

Ewa Krzyżak-Szymańska

ORCID: 0000-0002-7752-9266

Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach

Andrzej Szymański

ORCID: 0000-0002-3787-6474

Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach

# Physical Exercise Addiction Among Students Based on the EDS-R Scale Adapted for Poland

Uzależnienie od ćwiczeń fizycznych wśród studentów na podstawie adaptowanej do polskich warunków Skali EDS-R

## ABSTRACT

The purpose of the research was to adapt the Exercise Dependence Scale – Revised (EDS-R) by H.A. Hausenblas and D. Symons Downs to the Polish context and to evaluate the exercise addiction rate among students. The research was conducted online with 290 interviewees aged 19–23 years. Factor analysis confirmed the 7-factor structure of the EDS-R test and its good internal consistency. All the subscales were characterized by adequate reliability. To evaluate scale's accuracy, the correlation between the EDS-R scale and a question concerning the number of hours of exercise per week was measured. The number of hours spent exercising per week was favorably connected with all of the subscales of the EDS-R. Those results were confirmed by differential analysis. Based on the EDS-R test, the participants were classified as (1) at risk of exercise addiction (5.5%), (2) not

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## KEYWORDS

health security, behavior addictions, exercise addiction, EDS-R scale, students

## SŁOWA KLUCZOWE

bezpieczeństwo zdrowotne, uzależnienia behawioralne, uzależnienie od ćwiczeń fizycznych, Skala EDS-R, studenci

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Raporty z badań

addicted (symptomatic group) (72.8%) and (3) not addicted (asymptomatic) (21.7%). The material presented in the article may contribute to further research using the Polish adaptation of the EDS-R scale in different populations (e.g., due to different physical activities undertaken by the exercisers).

## ABSTRAKT

Celem podjętych badań była adaptacja testu ESD-R autorstwa H.A. Hausenblas i D. Symons Downs do polskich warunków oraz ocena skali występowania uzależnienia od ćwiczeń fizycznych wśród studentów. Badania przeprowadzono online. Objęły one 290 osób w wieku od 19 do 23 lat. Stosując analizę czynnikową, potwierdzono strukturę 7-czynnikową skali ESD-R i dobrą jej wewnętrzną spójność. Wszystkie podskale charakteryzowały się dobrą rzetelnością. Do oceny trafności kryterialnej skali zastosowano pomiar korelacji między skalą ESD-R a pytaniem dotyczącym tygodniowej liczby godzin wykonywania ćwiczeń fizycznych przez respondenta. Liczba godzin uprawiania ćwiczeń w tygodniu była dodatnio powiązana ze wszystkimi podskalami ESD-R. Wyniki te potwierdziły także analizy różnicowe. Na podstawie testu ESD-R uczestnicy zostali sklasyfikowani jako: (1) zagrożeni uzależnieniem od ćwiczeń fizycznych (5,5%), (2) nieuzależnieni (grupa objawowa) (78,3%) oraz (3) nieuzależnieni (grupa bezobjawowa) (21,7%). Prezentowany materiał może się przyczynić do dalszych badań z wykorzystaniem polskiej adaptacji skali ESD-R w różnych populacjach (np. ze względu na różne aktywności fizyczne podejmowane przez ćwiczących).

## Introduction

One of the basic human needs is the need for security, which researchers describe in various spheres of human activities (Jaworska 2019). They pay attention to social, economic and health security and describe these areas in the context of civilization and technological threats. According to researches (Mucha B., Mucha M. 2021) the pandemic period, social isolation and remote working resulted in a gradual decrease in physical activity and an increase of sedentary behaviors of people. This state of affairs sparked a discussion about the norms of physical activity of a health-promoting nature and the risks of both inactivity and addiction to it.

Furthermore, in health education the attention is paid to the statement that physical activity is every man's obligation to his body (Jegier et al. 2005). It is emphasized as well, that regular physical effort<sup>1</sup> which is adequate to the age and fitness of an individual strengthens his or her physical fitness, condition and mobility. There is no doubt among researchers that balanced physical effort causes beneficial adaptive changes in all the systems of human organism, it influences positively the metabolism, mental health, ageing processes and it prevents the development of chronic diseases. Therefore, it can be said that exercising is treated as health related phenomenon and the exercise recommendation is the common element of education promoting health (King et al. 2012).

The scientific reports also indicate that physical activity of some people may adopt the form of central element of their lifestyle becoming addictive or even pathological behavior. Then we deal with the activity which does not lead to keeping healthy lifestyle, it simply becomes harmful. Such physical activity connects usually with excessive physical effort and extreme concern for own appearance, negligence or exhaustion of organism, keeping the physical activity despite the experienced pain or physical disability and with the neglect of duties connected with work, education and family. This state is defined in literature as: habitual involvement in regular exercise, excessive exercise, exercise addiction, compulsive exercise, addiction to exercise, addiction to physical effort, obsessive exercise, exercise overuse (Habrat 2016).

Karolina Piątek indicates that the most appropriate term to describe the phenomenon is "behavioral disorder" and the term "behavioral addiction" should be used when identifying a phenomenon associated with a significant intensification of symptoms of a given disorder is recognized as a disease entity (Piasecka et al. 2022).

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1 According to recommendations of World Health Organization (WHO) the recommended levels of physical activity for healthy adult aged 18–64 which positively influences the health of an individual should consist of 150–300 minutes of moderate-intensity effort throughout the week or 75–150 minutes of vigorous-intensity per week or the equivalent combination of both. Additionally, adults should do at least moderate-intensity exercise that strengthens their muscles at least two days a week (WHO 2020).

Sometimes, the obsessive physical exercise is defined as bigorexia. However, this term relates more to distorted perception of own body, which may or may not lead to excessive engagement in physical exercise of an individual. The exercise addiction may also be the result of other conditions (problems), particularly eating disorders (Rowicka 2015).

Initially, the addictive exercising was treated as “positive dependence” (Glasser 1976) indicating the favorable results of physical exercise and positive relation between the amount of exercise and the individual’s health. It was connected with psychological and physiological benefits for human organism: strong pleasure experience, the feeling of gaining mental strength and going beyond own ability limits. However, it did not take long to notice (based on empirical research) that excessive exercise may lead not only to body injuries but also to negligence of the most important everyday duties. In clinical extreme cases, the excessive exercise was identified as the new form of addiction (Griffiths 1996). It was connected with the compulsive and addictive realization of activity, neuroadaptation (withdrawal symptoms and tolerance) and unfavorable consequences (exercising in spite of the medical contraindications) (Brevers et al. 2022; Martyniak et al. 2021).

Despite the fact that some forms of specified activity are presented as the actions of addictive nature, it is worth noticing that there is no direct reflection of it in ICD classification (ICD-11 2018) nor in DSM classification (APA 2013). This in turn causes that exercise addiction criteria are being set referring to the definition of addictive behavior or the criteria of dependent engagement in physical activity are created on the basis of classifications listed above (Manea et al. 2018). The representative of the first approach is among others: Mark D. Griffiths, who defined the following factors in exercise addiction:

1. Exercising becomes a priority as regards to other activities, which results in the individual’s thoughts and behavior preoccupation with exercise (salience).
2. The mood of an individual is modified by the physical exercise (mood modification).
3. There is a necessity of increasing the amount of actions in order to achieve the results faster (tolerance).

4. There are unpleasant emotional states or physical experiences in the situation of exercise interruption or its sudden reduction, such as: irritability, bad mood (the symptoms of withdrawal).
5. There are interpersonal conflicts between the exercise dependent and the surrounding (the conflicts with other forms of activity, internal conflicts).
6. There is a tendency to return to previous behavior patterns even after many years of withdrawal or controlling them (recurrence) (Griffiths 1996).

On the basis of substance addiction guidelines defined in DSM, David de Coverley Veale (1987) was the first to prepare diagnostic criteria of excessive physical activity. In his classification of “exercise addiction” he distinguished the following characteristics:

- a. The limitation of repertoire of exercises leading to stereotype pattern of training which takes place regularly, at least once a day.
- b. The engagement in exercise consisting of focusing on the physical activity at the expense of others in order to keep the exercise pattern.
- c. The increasing tolerance—increase of amount of exercise done in the following years.
- d. The withdrawal symptoms connected with mood disorders in case of exercise interruption or limited access to it.
- e. The delay or avoiding of the withdrawal symptoms by further exercising.
- f. The subjective awareness of exercise compulsion.
- g. The impulsive return to previous exercise pattern after the longer period of no exercise at all.

Similar situation is with Heather A. Hausenblas and Danielle Symons Downs (2002) who used DSM classification. They defined compulsive physical exercise as the multidimensional adaptive disorder of physical exercise leading to clinically significant disabilities or distress. They indicated that addiction of negative pattern of exercise appears when we have to do with three or more symptoms among seven diagnostic criteria below.

1. Tolerance—identified as a need of increased amount of physical exercise in order to achieve desired effect or the decreasing result of exercise while keeping the same workout intensity.

2. Withdrawal—characterized by such symptoms as: anxiety and fatigue in the condition of keeping the same level of activity and intensity or the lack of physical exercise.
3. Intention effect—the intended result relates to duration or the amount of physical effort which is expected (frequently there is a higher intensity than intended).
4. Lack of control over exercise usability or exercise as a whole—consists of the unsuccessful trials of exercise interruption or exercise control.
5. Time—the increase of amount of time devoted to physical activity.
6. Reduction of other activities—the interruption or decrease of social, professional, or recreational activity because of exercise.
7. Continuation—the continuation of exercise despite the knowledge about permanent or recurring problems caused by or increased by physical activity.

The evaluation of range of exercising addiction is not an easy assignment. It results from various diagnostic criteria used by researchers and the cultural diversity of this phenomenon (Habrát 2016). The fact that most of the research was based on the environment of regularly exercising people neither aids the evaluation. As a result, there is a significant scope of achieved outcomes. They indicate that addictive exercise concerns 3% to 30% of exercising people (Rowicka 2015). In the total population, the amount is estimated as 5% (Szabo, Griffiths 2007).

At present, the most exploited diagnostic and surveying tools used to measure the rate of exercise engagement are: Obligatory Exercise Questionnaire (OEQ) (Thompson, Pasma 1991), Exercise Addiction Inventory (EAI) (Terry et al. 2004), Commitment to Exercise Scale (CES) (Davis et al. 1993) and Exercise Dependence Scale (EDS) (Hausenblas, Downs 2002). The last of the tools in the modified version of the EDS-R is currently the only instrument that uses the symptoms of substance addiction specified in the DSM classification. Thanks to it there is a possibility to divide the respondents into three groups: (1) people at-risk of exercise addiction, (2) not addicted—symptomatic group, (3) not addicted—asymptomatic. EDS-R as a tool with good psychometric properties was translated into various languages and it is used in many countries, such as:

Portugal (Lindwall, Palmeira 2009), Spain (Sicilia, González-Cutre 2011), Italy (Costa et al. 2012), Hungary (Mónok et al. 2012) and France (Allegre et al. 2006).

## Method

### *Participants*

The research was conducted with the participation of 290 people aged 19–23 (the mean age was  $M=20.71$ , with standard deviation of  $SD=1.06$ ). More than half of the respondents i.e. 54.1% (157 people) were males, and the other part i.e. 45.9% (133 people) were females. All of the interviewees were the students of The Jerzy Kukuczka Academy of Physical Education in Katowice. The choice of research was intentional.

Based on EDS-R test, the participants were classified as:

- at-risk of exercise addiction ( $n=16$ : male=11, female=5),
- not addicted (symptomatic group) ( $n=211$ : male=116, female=95),
- not addicted (asymptomatic group) ( $n=63$ : male=30, female=33).

### *Measures*

The research was conducted with the use of diagnostic opinion poll method. It was divided into two stages.

The first one adaptation of Exercise Dependence Scale Revised<sup>2</sup> (EDR-R) by H.A. Hausenblas and D. Symons Downs<sup>3</sup> to Polish context.

The EDS-R scale consists of 21 statements (Table 1) on which the respondent issues the opinions on the basis of 6 level scale from 1 (never) to 6 (always). The EDS-R test was translated into Polish and then translated back into English (back translation). The translation

2 Due to changes in the nomenclature of behavioral addictions in the English language, the word “dependence” was replaced by the word “addiction” (DSM-5).

3 Ibidem.

was done carefully and thoroughly with elements of modification where the literal translation was impossible. All of the scale questions were kept in the adapted tool. In the range of tool adaptation, the adequacy of questions essence as regards to the Polish cultural context and questions understanding by young adults, i.e. students were examined. The tool consists of 7 subscales. They refer to 7 diagnostic criteria of addiction.

**Table 1.** Descriptive statistics for The Exercise Dependence Scale Revised individual items and factor analysis. English and Polish version of the EDS-R

| Subscales EDS-R and individual items   | M    | SD   | Skewness | Kurtosis | Factor loading |
|--|------|------|----------|----------|----------------|
| <b>Withdrawal (<math>\alpha=0.71</math>)</b>   |      |      |          |          |                |
| 1. Ćwiczę, aby uniknąć uczucia irytacji.<br>/ I exercise to avoid feeling irritable.   | 3.06 | 1.41 | .156     | -.696    | .809           |
| 8. Wykonuję ćwiczenia, aby uniknąć uczucia niepokoju.<br>/ I exercise to avoid feeling anxious.  | 2.64 | 1.44 | .407     | -1.016   | .967           |
| 15. Wykonuję ćwiczenia, aby uniknąć uczucia napięcia.<br>/ I exercise to avoid feeling tense.  | 2.98 | 1.29 | .206     | -.679    | .827           |
| <b>Continuance (<math>\alpha=0.80</math>)</b>  |      |      |          |          |                |
| 2. Ćwiczę pomimo powtarzających się problemów fizycznych. / I exercise despite recurring physical problems.  | 3.09 | 1.47 | .212     | -.842    | .872           |
| 9. Wykonuję ćwiczenia, nawet gdy mam kontuzję.<br>/ I exercise when injured.   | 2.64 | 1.44 | .407     | -1.016   | .967           |
| 16. Ćwiczę regularnie, nawet gdy mam poważne problemy fizyczne. / I exercise despite persistent physical problems.   | 2.48 | 1.39 | .748     | -.284    | .780           |
| <b>Tolerance (<math>\alpha=0.76</math>)</b>  |      |      |          |          |                |
| 3. Ciągłe zwiększam intensywność ćwiczeń, aby osiągnąć zamierzone efekty/korzyści. / I continually increase my exercise intensity to achieve the desired effects/benefits. | 3.58 | 1.39 | -.158    | -.666    | .796           |
| 10. Utrzymuję stałą częstotliwość ćwiczeń, aby osiągnąć pożądane efekty/korzyści. / I continually increase my exercise frequency to achieve the desired effects/benefits.  | 3.56 | 1.38 | -.127    | -.711    | .767           |
| 17. Nieustannie zwiększam czas i intensywność ćwiczenia. / I continually increase my exercise duration to achieve the desired effects/benefits.                            | 2.70 | 1.21 | .373     | -.568    | .790           |



| Subscales EDS-R and individual items   | M    | SD   | Skewness | Kurtosis | Factor loading |
|--|------|------|----------|----------|----------------|
| <b>Lack of control (<math>\alpha=0.80</math>)</b>  |      |      |          |          |                |
| 4. Nie mogę zredukować czasu ćwiczeń.<br>/ I am unable to reduce how long I exercise.  | 2.63 | 1.31 | .598     | -.207    | .701           |
| 11. Nie potrafię zmniejszyć częstotliwości ćwiczeń.<br>/ I am unable to reduce how often I exercise.   | 2.67 | 1.42 | .734     | -.189    | .835           |
| 18. Nie mogę zredukować intensywności ćwiczeń.<br>/ I am unable to reduce how intense I exercise.  | 2.46 | 1.22 | .652     | -.105    | .825           |
| <b>Reduction in other activities (<math>\alpha=0.82</math>)</b>  |      |      |          |          |                |
| 5. Wolę ćwiczyć niż spędzać czas z rodziną/<br>przyjaciółmi.<br>/ I would rather exercise than spend time with<br>family/friends.                                  | 2.56 | 1.31 | .477     | -.594    | .726           |
| 12. Myślę o ćwiczeniach, kiedy powinienem/<br>powinnam koncentrować na szkole/pracy. / I think<br>about exercise when I should be concentrating on<br>school/work. | 2.57 | 1.43 | .704     | -.339    | .739           |
| 19. Decyduję się ćwiczyć, nawet gdy jest to kosztem<br>czasu z rodziną. / I choose to exercise so that I can<br>get out of spending time with family/friends.      | 2.46 | 1.29 | .405     | -.887    | .843           |
| <b>Time (<math>\alpha=0.90</math>)</b>   |      |      |          |          |                |
| 6. Spędzam dużo czasu na ćwiczeniach.<br>/ I spend a lot of time exercising.   | 3.12 | 1.31 | .202     | -.448    | .759           |
| 13. Spędzam większość wolnego czasu ćwicząc.<br>/ I spend most of my free time exercising.   | 2.83 | 1.38 | .571     | -.330    | .779           |
| 20. Sporo czasu spędzam ćwicząc. / A great deal<br>of my time is spent exercising.   | 3.12 | 1.37 | .220     | -.710    | .786           |
| <b>Intention (<math>\alpha=0.91</math>)</b>  |      |      |          |          |                |
| 7. Wykonuję ćwiczenia dłużej niż zamierzałem/am.<br>/ I exercise longer than I intend.   | 2.87 | 1.25 | .250     | -.678    | .855           |
| 14. Gdy ćwiczę, robię to dłużej niż zamierzałem/<br>am.<br>/ I exercise longer than I expect.  | 2.87 | 1.35 | .316     | -.718    | .820           |
| 21. Ćwiczę dłużej niż planuję.<br>/ I exercise longer than I plan.   | 2.83 | 1.33 | .240     | -.906    | .796           |

Source: Own study.

The second stage of research process enabled the definition of exercise addiction distribution among students of Academy of Physical Education in Katowice, based on adapted scale (EDS-R). In the research, apart from the EDS-R scale, there was also used the

questionnaire including: the profile of respondents' physical activity, which distinguished among others: the amount of respondent exercising hours per week and the experienced results of excessive physical activity. Additionally, questionnaire included questions concerning satisfaction of life in the aspects of education, joy of living, family, friends, free time and life in general. The tool also provided the statistical part with socio-demographic data of respondents- meaning gender, age, place of living and the education level of parents.

### *Design and procedures*

The research was conducted with the use of online questionnaire placed on the Webankieta platform. The respondents were given the link to the questionnaire and with the use of it they accessed the online version. The organizers of the research presented respondents the aim of it, i.e. the adaptation of EDS-R test to Polish context and the description of the excessive physical activities among students. The choice of respondents was intentional, and it applied to the students in Academy of Physical Education in Katowice<sup>4</sup> who agreed to take part in the research. The research was carried out in 2020.

### *Statistical Analysis*

To analyze and prepare the statistical results, the following methods were used:

- to evaluate reliability of the tool/scale—the method of test's internal consistency was used ( $\alpha$ -Cronbach's coefficient),
- to evaluate criteria accuracy of EDS-R scale—the measure of correlation between scale and the question concerning the number of exercising hours per week for a respondent was used.

In the research, the procedure of results calculation was realized: the general result and the subscales' result were calculated according to the procedure presented by authors of EDS-R scale. Making use of this algorithm enabled:

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4 Research students were educated at the Faculty of Sport and Tourism Management and did not practice sport professionally.

1. The calculation of total and subscale mean results for EDS-R scale. The high result indicates more symptoms dependent on the physical exercise.
2. The classification of the participants into groups: (1) at-risk of exercise addiction, (2) not addicted (symptomatic), (3) not addicted (asymptomatic).

The affiliation to group of people at-risk of exercise addiction is submitted to operationalization through the result 5 or 6. The respondents, who obtained points between 3 and 4 are classified as nondependent (symptomatic group). And finally, the people with result 1-2 are classified as not addicted (asymptomatic group)<sup>5</sup>.

The statistical analysis of the research was made with the use of statistic suite SPSS, ver. 26.

## Results

The results presenting psychometric characteristics of EDS-R can be found in Table 1 and Table 2. As it is shown in before mentioned tables, the particular positions and subscales of EDS-R kept permissible skewness ( $< | 2 |$ ) and kurtosis ( $< | 1.5 |$ ). The respondents achieved the highest results in *Tolerance* subscale ( $M=9.83$ ), and the lowest result in the subscale: *Reduction in other activities* ( $M=7.59$ ). The individual total results were located between 21 to 109 points. The correlations between each factor and the global measure of behavior addiction fluctuate between 0.56 to 0.92 with  $p<0.01$ .

**Table 2.** Descriptive statistics and correlations of the Exercise Dependence Scale Subscales and number of hours of exercises per week

| <i>Subscales</i>   | <i>M</i> | <i>SD</i> | <i>Ske</i> | <i>Kur</i> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> |
|--------------------|----------|-----------|------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1. Withdrawal      | 8.68     | 3.279     | .013       | -.803      | –        |          |          |          |          |          |          |          |
| 2. Continuance     | 8.21     | 3.614     | .362       | -.784      | .790     | –        |          |          |          |          |          |          |
| 3. Tolerance       | 9.83     | 3.277     | -.198      | -.282      | .633     | .561     | –        |          |          |          |          |          |
| 4. Lack of control | 7.76     | 3.343     | .418       | -.249      | .677     | .638     | .561     | –        |          |          |          |          |

5 Ibidem.

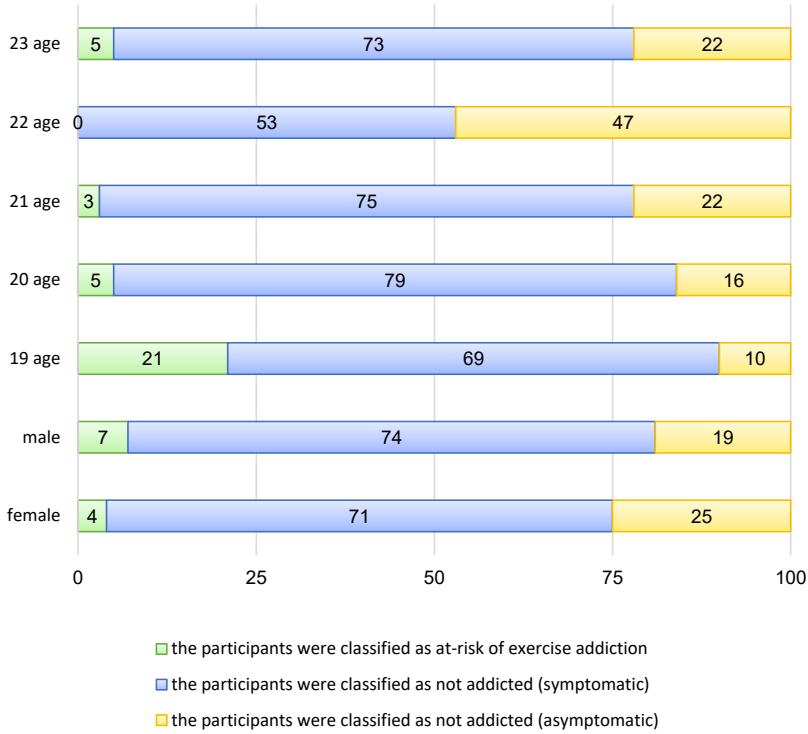
| <b>Subscales</b>                      | <b>M</b> | <b>SD</b> | <b>Ske</b> | <b>Kur</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b>      |
|---------------------------------------|----------|-----------|------------|------------|----------|----------|----------|----------|----------|----------|----------|---------------|
| 5. Reduction in other activities      | 7.59     | 3.456     | .486       | -.443      | .636     | .683     | .594     | .672     | -        |          |          |               |
| 6. Time                               | 9.07     | 3.705     | .326       | -.239      | .656     | .677     | .702     | .619     | .790     | -        |          |               |
| 7. Intention                          | 8.56     | 3.615     | .235       | -.752      | .598     | .588     | .655     | .605     | .678     | .767     | -        |               |
| 8. Total addiction                    | 59.71    | 20.420    | .051       | -.350      | .845     | .841     | .797     | .809     | .861     | .890     | .835     | $\alpha=0.93$ |
| Number of hours of exercises per week | 3.12     | 1.371     | .220       | -.710      | .603     | .634     | .656     | .576     | .747     | .924     | .696     | .826          |

Source: Own study.

The internal analyses were conducted for the Polish version of EDS-R. The factor analysis confirmed 7-factor structure of the scale and its good internal consistency. All of the subscales were characterized by adequate reliability calculated with the use of  $\alpha$ -Cronbach's coefficient (Table 1). To evaluate scale's accuracy criterion, the correlation between the EDS-R scale and the question concerning the number of exercising hours per week for a respondent was used. The number of exercising hours per week was favorably connected with all of the subscales of EDS-R. Those results were confirmed by the differential analyses as well. In the group of people at risk of exercise addiction the mean equaled to 4.83 (SD=1.29), in the group of not addicted (symptomatic) 3.09 (SD=1.02) and in the group correctly using physical exercise (not addicted—asymptomatic) the mean equaled to 1.51 (SD=0.88). The statistical analysis with the use of Kruskal-Wallis test by rank indicated significant differences between the groups as regards to the frequency of exercise, chi-square (2)=35.29;  $p<0.001$ . Those differences were confirmed by Jonckheere-Terpstra test,  $J-T = -7.14$ ;  $p<0.001$ .

Within the framework of presented research, the scale of respondents' addictive exercising was defined. It was established that 5.5% of respondents are at risk of exercise addiction, 72.8% are not addicted (symptomatic) and 21.7% appropriately use exercises (not addicted—asymptomatic). The division of respondents as regards to gender and age is shown in Figure 1.

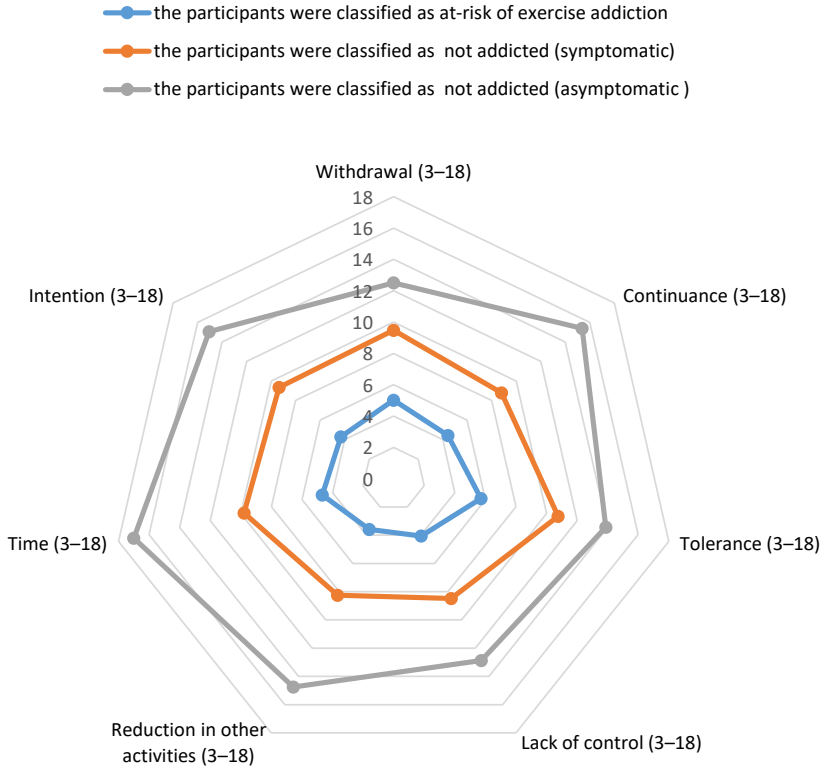
Figure 1. Exercise Addiction Scale by respondents divided on gender and age



Source: Own study.

It was examined whether the gender is statistically significant to differentiate the level of respondents' addictive exercising. The test of independence of two variables was conducted- Chi-square. It was established that gender is statistically significant when it comes to influence on the level of addiction. The strength of this connection is high, and V-Cramer equals to 0.569. Similarly, the age is statistically significant when it comes to differentiation of respondents' addictive exercising. However, the relationship between age and the level of addiction is very weak. Pearson's correlation coefficient is  $r=0.17$ ;  $p<0.05$ . Subsequently, the results in particular subscales with the division into three groups were examined (see Figure 2).

**Figure 2.** The number of points obtained by the respondents in EDS-R subscale with the division for categories of physical exercises involvement



Source: Own study.

It was established that in the highest degree, the respondents (regardless of what is their engagement in physical exercise) show addiction symptoms in the aspect of toleration change, which manifests itself in the necessity of increasing the exercise amount in order to achieve the expected result or in the decrease of exercise effects while keeping the same intensity. Additionally, it results from the gathered data that along with the intensification of addictive exercising more time is spent on this kind of activity while other forms of activities are reduced and frequently physical activity in the form

of exercise is continued despite the knowledge about permanent or recurring problems caused or increased by physical activity.

Next, taking into consideration the results of EDS-R test, the respondents were divided into two exercising groups- functional and dysfunctional. Dysfunctional group consisted of two respondents' categories, i.e. at-risk of exercise addiction and no addiction symptomatic.

The EDS-R test authors, isolated 7 subscales concerning various aspects of physical exercise overuse. The mean results of subscales of the discussed scale for the functional and dysfunctional exercisers are shown in Table 3.

**Table 3.** Mean ESD-R subscales results among practitioners in a functional and dysfunctional way

| Subscales ESD-R                      | Functional practitioners |       |   | Dysfunctional practitioners |       |   |
|--------------------------------------|--------------------------|-------|---|-----------------------------|-------|---|
|                                      | mean                     | SE    | Significance in the general results of the test | mean                        | SE    | Significance in the general results of the test |
| Withdrawal (3–18)                    | 5.02                     | .227  | 16%   | 9.70                        | .189  | 14%   |
| Continuance (3–18)                   | 4.43                     | .160  | 14%   | 9.26                        | .222  | 14%   |
| Tolerance (3–18)                     | 5.71                     | .294  | 18%   | 10.98                       | .165  | 16%   |
| Lack of control (3–18)               | 4.06                     | .171  | 13%   | 8.79                        | .198  | 13%   |
| Reduction in other activities (3–18) | 3.59                     | .117  | 11%   | 8.70                        | .203  | 13%   |
| Time (3–18)                          | 4.67                     | .218  | 15%   | 10.30                       | .208  | 15%   |
| Intention (3–18)                     | 4.30                     | .167  | 13%   | 9.74                        | .207  | 15%   |
| Total addiction (21–126)             | 31.78                    | 1.036 | 100%  | 67.46                       | 1.022 | 100%  |

Source: Own study.

When analyzing the results, the percentage share of particular subscales in the general test result is especially important. The biggest difference concerns the *Intention* subscale (the significance increases in the general test result from 13% for functional group to 15% for dysfunctional group) and *Reduction in other activities* (the significance increase in the general test result from 11% to 13% for dysfunctional group). On this basis, the conclusion is that dysfunctional group pays attention to achieving the expected result of exercise at the cost

of other activities, simply because they increase the amount of time devoted to exercise or the amount of physical effort.

The question about the self-assessment of respondents was asked as well, it regarded the results of the undertaken excessive physical exercise. In the dysfunctional group (N=227), 2/3 of the group (i.e. 152 people) identify the impairment as regards to friendships, social and professional life which means that an individual withdraws from other activities, chooses exercise over meeting friends and in consequence the friendly relations are worsened. Almost half of them (i.e. 108 people) indicate the health impairments resulting from exercising despite the injury or bad health state. The same number of people describe constant thinking about exercise and the lack of ability to reduce or control such kind of behavior.

To examine whether there is the relation between dysfunctional physical exercise and life's satisfaction, the respondents were asked about the satisfaction of some of life's areas (i.e. the achievements in studying, joy of life, family, friends, free time, and life in general. The classification of answers in this question is as follows: 5—very satisfied, 4—satisfied, 3—neutral, 2—dissatisfied, 1—very dissatisfied). There was possibility to achieve maximally 5 points for each answer in each area from the given answers. In dysfunctional group of exercisers mean results of researched life's aspects were significantly lower ( $p < 0.01$ ) in comparison to mean results achieved by group with functional physical exercise use. Additionally, none of the means achieved value 4 (satisfied), and the worst results were obtained in the area connected with achievements in studying ( $M=3.11$ ;  $SD=1.05$ ) and in the satisfaction of joy of life ( $M=3.5$ ;  $SD=1.17$ ).

## Discussion

The aim of this study was the commencement of the process of EDS-R validation in Polish context and the definition of the phenomenon's scale (namely the phenomenon of the overuse of physical exercise) among students of Academy of Physical Education in Katowice. It was established that Polish adaptation of EDS-R indicates good psychometric properties, and it can be used as a screen testing tool of existence of addictive exercising symptoms (exercise addiction symptoms).



Based on the EDS-R test, participants were classified as: respondents at-risk of exercise addiction (5.5%), not addicted (symptomatic group) (72.8%) and not addicted (asymptomatic) (21.7%). The presented material may contribute to further research using the Polish adaptation of the EDS-R scale in different populations (e.g., due to different physical activities undertaken by the exercisers).

The obtained results confirm the previous research and show similar results as achieved by the original English version of EDS-R. The frequency of existence of people at-risk of exercise addiction (5.5% in the present study) is comparable to research results from other countries. For example, in American sample the respondents being at-risk of exercise addiction fluctuated from 3.6 to 5% of the sample (Symons Downs et al. 2004). Similarly, Magnus Lindwall and Antonio Palmeira (2011) stated that the frequency of existence of exercise addiction was 9.2% in Swedish sample and 5.2% in Portugal sample.

The presented material shows that physical activity performed by human's contrary to accepted standards (WHO standards) may pose a threat to their health safety and cause long-term negative physical, mental and social effects.

## Limitations

The performed tests do not solve the problem of determining the symptoms of the described disorder. The first step in this direction (according to Attila Szabo) may be the description of behavioral disorders in the "Addictive Disorders" section of the DSM-5, which is potentially useful as a model for researching exercise addiction, while taking into account the typical symptoms of addictions (Szabo et al. 2015).

Future research should be based on in-depth interviews with people who are at risk for exercise addiction and focus not only on the symptoms of the disorder but also on its causes. An adapted EDS-R tool may allow for the selection of people for this type of activity.

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## ADDRESSES FOR CORRESPONDENCE

Ewa Krzyżak-Szymańska  
Academy of Physical Education in Katowice  
Faculty of Sport and Tourism Management  
e-mail: e.krzyzak-szymanska@awf.katowice.pl

Andrzej Szymański  
Academy of Physical Education in Katowice  
Faculty of Sport and Tourism Management  
e-mail: a.szymanski@awf.katowice.pl