper aims to determine the level of perceived exertion of kinesiology students using the Borg scale on various recreational activities (mountaineering tours, rafting, kayaking and canyoning), and to analyze differences by gender and sports status. With this research, we should get a better insight into the load of recreational activities among kinesiology students, which can be useful in planning them.

METHODS

Participants

The sample of respondents are students of the Faculty of Kinesiology who enrolled in the Recreation course in the academic year 2023-2024. Of the 56 students who enrolled, those who did not go on at least two trips and those who did not fill out the surveys were excluded from the sample, resulting in a final sample of 47 students. Sports background of the respondents: rowing n=1, swimming n=1, athletics n=1, football n=15, basketball n=1, rhythmic gymnastics n=1, dance n=2, boxing n=2, judo n=1, MMA n=1, taekwondo n=1, kickboxing n=1, free climbing n=1, recreation n=4, fitness n=4, gym n=5, running in nature n=2.Respondents were divided into groups based on gender (women n=19 and men n=28), and sports status (former athlete/recreational athlete n=30 and active athlete/representative athlete n=17). All students participated in the research voluntarily and anonymously, a detailed description of the sample can be found in Table 1.

Variables

As part of the course, students were supposed to go on five different recreational activities: hiking Mosor (10 km, height 950 m), hiking Fortica (5.8 km, height 355 m), rafting (8 km), kayaking (13.4 km) and canyoning (2.7 km). Immediately after the activity, they were invited to fill out a short questionnaire on the level of perceived exertion (RPE - Rating scale of Perceived Exertion, Borg, 1970). In addition to sports and professional needs, the RPE scale is also used to assess the load of various recreational activities (Mangona, Brasil, Prista, & Farinatti, 2024).

The original Borg scale:

6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No effort	Extremely light		Very light		Light		Somewhat hard		Hard		Very hard		Extremely hard	Maximum effort

Based on the aforementioned 5 variables in the research are: RPE Mosor, RPE Fortica, RPE Rafting, RPE Kayaking, RPE Kanjoning and the variables that describe the sample are: age of the subject (years), body mass (kg), body height (cm), body mass index mass BMI.

Data processing methods

The variables that describe the sample were processed with descriptive statistics (arithmetic mean - mean, standard deviation - SD), and the differences between them *were tested with the T test. Due to the small sample of some groups, the normality of the distribution was tested with the Shapiro-Wilk W test. Since most variables do not have a normal data distribution, further processing was performed using non-parametric statistical methods. Descriptive statistical parameters (median, mode, and mode frequency) were calculated for all groups, and differences by gender and sports status were tested with the Mann-Whitney U test. The level of statistical significance was set at $p < 0.05$. Data processing was done with the help of the software package Statistica 13 for Windows.*

RESULTS and DISCUSION

Table 1. Descriptive statistical parameters (arithmetic mean – Mean, Standard deviation – SD) for variables describing the sample (age, body height, body mass and body mass index BMI) for all groups and differences between groups (T test)

	Female n=19		*Male n=28*		*T test*	
	Mean	*SD*	*Mean*	*SD*	*t-value*	*p*
Age	*20.58*	*1.39*	*20.68*	*1.12*	*-0.27*	*0.79*
Body height (cm)	*167.26*	*6.00*	*184.04*	*7.21*	*-8.36*	*<0.01*
Body weight (kg)	*61.21*	*6.88*	*81.00*	*9.58*	*-7.74*	*<0.01*
BMI	*21.89*	*2.32*	*23.84*	*1.60*	*-3.41*	*<0.01*
Former athletes/recreationists n=30			*Active athletes n=17*			
	Mean	*SD*	*Mean*	*SD*	*t-value*	*p*
Age	*20.70*	*1.24*	*20.53*	*1.23*	*0.46*	*0.65*
Body height (cm)	*175.80*	*10.65*	*179.82*	*10.53*	*0.24*	*0.81*
Body weight (kg)	*71.60*	*14.12*	*75.47*	*10.68*	*0.41*	*0.68*
BMI	*22.95*	*2.42*	*23.23*	*1.55*	*0.82*	*0.42*

From Table 1, we see that men and women differ statistically significantly in terms of body height, body weight and body mass index (BMI).

It is interesting that out of 47 kinesiology students, almost two-thirds of the students (n=30) are not active athletes. When asked what kind of sport they do, 15 students wrote: recreation n=4, fitness n=3, gym, and running in nature. Although it has nothing to do with the topic, it is important to note that almost two-thirds of kinesiology students are not active athletes, and one-third do not know the difference between sports and recreation. One of the ideas in this paper was to separate groups of sports: aerobic, anaerobic, and combined, the idea could not be implemented due to the small number of athletes, the only possible division was by sports status (recreationist, former athlete, active athlete, national team member).

Table 2. Descriptive statistical parameters (median, mode and mode frequency) for all groups together and for groups separated by gender and sports status, normality of distribution (Shapiro-Wilk W test) and differences between these groups (Mann-Whitney U test).

	All groups n=47				*Shapiro-Wilk W test*	
Variables	*n*	*Median*	*Mode*	*F mode*	*W*	*p*
*RPE mosor**	*43*	*very hard*	*very hard*	*14*	*0.94*	*0.04*
*RPE fortica**	*24*	*light*	*light*	*12*	*0.88*	*0.01*
*RPE rafting**	*25*	*light*	*light*	*10*	*0.91*	*0.03*
*RPE kayaking**	*26*	*light*	*light*	*9*	*0.92*	*0.04*
RPE canyoning	*11*	*very hard*	*very hard*	*5*	*0.87*	*0.07*
	Female n=19			*Male n=28*		*MWU*	
	Median	*Mode*	*F mode*	*Median*	*Mode*	*F mode*	*Z*	*p*
RPE mosor	*somewhat hard*	*somewhat hard*	*7*	*hard*	*very hard*	*9*	*-0.27*	*0.78*
RPE fortica	*light*	*light*	*9*	*somewhat hard*	*Multiple*	*3*	*-0.67*	*0.51*
RPE rafting	*light*	*light*	*6*	*light*	*light*	*4*	*-0.87*	*0.38*
RPE kayaking	*somewhat hard*	*light*	*4*	*light*	*light*	*5*	*1.7*	*0.09*
RPE canyoning	*light*	*Multiple*	*1*	*somewhat hard*	*somewhat hard*	*4*	*-1.02*	*0.31*
	Former athletes/recreationists n=30			*Active athletes n=17*			*Z*	*p*
*RPE mosor**	*hard*	*very hard*	*9*	*somewhat hard*	*somewhat hard*	*6*	*103.5*	*<0.01*
RPE fortica	*light*	*light*	*11*	*light*	*Multiple*	*1*	*24.5*	*0.57*
RPE rafting	*light*	*light*	*6*	*light*	*light*	*4*	*44*	*0.26*
RPE kayaking	*light*	*light*	*7*	*light*	*somewhat hard*	*3*	*79.5*	*1.00*
RPE canyoning	*light*	*light*	*2*	*somewhat hard*	*somewhat hard*	*4*	*12*	*0.78*

**Statistically significant difference p<0.01; Multiple - there are more answers with the highest frequency*

From table 2 we see that all variables except canyoning (p=0.07) do not have normally distributed data, there are no statistically significant differences between men and women in the level of perceived effort, only in the kayaking variable the difference is almost statistically significant (p=0.09). Active athletes perceived a lower load when hiking on Mosor (p<0.01) in contrast to non-athletes and recreational athletes.

Recreational activities in this paper are very different. In addition to the environment (mountain, sea, river...) the activities differ in the type of activity (rowing, walking), the extent and intensity of the activity itself. It is

interesting that in the total sample, hiking Mosor (10 km) and canyoning (2.7 km) were perceived as very hard (17 on Borg's scale), while the other activities were perceived as light (11 on Borg's scale). Mountaineering Mosor is the most difficult in terms of the distance traveled and the altitude overcome, but canyoning is not. Other studies classify canyoning between light activity and moderate activity (Loureiro, Pereira, Martins, & Brandao, 2023; Matos et al., 2019). We can assume that it is about the difficulty of the route (climbing, descending, swimming...) because the distance covered is only 2.7 km. We found significant differences in the perceived burden between the sexes, but the only variable that was almost significant (p=0.09) was kayaking. This finding is not surprising because men in kayaks show greater strength and efficiency while having lower heart rates (Gomes et al., 2012). The author further explains that energy consumption will be the same, but for women it will be more strenuous due to poorer adaptation to constant changes in aerobic and anaerobic regimes (Gomes et al., 2012). Another possible reason is the fact that men are better than women in terms of strength and endurance (Ryman Augustsson et al., 2009), and these abilities are essential in kayaking. From the aspect of sports status, a statistically significant difference is evident only in the most difficult activity, Mountaineering Mosor, which is logical. Active athletes perceived this effort as somewhat hard (Borg scale 13) and former athletes as hard and very hard (Borg scale 15 – 17). As the most difficult activity offered, hiking Mosor requires serious physical fitness, physical fitness must be considered when planning such tours. People engage in recreational activities to improve their physical condition but also for pleasure. The motivation for recreational activities can be reduced if the feeling of comfort is compromised due to the perceived burden.

CONCLUSION

Most recreational activities are perceived as light to somewhat hard (Borg scale 11) in terms of workload, which is good since it is recreation. Strenuous and long-lasting activities are more appropriate for active athletes, while people with poor physical condition may perceive it as very hard (Borg scale 17), which can lead to a drop of motivation for further recreation. When planning kayaking tours for women it is important to be careful and consider that these activities require upper body strength and endurance, and longer tours can be too strenuous for them. Future research should include a larger population with some objective measures of workload to better suggest the type of recreation.

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