Anorexia Readiness Syndrome – about the need for early detection of dietary restrictions. Pilot study findings

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Summary

Aim. The pilot study aimed to determine the Anorexia Readiness Syndrome (ARS) severity in a population of children aged 10 to 17 years according to general and sport class attendance.

Method. The following instruments were used: the *Anorexia Readiness Syndrome* inventory (SGA-12), to identify anorexic tendencies in adolescents aged 10 to 17 years, the *Eating Disorders in Youth – Questionnaire* (EDY-Q) inventory by Hilbert and van Dyck (the results of work on the Polish version of the instrument – in preparation) to assess eating disorders in children, and a questionnaire to obtain the respondents' details such as the date of birth, gender, chronic diseases, height and weight.

Results. In the study sample, a higher ARS severity was observed among the girls compared to the boys. Higher levels of anorexia readiness were seen in physically active subjects with a lower body mass index. The SGA-12 inventory does not correlate with the EDY-Q-PL, but factor I "anorexic tendencies and statements" demonstrates important relations to the total score of the EDY-Q-PL.

Conclusions. It seems that the SGA-12 inventory can help identify ARS children and adolescents (including boys) to a greater extent than the previous tool (*Questionnaire for testing individual attitude towards food*); it helps determine the severity of anorexic behaviours within two factors and suggests the areas of intervention aimed at psychoprevention.

Key words: Anorexia Readiness Syndrome, physical activity, diagnosis

Introduction

Anorexia nervosa is an eating disorder that remains a source of many problems for psychiatrists, psychologists, physicians, etc., who support their patients in coping with this condition. On average, anorexia nervosa affects 0.5–4% of the world's population; in terms of the female to male ratio, it has changed from 9:1 to 6:4 [1, 2]. Although the overall incidence of anorexia was stable over the last decades, the high risk group has become larger and mostly includes girls aged 15 to 19 years [3].

The condition is observed in all developed and certain developing (e.g. China and Brazil) countries [4, 5]. According to some researchers [6], certain groups are particularly predisposed to development of anorexia nervosa symptoms (e.g. dancers, runners, figure skaters and gymnasts, but also models, actors as well as university students and others who, for some reasons, perceive slimness to be important and rewarding).

In 2000, the term *Anorexia Readiness Syndrome* (ARS) [7] was introduced, for which diagnosing may or may not lead to a full-syndrome anorexia. The rationale for this construct was primarily psychoprevention aimed at early diagnosis of anorexic tendencies among children and individuals in the first adolescence stage (aged up to 17 years) to prevent possible development of the condition, but not only. According to researchers who study improper eating habits in the population of adolescents, the effects of dietary restrictions and the use of limiting diets without medical or nutritional supervision may disturb proper human development and growth [8]; hence, effective diagnosing of any abnormalities and taking interventional measures seem to be important for promoting a healthy lifestyle of the young generation as a whole.

In 2018, due to a series of social and cultural changes that may pose a risk of nutritional problem development among young people as well as because of growing awareness of orthorexia [9, 10], ARFID[1] [13, 14] and other types of dietary restrictions, a new tool for ARS diagnosis was developed. It was assumed that ARS is a set of traits that are mainly related to the cognitive and behavioural spheres of an individual's functioning and that arise suspicion of abnormalities in terms of meeting nutritional needs and the attitude to one's own body as well as internalisation of media messages regarding physical attractiveness [7]. It was assumed that ARS aetiology is multifactorial as it is for anorexia nervosa [15]. By implication, among the many variables that are important for development of eating disturbances, interest in carnality and the specific way it is experienced and created (also through dietary restrictions), normative for the adolescence period, can be observed.

In a three-year American study aimed at verifying the importance of cultural factors for eating disorder onset in a multi-ethnic sample of 1,103 adolescent schoolgirls [16], it was demonstrated that 2.9% of the girls developed a full – or partial-syndrome eating disorder, presenting significant preoccupation with a thin body as well as sensitivity to social and media pressure related to physical appearance. In Ukraine, both boys and girls associate their self-esteem with body image satisfaction [17]. A study of younger adolescents (11 to 15 years of age) in South Africa confirmed demonstration of body image dissatisfaction by individuals of this age – not only due to over – but also underweight [18], which may relate to different standards of beauty, maleness and femininity. Also in India, according to researchers' opinion, adolescents as a group tend to assess themselves as fat and unattractive and over 31% of this social group is at

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[1]   ARFID (*Avoidant/Restrictive Food Intake Disorder*) is an eating disorder classified in the DSM-5 [11] which involves limiting or avoiding food despite its availability [12].

risk of eating disorders [19]. In Poland, one of the more recent studies [20] proved that only 56% of subjects from middle and secondary schools as well as 53% of university students perceived their weight as normal; the boys/young males more often declared that they were thin while the girls/young women regarded themselves as overweight. Moreover, significant criticism of not only the weight but also the body's proportion was observed among the subjects.

Thus, it is justified to state that striving to be slim and body image dissatisfaction increase the risk of eating disorders in children and adolescents [21] as well as other improper eating behaviours and non-constructive ways of weight management.

Today, young people are also strongly involved in the virtual world. Brosch [22] analysed the reasons why adolescents so readily use social media. One of the reasons was a need for exposing one's own body and image. In light of the above studies documenting young individuals' dissatisfaction with their appearance, this finding is quite surprising, on the one hand. On the other hand, the strong need for one's own body exposure in the media space may motivate social media users to achieve a culturally competent image.

Other researchers [23] indicate that the intensive use of social media increases the risk of eating disorder manifestation. Turner and Lefevre [24] suggest that, in particular, activity on Instagram where the users publish e.g. photographs of "healthy food", raises the risk of orthorexic behaviours. Interestingly, according to the authors, this risk is not posed by any other channel or electronic messenger. Tiggemann and Slater [25] found that the number of *Facebook* friends was, in turn, related to e.g. starting to achieve a slimmer body by its users. This is confirmed by virtual *fat talk*[2] investigations [26]. In addition, Tanner [27] emphasises that young people share messages in the media which promote even dangerous behaviours. This online study has confirmed that many adolescents idealise e.g. suicide and depression as well as risky diets and vomiting (being symptoms of eating disorders), which resulted (over the last decade) in an increase in self-injury cases by 70% among 10 – to 14-year-olds and by 37% regarding severe depression cases [28].

Study objective

The pilot study aimed to determine the Anorexia Readiness Syndrome severity among students of sports and comprehensive schools using a modified assessment tool (SGA-12). It was also important to identify anorexic behaviours that differentiate children according to gender, general or sports class attendance, existing chronic disease and body mass index (BMI).

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[2] *Fat talk* refers to real and virtual conversations in which an individual presents self-devaluating statements about his/her physical appearance [26].

Material and methods

At the core of the research the following assumptions were included:

– In the study sample, there is at least a moderate severity of ARS symptoms.
– Students of sports classes present a greater severity of ARS symptoms than students from general classes.
– Girls present more severe ARS symptoms than boys.
– ARS symptoms are related to the BMI value of the subjects.
– The presence of a chronic disease does not differentiate the severity of the ARS symptoms of the subjects.

The key variables include: Anorexia Readiness Syndrome – explained variable; belonging to a general or sports class – explanatory variable; gender, BMI value, somatic disease – secondary explanatory variables.

The study was conducted using the paper-and-pencil method on an overall non-clinical sample of 122 pupils/students of primary schools in the city of Poznan, but complete data were obtained from 116 subjects (girls – 66%, boys – 34%). General and sport profile classes were drawn from a list of primary and secondary schools. Then, a questionnaire survey was conducted – after obtaining the consent of the school authorities, parents of the children and the students themselves. Test completion was carried out in groups, only in the presence of the researcher. The pupils/students completed the tests without the presence of their teachers. The respondents' age ranged between 10 and 17 years (M_{Age} = 12.83, SD_{Age} = 0.99). Of the respondents, 25% attended sports classes; 23% had chronic diseases, mostly various types of allergies. The mean body mass index in all the children was M_{BMI} = 19.10 (SD_{BMI} = 3.38), M_{BMI-G} = 19.13 (SD_{BMI-G} = 3.96) in the girls and M_{BMI-B} = 19.05 (SD_{BMI-B} = 2.73) in the boys, which should be interpreted as normal body weight (normal weight: BMI = 18.5 to 24.99) [29]. It should be noted here that BMI values that are interpreted as starvation (BMI < 16.0) were observed in as many as 14 girls, with the minimum value of this indicator in the study sample being BMI_{MIN} = 14.20. There were 6 such cases in the subgroup of boys (BMI_{MIN} = 13.69). Class 1 obesity (BMI = 30.0 to 34.99) was observed in one female subject (BMI = 30.85) and overweight (BMI = 25.0 to 29.99)[3] – in another girl (BMI = 26.89). The characteristics of the study sample are presented in Table 1.

Table 1. **Characteristics of the study group**

	Girls (*n* = 77)	Boys (*n* = 29)	Total (*n* = 116)
Age *M (SD)*	12.95 (0.96)	12.59 (1.02)	12.83 (0.99)
BMI *M (SD)*	19.13 (3.69)	19.06 (2.74)	19.11 (3.39)

table continued on the next page

[3] The mean BMI values were not referred to percentile charts because the sample was comprised of subjects at different ages.

| Sports Class n | 12 (16%) | 17 (44%) | 29 (25%) |
| Chronic disease n | 18 (23%) | 9 (23%) | 27 (23%) |

n – sample size; M – mean value; SD – standard deviation.

In the study, the proprietary *Anorexia Readiness Syndrome* inventory was employed to identify anorexic tendencies in individuals aged 10 to 17 years. The inventory was developed based on the *Eating Attitudes Questionnaire* [7]. In its new form, the test is intended to diagnose attitudes towards eating and the body as well as internalisation of the attractiveness standards, both in girls and boys. This instrument is called SGA-12 and contains 12 statements to which a respondent answers "YES" or "NO". The statements were selected from a set of 30 working items and the final list was completed based on the criterion of correlation between the specific item and the total score (item-total correlation). Another criterion of item selection was their content analysis. Some of the items described the interest and activity regarding eating and diets while other items focused on adoption of standards from the media and on motivation for creating one's own image and criteria of its assessment. The confirmatory factor analysis (with the method of principal components) confirmed the assumptions concerning the content analysis and allowed to select two factors: "anorexic statements and tendencies" (ASTs) and "internalisation of attractiveness standards" (IAS) (Table 2). Simplification of the factor structure was possible due to the use of Varimax rotation: the factor loadings were 0.56 to 0.74 for the ASTs scale and 0.55 to 0.85 for the IAS scale. The factors explain 51% of the total variance of variables. Reliability was determined using the coefficient of internal consistency, Cronbach's alpha: $\alpha = 0.75$ for the ASTs scale, $\alpha = 0.80$ for the IAS scale and $\alpha = 0.83$ for the whole test.

Table 2. **Operationalisation of the "anorexic behaviours" variable**

	Factor I: anorexic statements and tendencies (ASTs)		Factor II: internalisation of the attractiveness standards (IAS)
1	I know the calorie count of many food products	7	I search for photographs of attractive people on the Internet / in advertisements / in magazines to follow them
2	I know a lot about the most recent / most fashionable diets	8	Lifestyles of people from the media are inspiring for me
3	I know how to lose excess kilos in the best and fastest way	9	I want to look like celebrities/idols
4	I pay a lot of attention to taking care of myself and my appearance	10	I think that for boys, slim girls are more attractive while for girls – slim boys

| 5 | After a large meal and/or when I am dissatisfied with my appearance, I take up (more) exercise | 11 | If I was slimmer, I would have more friends |
| 6 | I learn about diets and the ways of body shaping from the internet, magazines and TV | 12 | I have not got a boyfriend/girlfriend/friends because I am not very attractive |

The answers "YES" are of diagnostic value, so a higher total score (min 0, max 12) means more severe ARS. The overall score may be variously shaped by the above mentioned factors (min 0, max 6 points for each factor), which suggests the areas that require intervention – "anorexic statements and tendencies" or "internalisation of the attractiveness standards". The time for completing the questionnaire was not limited (it took 7 minutes on average).

In the present study, the *Eating Disorders in Youth – Questionnaire* (EDY-Q) in the Polish version (EDY-Q-PL) was also applied to assess eating disorders in children and adolescents, including symptoms of ARFID (Avoidant/Restrictive Food Intake Disorder). A comparison of the empirical material, obtained from the SGA-12, with the scores of EDY-Q-PL diagnoses allowed the assessment of criterion validity, which was $r = 0.38$, $p < 0.001$. Unfortunately, a low level of reliability was observed for the EDY-Q-PL on the study sample ($\alpha = 0.51$), and thus the authors think it is necessary to develop a new measurement method. The respondents also completed a questionnaire where they provided details such as date of birth, gender, chronic diseases, height and weight.

The statistical analyses were performed using Statistica v13 (StatSoft, Cracow, Poland). The p value was set at < 0.05 for statistical significance. The categorical variables were presented as numeric and percentage values, while the continuous variables – as mean values and standard deviations. In addition, for the continuous variables, normality of distribution was verified using the Shapiro-Wilk test and skewness and kurtosis were checked.

Results

The mean severity of Anorexia Readiness Syndrome in the children, assessed with the SGA-12, was $M_{ARS} = 7.39$ ($SD_{ARS} = 3.31$). The mean severities of the individual anorexic behaviours were: $M_{ASTs} = 3.81$ ($SD_{ASTs} = 1.87$) for the anorexia tendencies and statements and $M_{IAS} = 3.57$ ($SD_{IAS} = 1.99$) for internalisation of the attractiveness standards. The Pearson's r correlations demonstrated that the variables such as gender, class type and BMI significantly correlate with the scores of the SGA-12 and EDY-Q-PL tests. Also, the applied tests regarding anorexic behaviours significantly correlate with each other (Table 3).

Table 3. **Summary of correlations between the variables taken into account in the study**

Variables	1	2	3	4	5	6	7	8	9
1. Gender[1]	-								
2. Age	-0.01	-							
3. Class type[2]	-0.29***	0.08	-						
4. Chronic diseases[3]	0.18	-0.02	-0.10	-					
5. BMI	– 0.01	0.19*	0.04	-0.08	-				
6. ASTs	0.36***	-0.06	-0.17	0.18	-0.06	-			
7. IAS	0.37***	-0.08	-0.16	0.07	-0.28**	0.51***	-		
8. SGA-12	0.42***	-0.08	-0.19*	0.13	-0.20*	0.86***	0.88***	-	
9. EDY-Q-PL	0.27**	-0.06	-0.10	0.02	0.11	0.20	0.45***	0.38***	-
M *(SD)*		12.83 (0.99)			19.11 (3.39)	3.81 (1.87)	3.57 (1.99)	7.39 (3.31)	9.86 (2.21)

[1] Gender: 1 – girls, 2 – boys; [2] Class type: 1 – sports class, 2 – comprehensive class; [3] Chronic diseases: 1 – present, 2 – absent; *p <0.05; **p <0.01; ***p <0.001; BMI – Body Mass Index; ASTs – the score of "Anorexic Statements and Tendencies" assessment; IAS – the score of "Internalisation of the Attractiveness Standards" assessment; SGA-12 – the score of Anorexia Readiness Syndrome questionnaire containing 12 items; EDY-Q-PL – the score of the Eating Disorders in Youth Questionnaire containing 14 items.

The data in Table 3, referring to the correlations, were the basis for verifying the hypotheses about differences in anorexic behaviours. Results of the Student's *t* tests according to the gender, class type and the presence of chronic disease are presented in Table 4.

Table 4. **Results of the Student's t-tests according to the gender, class type and the presence of chronic disease in the study group**

Factors	Gender			Class type			Chronic disease		
	M_G (SD)	M_B (SD)	t(df)	M_{Sport} (SD)	M_{Comp} (SD)	t(df)	$M_{Chronic}$ (SD)	$M_{Healthy}$ (SD)	t(df)
ASTs	3.36 (1.85)	4.76 (1.55)	4.12 (120)***	4.37 (1.56)	3.66 (1.93)	1.82 (119)	3.29 (1.96)	3.97 (1.83)	1.71 (120)
IAS	3.07 (1.92)	4.64 (1.72)	4.35 (120)***	4.13 (2.05)	3.40 (1.96)	1.77 (119)	3.36 (1.98)	3.64 (2.00)	0.65 (120)
SGA-12	6.43 (3.10)	9.41 (2.81)	5.09 (120)***	8.50 (3.05)	7.05 (3.32)	2.11 (119)*	6.64 (3.63)	7.61 (3.19)	1.36 (120)
EDY-Q-PL	9.44 (2.23)	10.77 (1.89)	3.19 (120)**	10.30 (1.99)	9.74 (2.28)	1.21 (119)	9.86 (2.01)	9.87 (2.28)	0.03 (120)

ASTs – anorexic statements and tendencies; IAS – internalisation of the attractiveness standards; SGA-12 – Anorexia Readiness Syndrome inventory; EDY-Q-PL – Eating Disorders in Youth –

Questionnaire (Polish version); M_{G} – the mean score for the girls; M_{B} – the mean score for the boys; t – the result of the Student's t-test; df – degrees of freedom; SD – standard deviation; M_{Sport} – the mean score for the subjects in the sports class; M_{Comp} – the mean score for the subjects in the comprehensive class; $M_{Chronic}$ – the mean score for the subjects with a chronic disease; $M_{Healthy}$ – the mean score for the healthy subjects; *p <0.05; **p <0.01; ***p <0.001

The findings demonstrate statistically significant correlations between physical activity and ARS severity observed in the study population. The significance of differences test (Student's t-test) showed that individuals intensely involved in sports manifest more severe anorexic behaviours (M_{Sport} = 8.50, M_{Comp} = 7.05; $t(df)$ = 2.11(119); $p < 0.05$). A really interesting observation is that – contrary to our expectations – a higher severity of anorexic behaviours in the study sample was seen among the boys (M_{G} = 6.43, M_{B} = 9.41; $t(df)$ = 5.09(120); $p < 0.001$). Moreover, there was no difference in the intensity of ARS between the subjects with chronic disease and healthy individuals. The analysis of the results also leads to the conclusion that the higher the body weight, the lower the severity of anorexic behaviours, measured with the SGA-12 ($r = -0.20$; $p < 0.05$). An important issue for the factor structure of the SGA-12 is that there is only one IAS factor which negatively correlates with the BMI ($r = -0.28$; $p < 0.05$). Also, it was determined that the total SGA-12 score correlates with the score of the EDY-Q-PL inventory ($r = 0.38$; $p < 0.001$). However, of cognitive value seems to be the fact that a relation between the IAS factor of the SGA-12 and the EDY-Q-PL ($r = 0.45$; $p < 0.001$) was observed, which can be useful during differentiation of eating problems. While individuals with a tendency towards eating disorders (ARFID, pica, food neophobia) are characterised by dietary restrictions and/or unusual eating behaviours, they do not typically present eating limitations caused by internalisation of the attractiveness standards. Therefore, only the ASTs factor (anorexic statements and tendencies) correlated with the EDY-Q scores.

Discussion

The basic objective of the study was determination of ARS severity in the study sample. As there are no standards, increased ARS (assessed by the SGA-12) can be detected when the score is deviated by one standard deviation (i.e. 3.32) from the mean in the comprehensive classes (7.05), which means that the diagnosed individual scores at least 10.37 points. Increased ARS was diagnosed in 31% of the subjects in the sports classes and 19% of the subjects in the comprehensive classes.

Chytra-Gędek and Kobierecka [30] diagnosed increased anorexia readiness in 6.5% of the study sample that comprised 92 female individuals aged 14 to 26 years in the Kuyavian-Pomeranian Voivodeship. Results of the investigations by Nowak [31] showed that in the group of adolescents aged 15 to 19 years, the older subjects (17 to 19 years of age) manifested significantly more severe anorexic tendencies which were more distinct among the girls compared to the boys. These findings were confirmed

in other authors' reports [32-34]. In 2015, the study outcomes regarding 203 girls, of whom 31 individuals manifested ARS, were described [35]. It has also been proved that there are statistically significant relations between the elements of achievement motivation and the components of the Anorexia Readiness Syndrome and that the girls with ARS show higher scores concerning e.g. competitiveness, involvement and ambition. The most recent attempt to assess the ARS severity among young women was made in 2018 [36]. A total of 24 women with ARS and 55 schoolgirls without the syndrome symptoms participated in this pilot study. It was shown that ARS was strongly associated with the girls' self-discipline.

The second objective of our study was to determine whether physical activity is related to anorexia readiness (i.e. whether there are differences in ARS severity depending on sports vs comprehensive class attendance). It was expected that higher ARS severity would be present among the students of sports classes. This assumption was confirmed. To date, this thesis has been positively verified by other researchers who e.g. compared anorexic behaviours among female dancers depending on the level of anorexia readiness [37]. In the study sample, the dancers demonstrated more severe adverse eating behaviours compared to the control group and it was shown that these abnormalities increased with a higher ARS severity. A couple of years later, Chalcarz et al. [38] assessed anorexic behaviours among 324 female students of tourism and recreation. The empirical material showed that every fourth active young woman presented a high severity of ARS, declaring intensification of physical exercise and a tendency to restrict food as well as the use of various forms of body weight reduction and high nutrition knowledge regarding food calories. In a study of 156 German and Polish female dancers, Ołpińska-Lischka [39] reported that most of them were diagnosed with moderate or severe ARS.

The third thesis being the basis for our study concerned the relation of ARS to the gender. We expected that the girls' scores would be higher than the boys' results. It was assumed that due to the pressure of beauty standards, addressed to girls/women in particular, and because of a higher incidence of anorexia nervosa in girls [2, 3], they would manifest more severe ARS. Our assumption proved to be false. A higher level of anorexia readiness was seen in the subgroup of boys in the study sample. Although Kolarzyk et al. [40] observed that nearly a half of 456 schoolgirls and approximately one-third of 351 schoolboys manifested dissatisfaction with their physical appearance and a high ARS level, basically the ARS studies conducted thus far have been in the population of girls and women, and only the current version of the questionnaire allows diagnosing boys.

The fourth assumption referred to the relation between ARS and the BMI. It seems that actual body mass index values are not associated with anorexic behaviours but their subjective assessment and (dis)satisfaction with them significantly contribute to the syndrome expression. Our research demonstrated that higher levels of anorexia

readiness were observed in individuals with lower BMI values. Results of the research conducted by Brytek-Matera and Rybicka-Klimczyk [36] indicate that women with Anorexia Readiness Syndrome have a poorer self-image, are strongly body-oriented and have a tendency to distort the image of their body, including the weight and proportions. In 2015, a research article was published regarding ARS in 238 girls who sympathised with the pro-ana movement [41]. It was found that 52.1% of the respondents were underweight, nearly a half of the study group declared that they used weight-loss products or provoked vomiting after meals, and almost 60% of the subjects emphasised that they wanted to lose weight irrespective of its current level.

The last verified issue referred to relations between ARS severity and the presence of a chronic disease. As expected, it turned out that the somatic state is not associated with ARS manifestation, which has been confirmed by our study. However, this syndrome may be observed more clearly in individuals whose condition adversely affects their image and, as a result, their sense of physical attractiveness or leads to a subjective feeling of loss of weight control (e.g. diabetes). For example, Jaros and Oszwa [42] studied the locus of control in girls with ARS. The study sample was comprised of female adolescents aged 13 to 18 years from randomly selected five state middle and secondary schools. The study outcomes showed that the subjects with ARS manifested a greater external locus of control compared to the girls without this syndrome. It was also observed that the anorexic behaviours might become a way of gaining control or regaining the lost or restricted control.

Conclusions

On the basis of the selected studies from the last decade, it seems that researchers' interest in the ARS construct is considerable and has remained stable for many years. In our opinion, as mentioned above, it may be particularly important in screening tests to identify risk groups in terms of abnormal eating behaviours and attitudes to one's own body as well as internalisation of the beauty standards and to differentiate orthorexic behaviours from ARFID. We plan to conduct further studies on these issues.

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