

# MONITORING THE EFFECTS OF MOTOR LEARNING OF SKI TECHNIQUES THROUGH THE SUBJECTIVE FEELING OF PHYSICAL ACTIVITY IN STUDENTS

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Original research:

## Abstract

Motor learning can be defined as “changes in the internal process that determine an individual’s ability to perform particular motor task. The two aims of this research were: 1) analyze the differences in student’s physical activity related subjective feeling before and after two different ski training/teaching contents, and, 2) determine the between-group differences. A total of 51 kinesiology students participated in this study. Subjective Exercise Experience Scale (SEES) questionnaire was used to determine physical activity related psychological effects. Between groups differences were present in the subjective feeling of fatigue at the end of the practical skiing lessons implying higher fatigue levels occur in beginners than advanced trainees. It can be concluded that, as a consequence of different teaching contents and workload intensities, the psychological adaptation to the learning process varies.

**Keywords:** skiing, learning, motor abilities, holistic

## Introduction

The past two decades have seen an expansion of scientific studies and university textbooks dealing with motor learning problems (Schmidt & Wrisberg, 2008; Schmidt & Lee, 2005; Edwards, 2010). According to Coker (2009), motor learning can be defined as “changes in the internal process that determine an individual’s ability to perform a particular motor task. According to these authors, several factors can affect the process of motor learning and can be classified into three segments: person, environment, and task. According to the first criterion, it is assumed that the same learning process can have completely different effects on those who learn, respecting their characteristics and differences.

Every form of physical activity and thus physical exercise causes, in addition to physical, certain psychological effects. Thus, for example, according to Cigrovski and Matković (2003), skiing as a sport represents a great physical and mental effort for the skier, requiring him exceptional agility, coordination, strength and endurance because in competitive skiing the winner is decided by only hundreds of

seconds. The process of ski training itself does not only consist of descending the slope but also includes turning, climbing, walking and falling, in the realization of all these activities integratively, with different influences, almost all anthropological features act. It is the monitoring of the psychological effects of physical activity that has been the subject of many previous studies. Based on their results, many authors (Petruzzello et al., 1991; Cox et al., 2001) have concluded that these are mostly positive effects.

When it comes to subjective psychological effects, the best tool for assessing them, related to physical activity, is a survey questionnaire called SEES (Subjective Exercise Experience Scale), a scale for assessing the subjective feeling associated with exercise, created by McAuley and Courney (1994)), which aims, as stated by the authors, to determine a general psychological response that can be positively or negatively directed. It is this questionnaire that was used in this research to determine the level and character of students'

subjective feelings in the process of training in practical skiing classes.

When it comes to performing complex motor tasks, or learning complex knowledge, in this case participating in skiing lessons, the subjective feelings that result from these activities are very important, but, in addition, it is important to establish the subjective feelings that occur before joining the learning process, so it is necessary to assess the subjective feeling related to the beginning and end of ski training for each day of the educational process. Therefore, the subject of this paper is precisely global, negative and positive subjective effects, measurable by the SEES scale, ski training, more precisely the execution of various motor tasks, or the process of motor learning of different motor skills in the process of ski training, for two different academic years, of the student population.

The first goal of the research is to analyze the differences in the subjective feeling of physical activity of students before and after ski training of different teaching contents, namely: third-year - basics of skiing and fifth year - advanced skiing.

The second goal of the research is to determine whether there are differences by age in the subjective feeling of physical activity of students in learning different skiing techniques, namely: third-year - basics of skiing and fifth-year - advanced skiing.

## Methodology

### Participants

Students of the third and fifth academic year of the Faculty of Sports and Physical Education of the University of Sarajevo in the academic year 2020/21 participated in this study. A total of 51 respondents, 37 of them from the third and 14 from the fifth year of study.

### Variables

The sample of variables in this study consisted of three factors that indicate subjective feelings related to physical activity. Namely, the SEES questionnaire constructed by McAuley and Courtney (1994) was used to determine the global, negative and positive psychological effects of physical activity (Ivančić et al., 2013). SEES consists of 12 items, for the evaluation of which the Likert scale of 7 degrees is used, which define 3 factors (4 statements form one factor) of the subjective experience of physical activity. These factors are:

ZD - Positive well being

N - Subjective feeling of psychological distress

U - Subjective feeling of fatigue

### Testing procedure

All students completed the SEES questionnaire at the beginning and end of the practical skiing lesson and measured the pulse value before completing the questionnaire. They were explained to fill in the questionnaire according to their current feelings. They filled in the questionnaire every day before and after the ski lessons. The students who were tested did not know the purpose of the testing as well as the results of some previous studies to avoid possible objectification of the results.

### Statistical analysis

The results were processed with the software package SPSS 24 for Windows. For all dependent variables in all measurements, standard descriptive parameters were calculated: arithmetic mean (AS), standard deviation (SD), and in addition to the value of the KS test, to establish the normality of the distribution. Differences between years and differences before and after physical activity in practical skiing lessons of different teaching content in the subjective feeling of students' physical activity in learning different skiing techniques were analyzed by t-test for independent samples in normal and Mann-Whitney's U test in variables which do not follow a normal distribution. The level of statistical significance was set at  $p < 0.05$ .

## Results

Under the research objectives, the results are presented in Table 1.

Table 1. Mean values  $\pm$  standard deviations and values of KS-test of male and female subjects for all factors of subjective feeling of exercise before and after activity. T-test and Mann-Whitney U by groups

Table 1. Study outcomes

	before activity		after activity		
	III year	V year	III year	V year	
First hour	ZD 20,3 $\pm$ 4,1	0,14 22,8 $\pm$ 4,0	0,18 22,4 $\pm$ 5,1	0,16 22,8 $\pm$ 4,2	0,19
	N 5,6 $\pm$ 1,6	0,00 4,0 $\pm$ 0,0	0,00 4,3 $\pm$ 0,7	0,00 4,0 $\pm$ 0,0	0,00
	U 7,4 $\pm$ 2,9	0,00 6,4 $\pm$ 1,3	0,00 9,1 $\pm$ 2,2*	0,00 6,1 $\pm$ 0,9	0,00
Last hour	ZD 20,1 $\pm$ 5,2	0,08 21,5 $\pm$ 5,4	0,12 21,9 $\pm$ 4,3	0,07 24,3 $\pm$ 3,4**	0,18
	N 5,9 $\pm$ 1,3	0,00 5,6 $\pm$ 2,6	0,00 4,3 $\pm$ 0,9	0,00 4,0 $\pm$ 0,0	0,00
	U 9,1 $\pm$ 2,9	0,00 8,1 $\pm$ 2,2	0,00 11,2 $\pm$ 3,2	0,00 6,9 $\pm$ 1,6+	0,00

before and after activity (\*  $p < 0.05$  within the group; +  $p < 0.05$  between groups).

The variables of subjective feeling of restlessness and fatigue did not have a normal distribution in either group or any of the tests, so the Mann-Whitney test was used to compare them between the measurements and the groups. When it comes to the subjective feeling of psychological restlessness, no statistically significant difference was recorded between the measurements either at the beginning or at the end of the educational process. Furthermore, the recorded subjective feeling of fatigue was statistically different between the conditions before and after class at the beginning of the educational process in third-year students until the same difference occurred at the end of practical training. In fifth-year students, the absence of statistically significant differences in these variables was observed in all measurements. The subjective feeling of health followed the normal distribution, and a statistically significant difference was found only between the conditions before and after the end of classes at the end of practical classes, and only in fifth-year students.

Differences between groups were observed in the subjective feeling of health and subjective feeling of fatigue at the end of practical skiing lessons. The fifth-year recorded a higher level of subjective feeling of health and a lower level of subjective feeling of fatigue than the third year in the measurement after the successfully implemented program of practical ski training.

## Discussion

From the results, it can be noticed that there is no significant difference between students of different ages when it comes to factors of subjective feeling of health, psychological restlessness and fatigue before classes where different teaching contents are taught. Furthermore, the recorded differences between measurements at the beginning and end of practical skiing classes at the beginning of the educational process indicate that no level of ski training (basic and advanced) results in statistically significant positive or negative emotional effects, while, at the same time, only third-year students affect the subjective feeling of fatigue. Interestingly, this trend did not continue at the end of the educational process because, although the third-year students again recorded a higher level of fatigue after practical classes compared to the beginning, this difference is not statistically significant. Generally, although not statistically significant, the initial level of fatigue on the last day

of training was higher than at the beginning of training in both groups.

Further insight into the results recorded at the end of practical classes can be seen that fifth-year students showed both a higher level of subjective feeling of health and a lower level of subjective feeling of fatigue, which indicates the adequacy of the content and, if not directly measured, hypothetically, a higher level of technique adoption that even reduced the amount of fatigue they felt.

It could be said that subjective feelings about different program contents do not differ between different years, which may be a result of the fact that attitudes about different activities have not been formed. Namely, this is very easily explained by the fact that students, for this research, were interviewed at the very beginning of fieldwork before they had the opportunity to get acquainted with the type of activities they will do, the type of motor skills they will learn, but also with activity leaders.

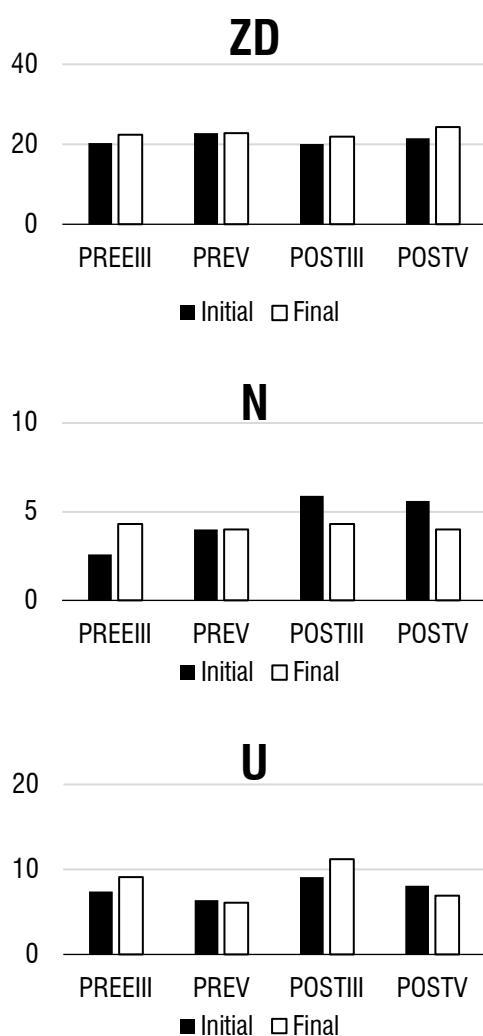
When we look at the factors of subjective feeling of health and subjective feeling of fatigue, it is noticeable that they differ statistically significantly between students of different ages. These results suggest that the subjective feeling of physical activity differs after completing the last day of ski education, to the benefit of fifth-year students. In other words, after the last day of advanced skiing, the positive feelings of students are more pronounced than those recorded in third-year students. The reason for this may be the content of teaching. Namely, since during the classes with fifth-year students we mostly work on activities in which the methodological sequence is simpler and, therefore, it is easier to accept after the individual has basic knowledge, there is a possibility that the content of practical classes benefits students in some other segments (socialization etc.).

The fact that none of the measurements showed increased restlessness, and that, as Landuyt et al. (2000) and Ekkekakis et al. (2001) that high-intensity physical activity has negative effects on subjective feelings, it is very clear that the content of teaching was appropriate for the student population.

Furthermore, fatigue, which proved to be a clear difference between the study years at the end of practical classes, can be attributed primarily to ignorance of motor structures because according to previous research indicating that ignorance of motor structures performed as part of a motor program results in irrationality in performance (Schmidt & Wrisberg 2000). This irrationality requires additional energy consumption. Guthrie (1952) found in the middle of the last century (according to Schmidt and Wrisberg 2000) that the improvement of motor skills

is reflected in an increase in the accuracy of movement and a decrease in energy consumption. It is fatigue, although not different within groups, that is statistically significantly different between the two groups at the end of practical classes after completed training. Also interesting are the results that indicate that the level of fatigue in that last hour of practical classes was moving in opposite directions. Namely, while it increased concerning the situation before classes among third-year students, a decrease in the level of subjective feeling of fatigue was recorded among fifth-year students. There are several reasons for the existence of a statistically significant difference after the end of practical skiing classes in the subjective feeling of fatigue. In particular, the fact that this same difference is not statistically significant when students come to class shows that it is the subjective feeling that changes due to the effect of the educational process.

Chart 1. Study outcomes



The reason why the subjective feeling of fatigue is higher in third-year students compared to fifth-year students could be because classes for third-year students last longer than fifth-year students, teaching contents for third-year students are unknown to students and they are in the phase of learning new teaching contents, daily travel from home to the mountains, these could be the reasons why the subjective feeling of fatigue is more pronounced in third-year students.

A more pronounced sense of health after advanced training indicates that it causes better positive effects, which can be attributed to the existence of the base on which the upgrade is performed, and, in addition, the aesthetics of the correct technique (Miletić, 2012).

Good effects can be attributed to a better teacher, the adequacy of teaching content and, of course, a shorter period of training as well as the earlier adoption of skiing techniques that are only improved in this teaching process. (Nethery, 2002; Potteiger et al., 2000).

Based on the preceding findings, it can be concluded that advanced skiing training has a positive impact on students. This indicates that the content of the advanced skiing lesson is very well suited and adapted, and, among other things (*inter alia*), purposeful for students. This is supported by the conclusion reached by Focht and Koltyn (1999) that, if physical exercise is adapted to the population, similar results occur regardless of the type of activity.

## Conclusion

Taking into account the results of this research, it can be concluded that the students had a minimal difference in the values of all factors at the beginning of the practical skiing classes. Furthermore, the first day of training, which is also an introduction to techniques, did not result in any significant or positive effects that could be attributed to either inadequate teaching or synergy and mutual annulment of various factors (subjective feeling of health and subjective feeling of restlessness). This could be addressed in more detail by including another measurement in half of the practical teaching.

On the other hand, the subjective feelings of students differ greatly concerning the type of activity that was realized at the end of the educational process. This can be a consequence of different teaching contents, but also the intensity of the workload itself and the adaptation of teaching topics to a given population. This is mostly reflected in the

subjective feeling of fatigue. This can apply to both types of teaching classes because it is precisely about subjective feeling.

Further research can be improved with objective fatigue monitors to further expand knowledge and vision of teaching, for both beginners and advanced.

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**Submitted: 13.04.2021.**

**Accepted: 18.05.2021.**