

Table 3: Metric characteristics of Goal achievement satisfaction scale in sport environment for the first sample (kinesiology students) and second sample (athletes)

	Students sample	Athletes sample
Cronbach's α coefficient	0,88	0,87
First egenvalue of item correlation matrix and the persantage of total variance	5,74 41,02	5,61 40,07
Number of eigenvalues exceeding 1	3	2
Average inter-item correlation	0,36	0,35
Total score mean	44,68	47,99
Standard deviation of total score	9,24	9,70
Minimum total score	17	20
Maximum total score	69	70

Crombach's alpha reliability coefficient of the scale for the first sample (Kinesiology students) shows value of 0,88, and for the second sample (athletes) 0,87 (Table 3). First eigenvalue of item corelation matrix explains satisfactory 41,02% for the first sample, and 40,07% for the second sample. Means of total scores are 44,68 and 47,99 respectevly. In both sample minimal observed total score is higher then theoretical minium total score. In athlete sample maximal value 70 is observed, which is the sam value as maximum teoretical value.

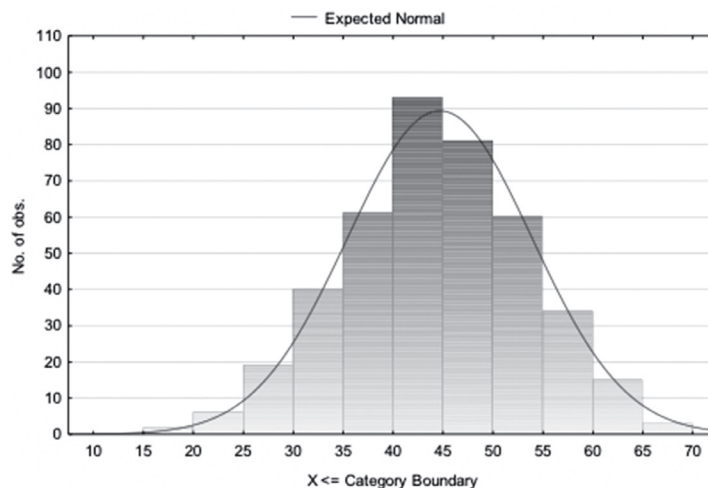


Figure 1: Distribution of total result of Goal achievement satisfaction scale in sport environment on the sample of 415 Kinesiology students; theoretical normal deistribution is represented by line.

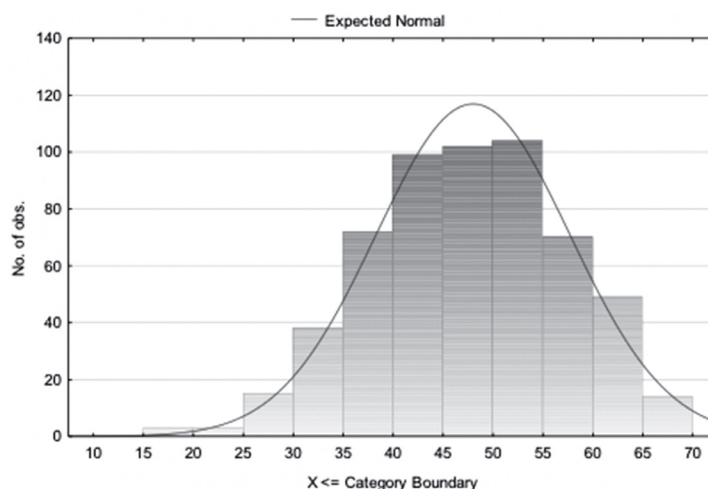


Figure 2: Kolmogorov-Smirnoff test show that distribution of results from both samples do not statistically differ from theoreticly normal distribution ($d_1=0,03654, p_1>0,20$; $d_2=0,04144, p_2>0,20$), respectively.

Conclusion

The results of analysis of metric properties of *Goal achievement satisfaction scale in sport environment* conducted on both samples show that all 14 items are good measure of Goal achievement satisfaction in sport environment; total result show high value of reliability and acceptable distribution statistically not different from normal. It can be concluded that the scale can be used for both individual assessment as for the research.

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THE MEASURE OF INTRINSIC AND EXTRINSIC MOTIVATION IN TENNIS

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Summary

A questionnaire was designed to estimate the quality and intensity of motivation of tennis players (Kumburić, 2015), based on the model of Deci and Ryan (1985). The designed questionnaire consists of 38 items that form six subscales, including six regulatory styles described by Deci and Ryan (1985). The analysis of the measurement properties of questionnaire was done on the sample of 174 junior tennis players aged from 15 to 18 years. The analysis show that the newly designed questionnaire has overall Cronbach alpha reliability of $\alpha=0.849$, which implies that the questionnaire is applicable for practical purposes. The analysis of the measurement properties of subscales showed Cronbach alpha reliability $\alpha=0.74$ for intrinsic motivation subscale, $\alpha=0.563$ for identified motivation subscale, $\alpha=0.657$ for integrated motivation, $\alpha=0.61$ for introjected motivation, $\alpha=0.628$ for external motivation, and $\alpha=0.582$ for amotivation subscale. The reliability of the subscales is not adequate for the individual application (e.g. to estimate the profile of a player).

Key words: motivation, tennis, analysis of metric properties, reliability

Introduction

Motives are generally defined as generators of the behavior, which is directed to some goal (Petz, 2005). There are a number of reasons for human behavior, described by different theories of motivation. Over the last decade, research in the field of sport psychology, as well as interventions for developing high quality motivation, are predominantly done based on Self-Determination Theory (Niven & Markland, 2016; Sebire et al., 2016).

Self-Determination Theory by Deci and Ryan (1985) defines basic human needs, a need for autonomy, competence, and relatedness, and ways to satisfy them. Ryan and Deci (2000) noticed that intrinsically motivated behaviors satisfy need for autonomy and competence, while extrinsically motivated behaviors very often do not. They noticed that extrinsic motivation includes different types of regulatory styles, and therefore defined continuum from amotivation to intrinsic motivation including four interpolated types of extrinsic motivation: external regulation, introjection, identification and integration (Figure 1).

Preferable outcomes of behavior generated by motives perceived as having internal or somewhat internal locus of causality were proved in exercise and sport (Vlachopoulos et al., 2000, Friedrichs et al., 2015); therefore, it is important to know not only the intensity, but also to understand the quality of motivation of athletes.

The purpose of this work is to introduce a questionnaire designed to estimate the quality and intensity of motivation in tennis (Kumburić, 2015) based on the model of Deci and Ryan (1985).

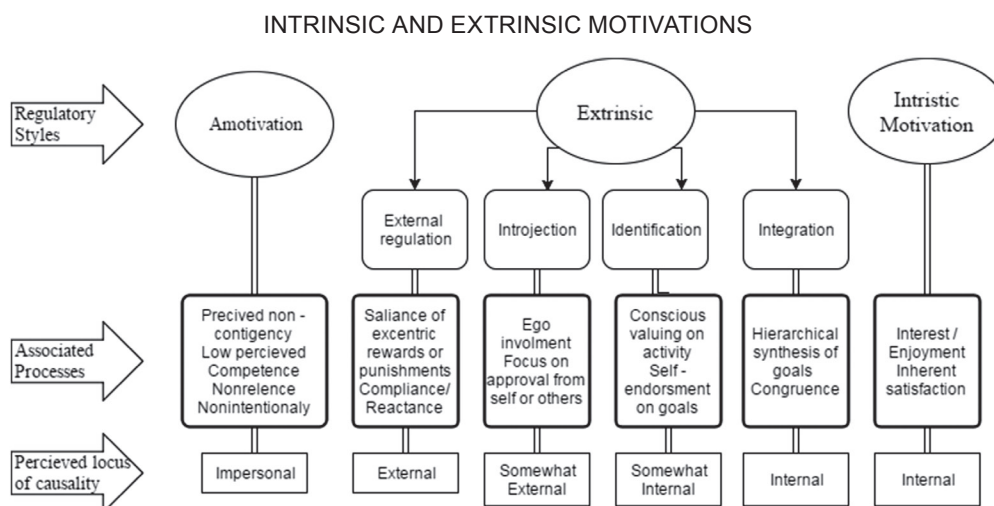


Figure 1: Graphic representation of intrinsic and extrinsic motivations, from Ryan, R. M. & Deci, E. L. (2000).

Methods

The designed questionnaire consists of 38 items that form six subscales, including six regulatory styles described by Deci and Ryan (1985); the responses are given on the 5-point scales.

The analysis of the measurement properties of questionnaire was done on the sample of 174 junior tennis players aged from 15 to 18 years, with mean age of 17,6 years, with SD of 0,61. Questionnaire was used on Croatian National Championship U18, and on ITF U18 tournament in Umag (Grade 1). After individually given instructions to each subject, filling out the questionnaire took less than 10 minutes. Data analysis was done by Statistica 12 software.

Results and discussion

Measuring properties 38 items of newly constructed questionnaire can be found in Table 1.

The variability of the response is satisfactory, answers on 37 items are in maximum range 1-5. It may also be noted that the dominant number of items has a standard deviation greater than 1. A majority of items has a noticeable projection on the first component (K1) and great number of items have a medium to high correlation with the overall summarized results.

Table 1: Metric properties of the items of the measure of intrinsic and extrinsic motivation in tennis

Item	Mean	Min	Max	SD	RIT	K1
1. Going to tournaments is not always a pleasure, but I do it because it is good for personal experience.	3,14	1	5	1,42	0,098	0,112
2. Tennis is my greatest pleasure.	4,56	2	5	0,64	0,573	0,708
3. I have a pang of conscience when I miss training	3,79	1	5	1,13	0,373	0,468
4. I take care to have a good night's sleep because night entertainments are not for tennis players.	4,11	1	5	1,07	0,527	0,640
5. I don't want to disappoint my friends with defeat.	2,76	1	5	1,37	0,160	0,075
6. It is my pleasure to win point after a long rally.	4,48	1	5	0,90	0,261	0,323
7. I want to prove to everyone that I'm the best.	3,93	1	5	1,14	0,378	0,351
8. Tennis training makes me happy.	4,42	1	5	0,78	0,543	0,669
9. I enjoy the rally on the court.	4,25	1	5	0,94	0,345	0,458
10. I live healthy so that I could be better at tennis.	4,13	1	5	0,94	0,551	0,687
11. Tennis is more important for me than education.	3,30	1	5	1,31	0,348	0,385
12. Physical trainings are boring but they make me better tennis player.	3,34	1	5	1,45	0,303	0,303
13. Tennis requires too much sacrifice.	3,49	1	5	1,23	0,010	-0,045
14. Early morning training is hard, but useful.	3,99	1	5	0,97	0,289	0,320
15. Tennis will make me famous.	3,25	1	5	1,21	0,303	0,344
16. My coach is proud of me, so I am regular on trainings.	3,40	1	5	1,29	0,406	0,444
17. As a tennis player I don't allow myself sloppy lifestyle.	4,07	1	5	1,02	0,529	0,652
18. In my career parents expect only victory from me.	2,07	1	5	1,16	0,161	0,076
19. I could use my time better than playing tennis.	2,04	1	5	1,15	0,244	-0,366
20. I take care of diet in order to be a better tennis player.	3,60	1	5	1,13	0,558	0,652
21. For me is important that audience loves me	2,97	1	5	1,39	0,338	0,284
22. I don't get angry at the tennis judges because real tennis players don't do that.	3,48	1	5	1,20	0,041	0,072
23. People appreciate me more because I am a tennis player.	3,45	1	5	1,08	0,191	0,163
24. I like to perform a good strong service.	4,40	1	5	1,04	0,346	0,395
25. I play tennis because there is a lot of money.	2,37	1	5	1,30	0,135	0,053
26. In tennis I can truly express myself.	4,06	1	5	0,99	0,601	0,718
27. I do my best when one of my friends is sitting in the stand.	3,53	1	5	1,27	0,280	0,260
28. Tennis is great because I travel a lot.	3,90	1	5	1,13	0,321	0,340
29. I train tennis because there is a chance that I get a very good sponsor.	3,28	1	5	1,13	0,361	0,313
30. I take care of my diet because that makes me tennis player.	3,66	1	5	1,21	0,610	0,675
31. Glory will make my life easier after career.	3,39	1	5	1,15	0,381	0,392
32. I do not drink alcohol because tennis players don't do that.	3,78	1	5	1,48	0,284	0,382
33. Everyday training does not make sense.	1,87	1	5	1,25	0,150	-0,287
34. I hope to be a famous tennis player.	3,98	1	5	1,19	0,497	0,606

35. Sometimes I think that tennis is not for me	2,21	1	5	1,23	0,359	-0,498
36. Tennis can make my life easier.	3,55	1	5	1,25	0,046	0,035
37. Tennis makes me more nervous than I usually am.	2,93	1	5	1,34	0,164	-0,266
38. I don't miss trainings because I am a tennis player.	4,17	1	5	0,97	0,378	0,502

Legend: min = minimal item result value; max = maximal item result value; SD = standard deviation; RIT = item correlation with the overall summary result of the subscales of "intrinsic motivation", α = Cronbach's coefficient if individual item is expelled, K1 = the first principle component of the matrix of item correlations.

The first eigenvalue of correlation matrix of 38 items is 7,738 and explains 17,99% of total variance. The Cronbach alpha reliability of total result is $\alpha=0.849$, which implies that the questionnaire is appropriate for practical purposes and individual application.

Table 2: Metric properties of 5 items of the subscale measuring amotivation

Item	RIT	α	K1
13. Tennis requires too much sacrifice.	0,205	0,595	-0,421
19. I could use my time better then playing tennis.	0,294	0,547	-0,581
33. Everyday training does not make sense	0,363	0,510	-0,665
35. Sometimes I think that tennis is not for me	0,613	0,359	-0,847
37. Tennis makes me more nervous than I normally am	0,251	0,576	-0,519

Legend: RIT = item correlation with the overall summary result of the subscales of "intrinsic motivation", α = Cronbach's coefficient if individual item is expelled, K1 = the first principle component of the matrix of item correlations.

The first eigenvalue of correlation matrix of 5 items describing *amotivation* is 1,944 and explains 38,88% of total variance. Cronbach alpha reliability is low $\alpha=0.582$, and scale should be expanded.

Table 3: Metric properties of 7 items of the subscale measuring external regulation

Item	RIT	α	K1
15. Tennis will make me famous.	0,416	0,564	0,688
25. I play tennis because there is a lot of money.	0,424	0,559	0,623
28. Tennis is great because I travel a lot.	0,240	0,619	0,378
29. I trainin tennis because there is a chance that I get a very good sponsor.	0,422	0,564	0,649
31. Glory will make my life easier after career.	0,461	0,550	0,749
34. I hope to be a famous tennis player.	0,354	0,585	0,571
36. Tennis can make my life easier.	0,088	0,669	0,113

Legend: RIT = item correlation with the overall summary result of the subscales of "intrinsic motivation", α = Cronbach's coefficient if individual item is expelled, K1 = the first principle component of the matrix of item correlations.

The first eigenvalue of correlation matrix of 7 items describing *external regulation* is 2,324 and explains 33,20% of total variance. Cronbach alpha reliability is $\alpha=0.628$, and is too low for wider use.

Table 4: Metric properties of 8 items of the subscale measuring introjection

Item	RIT	α	K1
3. I have a pangs of conscience when I miss training.	0,180	0,615	-0,295
5. I don't want to disappoint my friends with defeat.	0,326	0,577	-0,531
7. I want to prove to everyone that I'm the best.	0,377	0,564	-0,631
16. My coach is proud of me, so lam regular on trainings.	0,199	0,614	-0,335
18. In my career parents expect only victory from me.	0,316	0,580	-0,507
21. For me is important that audience loves me	0,446	0,536	-0,692
23. People appreciate me more bacause I am a tennis player.	0,257	0,595	-0,487
27. I do my best when one of my friends is sitting in the stand.	0,390	0,557	-0,609

Legend: RIT = item correlation with the overall summary result of the subscales of "intrinsic motivation", α = Cronbach's coefficient if individual item is expelled, K1 = the first principle component of the matrix of item correlations.