

Factor structure of symptoms in the Kraków Depression Inventory KID IO “C1”

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Summary

Aim. The aim of this article is partial empirical verification of the depression image theoretical concept underlying the KID IO “C1” construction, and also, a check of the questionnaire’s factor relevancy.

Material. KID results of a study of an untreated population sample of 17-year-olds were analysed statistically. Out of 1823 questionnaires, 1349 were included in the analysis (560 filled in by boys and 789 girls by girls). Of these, 499 respondents received a screening diagnosis of depression. 474 sheets were rejected at random to standardise the distribution of the overall scale results. In search of the presence of a general factor and to verify the legitimacy of the division of depressive symptoms according to the clinical criterion, factor analyses were conducted using the principal components method with oblimin, quartimax and varimax rotations separately and jointly for both sexes.

Results. The following new factors were identified: I – pessimism, II – mood instability, III – difficulty in learning, IV – self-destruction, V – fear of the future, VI – eating problems.

Conclusions. The analyses conducted only partially confirm the validity of a clinical-picture based questionnaire. A non-compliance of a number of factors with the assumed questionnaire scales emerges. A non-uniform symptomatic depression image in late adolescence phase is confirmed. Two factors stand out decidedly: self-destructive behaviours and eating problems.

adolescent depression / Kraków Depression Inventory (KID) / factor analyses

INTRODUCTION

The concept of adolescent depression, as presented by Antoni Kępiński in 1974 [1] is an attempt to connect the psychopathological symptoms emerging in adolescence with the bio-psycho-social crisis of this developmental stage. It is also a step towards clarifying the long-observed increased risk of various mental and behavioural disorders in adolescence. Kępiński postulated that there are situations in human life which

should be viewed as crisis in biological, social and mental dimensions. Besides adolescence he included involution and perinatal period. According to the thesis these periods of human life include significant changes in body functioning, confront an individual with new social roles and demand solving significant emotional conflicts. As for the adolescence Kępiński emphasised also rapid development of abstract thinking. It was essential for the idea, that developmental crisis can result in mental and behavioural symptoms similar to those described for depressive states. Nevertheless adolescent depression as defined by the author of the concept himself should not be treated as a mental disorder. While it is not a disease, it requires counselling as a signal of increased difficulties in overcoming the development crisis and a factor of increased risk of illness. What is more, adolescent depression may

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overlap with symptoms of mental disorders beginning in adolescence.

Kępiński's concept was checked in clinical study of adolescents hospitalised in psychiatric in-patient unit, for the first time in their life. It was found, that prevalence of depressive syndrome among adolescent inpatients is very high (94.12%) independently from the reasons for referral to the hospital or main diagnosis established during hospitalisation [2, 3]. These findings provided empirical verification of Kępiński's thesis. Moreover 5 years follow-up provided additional data on weak or nonexistent relations between adolescent depression and affective disorders [2]. Later study on depressive adolescents followed-up 15 years after screening general population brought additional proof against relation of depressive symptomatology in adolescence and affective disorders [4].

The above mentioned study [4] was performed as a part of bigger epidemiological one carried on since 1980'. Empirical verification of Kępiński's concepts required survey of adolescent population across the developmental period, in general (untreated) population. Across the developmental period was understood as screening prepubertal children, [re adolescents and adolescents. There was no screening tool for depression in the 1970's to be used in population 5–19 years old. It was decided to construct such one. The symptom structure of depression in children and adolescents had been already described by significant researches: Kępiński [1], Nissen [5, 6], Poznansky [7], Cytryn and McKnew [8], Albert and Beck [9], Pużyńska [109], Witkowska-Roszka [11]. Authors of Kraków Depression Inventory could rely also on the results of their own analysis of the clinical and follow-up work. The items of the depressive symptoms inventory were adjusted to the specific forms of psychopathological expression in the different phases of development.

The inventory was prepared in the form of a questionnaire for adolescents in the early, middle and late stages of adolescence, and in the form of a questionnaire for parents and carers for children at preschool and early school age. The low rates of validity and reliability of the tool for preschool children (KID AO "A") and the inventory which filled in by the children at early school age themselves (KID IO "A") caused them

not to be used any further. Satisfactory rates were obtained for the following versions of the Kraków Depression Inventory (KID): 1/Observation Sheet AO "B1" – for children at younger school ages (7–12 years old), 2/Symptomatic Inventory IO "B1" – for youth in early and mid-stage adolescence (13–15 years old), 3/Symptomatic Inventory IO "C1" – for youth in the late phase of adolescence (16–19 years old).

The KID is made up of items describing depression symptoms allocated in areas identified in taxonomic analysis of clinical trial results [3]. Experiences, feelings and behaviours regarded as depressive symptoms this way were divided into groups assumed theoretically as related to: mood, anxiety, intellectual (cognitive) functions, activity level (drive), self-destructive behaviour and somatic symptoms. Consequently, KID was broken down into six symptomatic areas:

- A. Mood disturbances,
- B. Anxiety,
- C. Cognitive disturbances,
- D. Drive disturbances,
- E. Self-destruction,
- F. Somatic symptoms

The individual versions of KID differ in the number of items throughout the questionnaire and in the areas. This is due to differences in the richness of symptomatic manifestations at different stages of development.

Standard sten scales were developed, both a general one and for specific symptomatic areas.

GOAL

A study was conducted, aimed at empirical verification of the theoretical concept of the depression image underlying the KID IO "C1" construction, and also, a check of the questionnaire's factor relevancy.

MATERIAL

The Kraków Depression Inventory (KID), version IO "C1" consists of 119 statements describing the phenomenon whose presence in them-

selves is stated by the respondents. The one hundred and four KID IO "C1" items describe depression symptoms, taking into account specificities related to the development phase. The introductory instruction refers the truthfulness of the claims to the month preceding the survey. Some questions (e.g. on self-harm, especially suicide attempts), by their very nature force reflection covering a longer time than that specified in the instructions for the test. The diagnosis of depression based on the KID takes into account standard sten results for the different scales and for the overall scale. The reliability coefficient for the overall scale KID IO "C1" Cronbach's $\alpha=0.942$. The diagnosis accuracy as measured by the spot-biserial correlation coefficient $r=0.692$ [12].

For the analyses, data were used obtained in the KID IO "C1" study of a group representative of the population of second-form students of Krakow secondary schools. It was selected using two-stage method draw establishing the correct proportions of boys and girls from secondary schools, technical schools and vocational schools (17-year-olds).

Out of the total number of 1,823 KID IO "C1" questionnaires selected for the analysis 1,349 sheets of questionnaires were subjected to exploratory factorial analyses (including 560 boys and 789 girls, of whom 499 received a result over the criterion of a screening depression diagnosis). 474 sheets were removed at random to partially standardise the distribution of the overall scale results. The procedure of random removal of some of the data involved the need to mitigate an overly sloping distribution of results in the overall scale.

METHODS OF ANALYSIS

At the outset, a series of confirming factorial analyses were performed, to verify the six-factor model proposed by Bomba [12, 13].

In view of their results, exploratory factor analyses were performed to examine the actual factor structure of the Kraków Depression Inventory (KID), version IO "C1".

The factor analyses were performed using principal components with varimax and quartimax rotation and Kaiser normalisation of the

KID IO "C1" items (without control scale questions) separately and jointly for boys and girls. They aimed to find an answer to the question concerning the presence of a general factor on the one hand (quartimax rotation) and the merits of the division of depressive symptoms according to clinical criteria into 6 groups (varimax rotation) on the other. In addition, the level of correlation was checked between the agents isolated after applying direct oblimin rotation to get an additional argument in favour of the existence of a general factor. If a general factor were detected, it might indicate a uniform origin of depressive symptoms in adolescents.

A cluster analysis was performed, which groups respondents according to the arrangement of factors, and thus verifies the forms of depression

Factor analysis results

A series of confirmation factor analyses were carried out, verifying the six-factor structure adopted in the IO "C1" construction, while testing out models assuming correlated factors and uncorrelated factors. These analyses were performed on all respondents and separately in both sexes. In all studies, results were obtained that definitely pointed to a mismatch between empirical data and the model assumed (p for the entire model for all studies was lower by 0.001, Jöreskog's *GFI* and *AGFI* indices in none of the analyses not exceeded the value of 0.8; nor did Bentler-Bonette *NFI* and *NNFI* indices even reach 0.8). Therefore, exploratory factor analyses were performed to examine the actual factor structure of the Kraków Depression Inventory (KID), version IO "C1".

(According to the scree test criterion,) exploratory factor analyses yielded irresolute solutions with 1 or 5–6 factors both in the entire study group and boys and girls separately. Due to the six-scale structure of the questionnaire assumed by the authors, six-factor solutions were adopted. The total explained variance for the 6-factor solution was as follows: for the entire group and both sexes 32 to 33%. The measure of sampling adequacy for the entire group was $KMO=0.948$; for girls $KMO=0.924$, for boys $KMO=0.897$ with very statistically significant Bartlett sphericity

test values ($p < 0.0005$). In all three cases, the rotation had reached convergence, respectively: in the whole group – for quartimax in 6 iterations for direct oblimin - in 19, for varimax - in 10 iterations, in boys – in 11, 24 and 11, in girls – in 8, 34 and 17.

As expected, the vast majority of items (69 of 92 in the whole study group, 72 in girls and 68 in boys) of the questionnaire have factor loads above the criterion adopted (value 0.30) in a single general factor following quartimax rotation. The largest loads were obtained for item B037 (I am constantly anxious: 0.627 in the whole group; 0.625 in girls and 0.568 in boys), A034 (I feel depressed all the time: 0.606 in the entire group, 0.673 in girls and 0.583 in boys) for item D80 position (I have no strength for anything: 0.588 in the whole group; 0.656 in girls and 0.504 in boys) and for item A030 (I am sad all the time: 0.556 in the whole group, 0.622 in girls and 0.533 in boys). Intergenerational reliability of the general factor determined using the Spearman rank correlation coefficient between the loads of corresponding factors (following rotation) $\rho = 0.701$ for all 92 items and $\rho = 0.574$ for 75 items with at least one load equal to or greater than 0.40 is relatively low.

An analysis with quartimax rotation rendered results in favour of the existence of a general factor in almost the entire content-related area of the questionnaire. The only exception seems to be a few items, all associated with eating disorders.

Direct oblimin rotation resulted in six separate factors, weakly correlated with one another. The correlation coefficients are so low that they cannot provide references for further arguments in favour of the existence of a general factor (the highest rates do not exceed 0.35). The correlation coefficients between the first and the sixth factor (bringing together items relating to eating disorders) are low, although higher than many others in the whole group ($r = 0.287$) and in girls ($r = 0.284$). In boys, the corresponding Pearson coefficient is lower ($r = 0.189$).

The components extracted in the varimax rotation have sufficiently high loads for semantic interpretation.

Factor 1, with the highest loads for items D025 – I feel that my life has no sense (0.627 in the whole group, 0.633 in girls and 0.609 in boys)

and in boys for item E102 – I do not see anything which I could pursue (0.658; in the whole group – 0.551, in girls – 0.536), with the most significant loads in scales A (10 out of 13 in the entire group, just as in girls and 9 out of 13 in boys), D (8 out of 17 in the whole group, 7 in girls and in boys) and E (6 out of 18 in the entire group, as well as girls and boys). The intergenerational reliability coefficient for factor 1 is quite high ($\rho = 0.832/0.848$). The content of most items is associated with sadness, pessimism and poor motivation to act.

Factor 1 Pessimism

- A030 – I am sad all the time
- A034 – I feel depressed all the time
- A061 – I feel nobody needs me
- A071 – I do not succeed in anything
- B010 – Nothing good awaits me in the future
- B086 – It seems to me that everything will finish badly
- C108 – I am not satisfied with myself
- D025 – I feel that my life has no sense
- D080 – I have no strength for anything
- D081 – Life is such that it is not worth to get out of bed, to dress
- D110 – I do not start anything new
- E039 – It seems to me that human life has no sense
- E102 – I do not see anything which I could pursue
- E115 – It seems to me there is no sense in caring for anything

Factor 2 features a high load at item A013 – I cry or get angry just about anything, but only in the entire group – 0.616 (0.559 in girls, while in boys less than 0.300). This item in boys is closest to factor 5. Factor 2 is clearly consolidated by differences between the sexes and differences between the girls than it is by differences between the boys, for whom its semantic contents is somewhat different. This is reflected both in smaller factor loads in boys, as well as in their different location for B scale items, of which as many as 9 have significant loads throughout the sample, while in girls – 7, and in boys only 1. For other scales, the differences are much smaller – in the A scale (7 in the entire group and in girls, 5 in boys) in D (6 in the entire group, 4 – in girls, 5 – in boys), in the F scale (8 in the whole group, 5 in girls and 6 in boys). Also, the intergenera-

tional reliability of this factor is relatively low ($\rho=0.627/0.678$). The content of the item is associated primarily with mood fluctuations, fatigue and autonomic dysfunction.

Factor 2 Mood instability

- A013 – I weep or get cross for trifles
- A076 – I am sad or merry even on the same day without any visible reasons
- A107 – Even a trifle brings me to despair
- B014 – I often tremble all over
- B022 – Sometimes I am afraid I do not know of what
- B035 – I easily weep for trifling reasons
- B037 – I am constantly anxious
- B062 – I have a feeling of fear all the time
- D003 – Even if I sleep the whole night I am tired in the morning
- D114 – I am tired all the time that I cannot undertake anything
- F028 – I often have tummy aches
- F054 – I am sleepy all the time
- F083 – I often have a headache
- F100 – Something often ails me

Factor 3 has the biggest number of significant factor loads in scales C (8 in the entire group and in girls, 7 in boys) and D (7 in the entire group, 6 in girls and 7 in boys). The content of these items indicates difficulty with schoolwork and a drop in motivation to learn. This factor has the highest intergenerational reliability ($\rho=0.895/0.908$).

Factor 3 Learning difficulties:

- C005 – I cannot study lately
- C020 – When I study nothing enters my head
- C041 – I receive worse grades now than usually
- C057 – I prefer to occupy myself with anything but study
- C087 – I do not think as quickly as before
- C089 – I cannot concentrate on books
- C109 – Learning ceased to interest me
- D067 – I cannot get out of bed in the morning
- D111 – Even if I study for short time I get very tired
- D114 – I am tired all the time that I cannot undertake anything
- E043 – It does not matter what I do as long as it is fine
- E098 – I do not attach any importance to school or to studying

Factor 4 (in the entire group, while 3 in girls and boys) has the largest loads for the following items: E097 – I often think about taking my life (0.696 in the entire group, 0.689 in girls, 0.695 in boys), E59 – constantly thinking about taking my life (0.649 in the entire group, 0.641 in girls, 0.654 in boys), E068-I wish I was dead (0.638 in the entire group, 0.634 in girls, 0.665 in boys). This factor is very uniform semantically, because it has loads mainly on one scale – E (12 out of 18 in the entire group and in boys and 13 in girls), associated with self-harm (self-destruction in the form of suicidal thoughts and plans.) Its intergenerational integrity is not very high ($\rho=0.709/0.777$).

Factor 4 Self-harm:

- E007 – I look for dangerous situations
- E015 – I often think about death
- E017 – I drink alcohol because I see no other solution in this situation
- E046 – I It happens to me that I cause myself pain (by cutting or burning myself) on purpose
- E053 – I think it would be good to finish with oneself
- E059 – Constantly thinking about taking my own life
- E075 – I have happened to try to take my life because I could no longer endure
- E097 – I keep on thinking about suicide
- E068 – I would like to die

In the entire group and in girls, factor 5 and the corresponding factor 2 in boys has the most significant loads at B scale positions, related semantically to fear of the future (10 of 17 in the entire group and 11 in girls and boys). Item B078 has the highest load in the entire group and in girls – I am afraid of events that are to happen in my life (0.596 and 0.607, respectively; in boys – 0.543). As with the previous one, its intergenerational accuracy is not very high ($\rho=0.723/0.748$).

Factor 5 Fear of the future:

- B044 – I am afraid I will not be able to cope with my duties
- B048 – It seems to me that something bad will happen

- B056 – I am afraid that when I begin working I will not be able to cope with it
 B066 – A fear of something I do not understand paralyses me
 B072 – I am afraid of all changes
 B078 – I am apprehensive of events that are to take place in my life
 F119 – I am afraid I can fall seriously ill

Factor 6, (as well as after quartimax rotation) consists of four F-scale items concerning appetite and eating: F103 – I almost do not eat at all (0.718 in the entire group, 0.724 in girls and 0.559 in boys), F008 – I have no appetite (0.666 in the whole group, 0.673 in girls and 0.535 in boys), F049 – Eating is no longer a pleasure for me (0.611 in the whole group, 0.597 in girls and 0.610 in boys) and F069 – I lost much weight lately (0.583 in the whole group and in girls; 0.593 in boys). Its intergenerational reliability $\rho=0.479/0.533$ is low due to the small number of items that it is related to.

Factor 6 Eating problems:

- E008 – I have no appetite
 E049 – Eating is no longer a pleasure for me
 E069 – I lost much weight lately
 E103 – I almost do not eat at all

Cluster analysis results

Cluster analysis was performed using k – average method, imposing the isolation of 6 clusters. Six clusters have been isolated.

Focus 3 – 417 respondents: all averages of factor results below the arithmetic mean. Most apparent is the deviation from the average in the results in factor 3 and factor 2 (studying difficulties and mood instability).

Focus 2 – 317 respondents: elevated level of factor 3 (studying difficulties) (average 1z). Other averages below 0z.

Focus 5 – 230 respondents: elevated level of the following factors: 5 (fear of the future: 0.9z) and 2 (Mood instability: 0.9z). Other averages below 0z.

Focus 1 – 167 respondents: very clearly elevated results for factor 1 (pessimism – 1.7z) and slightly elevated for factor 5 (fear of the future: 0.4z). Reduced results in factor 4 (self-harm: – 0.4z).

Focus 4 – 118 respondents: very clearly elevated results of factor 4 (self-harm: 2.3z) and slightly elevated in factor 1 (pessimism: 0.6z).

Cluster 6 – 100 respondents: very high scores in factor 6 (eating problems: 2.6z) and moderately elevated in factor 2 (mood instability: 0.7z).

There were statistically significant differences between girls and boys in cluster frequency distributions ($\chi^2=130, 18, df=5, p < 0.0005$). The girls are relatively more often part of cluster 5 (24.7%) compared with 6.3% of boys and to cluster 6 (9.8% vs. 4.1%). Boys are more often found in cluster 2 (29.8%) compared with 19.0% of girls and in cluster 3 (40.7% vs. 24.0%). The cluster with no differences in the frequencies is associated with self-harm (about 9% of boys and girls each). The above percentages refer to all adolescents included in the analysis, regardless of the overall score in KID IO “C1”.

DISCUSSION OF RESULTS OF ANALYSES CARRIED OUT

The factor analysis of the whole of material containing full information on the subjective experiences of adolescent girls and boys did not confirm the model of grouping of sensations and behaviours assumed when building the KID model, treated as psychopathological symptoms around mental functions included previously: mood, anxiety, cognitive functions, drive, self-destruction and somatic symptoms. This result is remarkable, especially in the context of the contemporary understanding of psychopathology. The modern classification of mental disorders is based on the ‘relationship between the basic issues and descriptive similarity’ [14]. Note, however, that the analysis included material obtained in the respondents’ own reflections gathered using the questionnaire method, of whom only 27.9% [15, 16] were given a screening diagnosis of depression. Thus, most of the adolescents surveyed only showed single symptoms considered typical of adolescent depression. This was observed already in the sixties [17].

The exploratory factor analyses conducted using principal components only partially confirm the validity of the breakdown of the KID IO “C1” based on the clinical picture into six groups

of symptoms considered typical of adolescent depression in late adolescence and developed as KID sub-scales. As is indicated by the analysis with quartimax rotation, almost all of the symptoms included in KID IO "C1" symptoms may be associated with a single general factor. Exceptions are individual items of the questionnaire describing eating disorders. However, direct oblimin rotation failed to provide a reinforcement for assuming the existence of such a factor.

It can therefore be concluded that the analyses did not confirm explicitly, nor did they challenge explicitly, the existence of a single mechanism for adolescent depression.

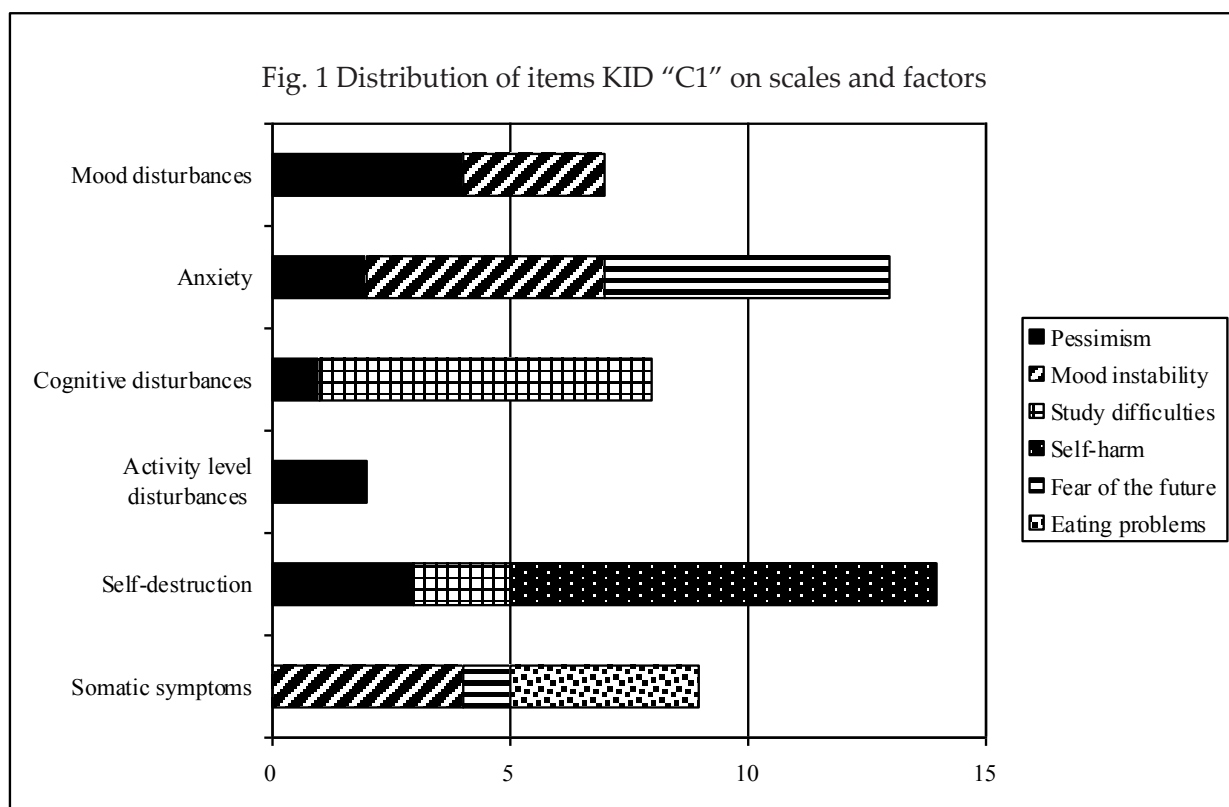
In the varimax rotation analysis, six components were isolated with loads that would enable semantic analysis. The factors determined this way do not coincide with the groups of symptoms that make up the subscale KID, with the exception of self-destructive behaviours [15]. Other factors, interpreted according to the content of the descriptions of experiences and behaviours which they consist of are similar to Kępiński's types of adolescent depression [1], rather than a group of symptoms combined with a single content. The symptoms grouped into KID subscales in the analysis

were included in the various factors (Fig. 1), sometimes showing a link to several factors.

For example, somatic symptoms, grouped in the F subscale in KID, were scattered. Some of them associated with eating formed a separate factor (6). Others were included in factor 2 described as mood instability and factor 5 described as fear of the future. Factor 2 came to include symptoms treated by Nissen [4, 5, 6] as characteristic of depression in children and interpreted as an expression of child alexithymia (headache, abdominal pain, fatigue).

The factor that seems nearest to the cognitive scale is the factor related to difficulties at school, though it also includes the greater part of drive abnormalities. If we assume that drive problems are not a symptom unique to adolescent depression, like somatic disorders, but rather join other symptoms associated with the various factors, then this would imply the need to revise the scales of the questionnaire.

Interesting information is also given by cluster analysis. Cluster 3 that groups respondents with the lowest KID results – includes more boys, which corresponds to the results of studies of the prevalence of depressive symptoms in the untreated population of 17-year-olds in Kraków



[15]. The over-representation of girls in cluster 5 corresponds to a more frequent occurrence of eating disorders in females. The uneven distribution of sexes in the other clusters is associated with different symptomatic manifestations of depression. This shows the impact of gender on the picture of depression. In girls, it is related to a predominance of symptoms of anxiety and mood swings, while in boys, studying difficulties appear typically.

However, although the analysis included IO "C1" results, regardless of screening diagnosis, its results indicate that the picture of adolescent depression is varied and the clusters obtained (2, 5, 1 and 4) are similar to the types of depression image that were identified as a result of taxonomic analysis of the population who received stationary treatment [2, 3].

Particularly interesting is the result indicating the persistence in the image of late adolescence of symptomatic mechanisms described in children rather than in young adults. The tendency for the childhood depression mechanisms to subside was reported in the seventies [18].

CONCLUSIONS

1. The Kraków Depression Inventory KID IO "C1" brings together symptoms whose presence is weakly associated with one factor.
2. The factor structure of KID IO "C1" does not correspond to that established theoretically, based on the symptom themes.
3. KID IO "C1" enables the conduct of screening tests of depression in adolescents.
4. The symptomatic picture of depression in young people in the later stage of adolescence is mixed.
5. Depression in young people in late adolescence phase takes on forms dominated by the following: – difficulties in school study
– mood instability
– pessimism
– self-harm.
6. The presence of eating disorder symptoms is not associated with the presence of depressive symptoms.

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