Wioletta Radziwiłłowicz[*]
Paulina Hrycyk[**]
Beata Dutczak[***]

The impact of accepting biological changes during adolescence on the severity of depression symptoms

Abstract: The aim of the study was to establish whether any relation exists between depression symptoms and the extent to which adolescents accept the changes their bodies undergo (the physical changes they experience at different stages of growing up), and if the connection does exist – is it gender-related. Method: Data were collected from four sub-groups: younger girls (aged 12–13), older girls (aged 17–18), younger boys (aged 12–13), and older boys (aged 17–18). The participants were asked to complete questionnaires that allow to measure the subjective intensity of depression symptoms (BDI), the current stage of biological changes (the Tanner scale) and whether these changes are accepted by the individual who experiences them (the original Feelings Towards the Body questionnaire). Results: The less adolescents accept the changes in their bodies, the higher depression symptoms they demonstrate. For younger girls, older girls and older boys, no links were established between levels of accepting bodily changes and early/late maturation (in comparison with the population of their peers). For younger boys, the later the stage of their development, the less likely they are to accept the changes in their bodies. Girls report more intense depression symptoms than boys do, but their levels of accepting changes that occur around puberty are significantly lower only when compared to those of older boys. Conclusions: Whether biological changes during puberty (mainly feelings of anxiety and shame related to the body) are accepted or not, was proven to be a significant predictor of more intense depression symptoms.

Key words: depression symptoms, puberty, acceptance of body changes, body image measures, body shame

Introduction

Biological, psychological and social factors – they are all involved in the processes of forming one's body image, and they dynamically interact with psychosexual changes (Kelly & Field, 1997; Evans et al., 2008; Grogan, 2008; Price, 2009). As much as 27% of teenagers reports considerable dissatisfaction with their bodies (Kittler, 2009). When an adolescent observes rapid changes their bodies undergo, they are forced to assimilate new information regarding how to perceive the body, what to think of it, and what kind of feelings it evokes. This process plays an important role in shaping a young person's identity, and constitutes one of the most important developmental tasks for this period. To some extent adolescents have to adapt to the hormonal and pubertal changes for which, in general, they are not prepared. Also, a great need arises to make sense of what's happening.

All psychophysical changes that occur during puberty are risk factors for depression, and what is more, among adolescents the onset of major depression may be confused with signs of puberty – characteristic for that stage in life (Rudolph, Kurlakowsky, & Conley, 2001). Girls are more prone to manifest depressive disorders due to hormonal imbalance associated with the secretion of estrogen and progesterone (Nolen-Hoeksema & Girgus, 1994; Kiesner & Poulin, 2012). Furthermore, secondary sexual characteristics may be of greater significance to the development of depression in adolescence than one's hormonal functioning (Brooks-Gunn & Warren, 1989). It is much more difficult for girls to accept the changes in the maturing body. When adipose tissue accumulates, a girl

[*] **Institute of Psychology, University of Gdansk, Poland**
[**] **Graduate of the University of Social Sciences and Humanities, Sopot, Poland**
[***] **The "Syntonia" Mental Health Clinic, Gdynia, Poland**

Corresponding author: Wioletta Radziwiłłowicz, psywr@ug.edu.pl

cannot maintain her slim figure so much promoted in the media, thus causing dissatisfaction with her body; and when she starts menstruating, she can experience discomfort and shame.

It is still debatable to what extent dissatisfaction with one's body is linked to depression in both sexes, although many studies have already showed that girls in early adolescence are more susceptible to depression than boys, and have a tendency to create a negative body image. Besides, adolescents who go through stressful life events while in the period of major physical developmental changes are much more prone to depressive states (Nolen-Hoeksema & Girgus, 1994; Marcotte et al., 2002; Tomkiewicz, 2007; Radziwiłłowicz, 2010). The studies have indicated that this regularity is true mainly for girls, though. So the link between biological changes and depression may be observed among girls: especially in the first stages of developing secondary sexual characteristics; when the changes appear earlier than in the population of peers; or when an individual is much less likely than her environment to accept these changes.

The purpose of our study was to provide answers to the following research questions: Is there any relationship between accepting one's body during adolescence and the severity of depression symptoms? Do girls who mature earlier than their peers experience higher levels of depression symptoms and have lower levels of acceptance for biological changes? Do boys who mature on time or earlier than their peers have lower levels of depression symptoms and higher levels of acceptance for biological changes (in comparison with the late-maturing peers)? Do teenage girls score higher on measures of depression symptoms and lower on measures of accepting biological changes when compared to teenage boys? Which depression symptoms are most strongly associated with low levels of accepting one's body in adolescence? Which of the feelings towards the bodily changes that occur during adolescence are the strongest predictors of depression symptoms?

Methods

Participants

A total of 172 persons were examined during the study. The younger group consisted of 40 girls and 40 boys, primary school pupils from Gdynia, whose average age was 12.57 years ($SD = 0.50$). The older group was made up of 45 girls and 46 boys, secondary school students from Gdynia, whose average age was 17.80 years ($SD = 0.40$). All subjects were explained the study procedure prior to signing informed consents. A consent from their caregivers from the subjects were obtained (according to the Polish law).

The great majority of both groups grew up in complete families: this was true for 76% of pupils and 67% of students. Five persons from each group suffered a loss of a parent. Three pupils (3.7% of the younger group) were brought up in a foster family. Parents of 11 pupils (13.6% of the younger group) and 12 students (13.2% of the older group) got divorced. There were 6 participants (6.6%) in the older group whose parents separated, and 3 participants (3.3%) who lived in reconstituted families. Another 4 from among older participants lived on their own – that's 2.3% of all examined persons. The two groups (younger and older) do not differ in terms of the structure of their families of origin ($t(170) = -1.52$, $p < 0.39$).

Nor do they differ in terms of the number of brothers and sisters each participant had ($t(170) = -0.53$, $p < 0.59$). In both groups those who had only one brother or sister outweighed the others (43 pupils, 53% of the younger group, and 44 students, 48.4% of the older group). 15 younger (18.5%) and 15 older participants (16.5%) were their parents' only children. 16 persons from the younger group (19.8%) and 19 persons from the older one (20.9%) had two siblings, and 4 from the younger group (4.9%) and 9 from the older one (9.9%) had three. Next, one younger person (1.2%) and two older persons (2.2%) had four siblings. One participant from among the older ones had five siblings (1.1%). Two participants (one from each group: 1.2% of the younger group and 1.1% of the older group) had six siblings. In the younger group, there was one participant (1.2%) who was brought up with nine siblings.

The data we collected on the parents' education levels show that among the mothers of younger participants the most numerous group was made up of those having secondary ($N = 21$; 25.9%) or vocational education ($N = 20$; 24.7%). 17 mothers had higher education degrees (21%), while 6 had elementary education (74%). In the group of mothers of the older children the majority had either secondary education ($N = 32$; 35.2%) or a university degree ($N = 25$; 27.5%). Only 3 mothers of the older participants had elementary education (3.3%). After analyzing the data relating to the fathers' education levels, we found that most of the fathers of younger children completed secondary ($N = 21$; 25.9%) or higher education ($N = 20$; 24.7%). Three of the younger participants had no knowledge of their fathers' educational background. As for the fathers of older participants, they predominantly had vocational ($N = 25$; 27.5%), secondary ($N = 24$; 26.4%) or higher education degrees ($N = 24$; 26.4%). The two examined age groups did not differ significantly in terms of educational levels of fathers ($t(170) = -1.06$, $p < 0.29$) and mothers ($t(170) = -1.25$, $p < 0.21$).

2 individuals (1.2% of all participants) were in the Tanner Stage 1 of pubertal changes, 15 persons (8.7% of all participants) were in the second Stage, 50 persons (29.1% of all) in the third, 37 persons (21.5% of all) in the fourth, and 68 persons (39.5% of all participants) were in the fifth Stage (Table 1). The two age sub-groups differ between themselves in terms of which Tanner Stage is declared to be the current one ($c^2 = 97.76$, $df = 12$, $p < 0.0001$).

Measures

1. Beck Depression Inventory (Beck et al., 1961; polish standardization by Parnowski & Jernajczyk, 1977).
2. An original questionnaire to measure the level of accepting biological changes that occur in adolescence

Table 1. Stages of pubertal changes in the examined subgroups

Group / Stage of development acc. to the Tanner Scale	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Total
Younger girls (N)	0	5	20	14	1	40
% of the group	0.0	12.5	50.0	35.0	2.5	
% of the stage	0.0	33.0	40.0	38.0	1.0	
% of all participants	0.0	2.9	11.6	8.1	0.6	
Younger boys (N)	0	8	22	4	7	41
% of the group	0.0	19.5	53.7	9.8	17.1	
% of the stage	0.0	53.0	44.0	11.0	10.0	
% of all participants	0.0	4.7	12.8	2.3	4.1	
Older girls (N)	2	2	7	13	21	45
% of the group	4.4	4.4	15.6	28.9	46.7	
% of the stage	100.0	13.0	14.0	35.0	31.0	
% of all participants	1.2	1.2	4.1	7.6	12.2	
Older boys (N)	0	0	1	6	39	46
% of the group	0.0	0.0	2.2	13.0	84.8	
% of the stage	0.0	0.0	2.0	16.0	57.0	
% of all participants	0.0	0.0	0.6	3.5	22.7	
Total	2	15	50	37	68	172

– describes one's feelings towards the body, and was constructed on the basis of the Tomkiewicz's description (2007). After analyzing reliability of all the test items, we found that Cronbach's *alpha* was 0.891. When the following items "I'm worried that I won't like my body in a few years' time" and "I find it hard to understand the changes my body undergoes" were removed, the Cronbach's *alpha* coefficient increased to 0.91, which proves that the questionnaire is highly reliable (Table 2).

All statistical analyses that refer to the level of accepting biological changes were carried out for the scale consisting of the nine items above.

3. The Tanner scale (separate versions for boys and girls), consisting of black-and-white illustrations which depict various stages of physical development

Table 2. Descriptive statistics for the "accepting biological changes in adolescence" scale

Items	Scale variance if item deleted	Item-total correlation	Cronbach's *alpha* if item deleted
My body makes me happy	57.80	0.73	0.897
My body feels alien to me	63.84	0.53	0.910
I find my body attractive	60.80	0.60	0.906
My body scares me	57.90	0.72	0.897
I like my body	57.94	0.78	0.894
I feel emotionally attached to my body	63.37	0.60	0.906
I detest my body	57.33	0.73	0.897
My body worries me	57.63	0.72	0.897
My body shames me	55.83	0.79	0.892

(5 stages of development for *pubarche*, *thelarche* or testicles), together with supporting descriptions (Marshall & Tanner, 1969, 1970, quoting: Pniewska-Siark, 2003, Mendle et al., 2010). The first stage is prepubertal, which means that no signs of sexual maturation are visible, while the fifth stage is postpubertal, with fully matured figure characteristic of adult human beings.

4. A socio-demographic survey, through which data were gathered on some basic demographic data describing each participant: gender, age, parents' education levels, family structure and the number of siblings.

Statistical analysis

The first step of statistical analyses was aimed at examining the reliability of our original questionnaire – a tool constructed on the basis of the description provided by S. Tomkiewicz to measure the levels of accepting biological changes that occur in adolescence. Correlation analysis (using Pearson's *r* coefficients) was carried out in order to investigate relationships between the severity of depression symptoms and levels of accepting biological changes in adolescence, and also between the severity of depression symptoms, levels of accepting biological changes and the current Tanner stage. The ANOVA (analysis of variance) method allowed us to estimate the relationship between depression symptoms and accepting biological changes vis-a-vis gender and age. Next, multiple regression analysis was used to check whether hypothetical predictors of depression (accepting biological changes, age, the current Tanner stage) exert any influence. One-way ANOVA was later used to determine whether any relations exist between levels of accepting biological changes and keeping a diet (one of the BDI items refers to dieting). The last step was to analyze how feelings towards the body affect depression symptoms. With this end in view, a multiple regression analysis was carried out.

Results

The severity of depression symptoms and accepting biological changes that occur around adolescence

The analysis results (Pearson's *r* coefficients) with regard to the entire examined group indicate that there is a moderate negative correlation between the severity of depression symptoms and acceptance for biological changes experienced in adolescence ($r = -0.54$, $p < 0.001$). The greater the intensity of depression, the lower tolerance for bodily changes an individual reports. This link is stronger for girls ($r = -0.57$, $p < 0.001$) than for boys ($r = -0.47$, $p < 0.001$). From the highest to the lowest, this relationship takes on the following values: $r = -0.598$, $p < 0.001$ for older girls; $r = -0.549$, $p < 0.001$ for younger girls; $r = -0.525$, $p < 0.001$ for older boys; and $r = -0.499$, $p < 0.001$ for younger boys.

The relationship between the severity of depression symptoms and accepting biological changes vis-a-vis the current Tanner stage

As revealed by the analysis, there is no relationship between the severity of depression symptoms and levels of accepting biological changes vis-a-vis the current stage of physical development. The link was not found in any group, the *r* values were as follows: for younger girls: $r = 0.28$, $p < 0.78$; for older girls: $r = -0.211$, $p < 0.165$; for younger boys: $r = 0.203$, $p < 0.202$; and for older boys: $r = -0.115$, $p < 0.446$.

Further analysis indicates that in girls, younger ($r = -0.027$, $p < 0.92$) and older ($r = 0.096$, $p < 0.532$) alike, no relationship exists between their acceptance for biological changes and which stage of development they are currently in.

This observation is also true for boys from the older group ($r = -0.246$, $p < 0.1$). Only among younger boys a significant link was found between accepting one's biological changes and how far these changes have gone. This link is described by a weak negative correlation ($r = -0.326$, $p < 0.037$). So among boys whose age would indicate initial and middle stages of maturation, the following is true: with later stages comes lower acceptance for the biological changes that occur in the process.

The relationship between depression symptoms and accepting biological changes vis-a-vis gender and age

The results of analysis of variance show that neither sex [$F(1,68) = 3.727$, $p < 0.055$] nor age ($F(1,168) = 1.698$, $p < 0.194$] is significantly linked to the severity of depression symptoms, although the effect for gender nearly meets the criterion of significance level (for girls: $M = 11.0$, $SD = 7.98$, for boys: $M = 8.79$, $SD = 7.08$). Also, no interaction effect was found, which means that the two variables do not modify each other's hypothetical influence on the severity of depression symptoms [$F(1,168) = 0.078$, $p < 0.781$].

The ANOVA results show that the levels of acceptance for biological changes are not affected by age – neither for girls nor for boys [$F(1,168) = 0.595$, $p < 0.442$]. There is, however, a significant difference between average levels of accepting biological changes when gender is taken into account [$F(1,168) = 9.328$, $p < 0.003$]. Girls reported lower levels ($M = 37.15$, $SD = 11$) of accepting biological changes than boys ($M = 41.62$, $SD = 7.48$), the difference was statistically significant [$t(147,619) = -3.106$, $p < 0.001$].

What was also observed was the interaction effect between gender and the stage of maturity for the "accepting biological changes" dependent variable. The effect is close to our preset significance level [$F(1,168) = 3.324$, $p < 0.07$]. After we analyzed simple effects of this interaction (a Student's *t*-test) we found significant differences in mean levels of accepting biological changes between girls and boys from the older group [$t(65,056) = -3.453$, $p < 0.001$]. At the age of final biological changes, girls ($M = 29.22$, $SD = 10.78$) demonstrated a significantly lower level of accepting biological changes than boys did ($M = 35.43$, $SD = 5.49$). These significant changes concern

a proportion of girls, as evidenced by the standard deviation value (SD = 10.78). Additionally, for boys and girls alike the findings are supported by the observed differences in homogeneity of variance (F = 6.028, $p < 0.016$). In the younger group, however, among those at the initial and middle stages of maturity, no significant differences in terms of accepting biological changes between girls (M = 32.72, SD = 4.68) and boys (M = 34.04, SD = 5.27) were found [$t(79)$ = -0.870, $p < 0.502$].

Predictors of the severity of depression symptoms

A model explaining the severity of depression symptoms on the basis of accepting biological changes, declared Tanner stage and an individual's age (indicating initial, middle or late phases of maturation) may be deemed significant, as revealed by multiple regression analysis [$F(3,168)$ = 23.55, $p < 0.001$]. With these predictors, the proportion of explained variance in the dependent variable was 29.6%. The results of a detailed analysis show that of all the factors only the levels of acceptance for biological changes significantly affect the severity of depression symptoms. They turned out to be the only significant predictor of how intense depression symptoms are (Table 3).

Table 3. The effect of individual factors on the intensity of depression symptoms

Variables	B	β
Level of acceptance for biological changes	-0.47	-0.54*
Progression of biological changes in adolescence (measured in Tanner stages)	-0.15	-0.021
Age group	1.23	0.081

B – non-standardized regression coefficient, *β* – standardized regression coefficient.
* $p < 0.05$

The impact of accepting biological changes during adolescence on particular depression symptoms

All the BDI items were broken down into four categories: depression as a symptom; diminished complex activities; anxiety; biological dysregulation. Linear regression analysis indicates that the model which explains relinquishing complex activities through the levels of acceptance for biological changes is significant [$F(1,170)$ = 41.324, $p < 0.001$]. In it, as much as 19.6% of variance in the dependent variable is explained. Accepting or not accepting biological changes also explains 5.7% of the variance in anxiety [$F(1,170)$ = 11.278, $p < 0.001$], 6.5% of variance in increased somatizing depression symptoms [$F(1,170)$ = 12.805, $p < 0.001$], and 5.9% of variance in biological dysregulation [$F(1,170)$ = 11.745, $p < 0.001$]. Therefore, the levels of acceptance for biological changes significantly explain why depression symptoms occur [$F(170.1)$ = 61.719, $p < 0.001$]. This predictor explains

around 26% of the variance in the severity of depression symptoms. The impact that individual predictors have on intensity of depression symptoms are provided in Table 4.

On the basis of the analysis we concluded that a low level of accepting biological changes to a large degree explains higher intensity of typical depression symptoms and diminished activity, and to a lesser extent the intensity of somatization, biological dysregulation and the intensity of anxiety symptoms.

Table 4. Levels of acceptance for biological changes as predictors of particular depression symptoms

Variables	B	β
Diminished complex activity	-0.08	-0.44*
Anxiety symptoms	-0.03	-0.25*
Somatization	-0.02	-0.27*
Biological dysregulation	-0.05	-0.25*
Depression as a symptom	-0.30	-0.52*

B – non-standardized regression coefficient, *β* – standardized regression coefficient.
* $p < 0.05$

In addition, we analyzed the possible relationship between levels of accepting biological changes and being on diet. A one-way analysis of variance proves that there are major differences in how likely an individual is to accept biological changes in one's body depending on whether he or she eats less with a view to losing weight [$F(1,168)$ = 10.582, $p < 0.001$]. On average, those who diet to lose weight report a lower acceptance for biological changes (M = 33.37, SD = 10.66) than those who don't (M = 41.82, SD = 8.04). Also, an interaction exists between one's gender and keeping a diet in order to lose weight. Girls who diet report lower acceptance for the changes their bodies undergo (M = 30.5, SD = 10.58) than is the case with boys who are on diet (M = 41, SD = 5.92). The difference is statistically significant [$t(38,203)$ = -4.485, $p < 0.001$]. No differences were found, however, in terms of levels of acceptance for biological changes between girls and boys who do not diet [$t(121)$ = 0.246, $p < 0.806$].

Particular feelings towards the body and their impact on the severity of depression symptoms

The model explaining how the severity of depression symptoms is linked with particular feelings an adolescent experiences towards his or her own body (which were measured with the questionnaire items designed to reveal the level of accepting biological changes) is statistically significant [$F(9,162)$ = 11.25, $p < .001$]. It explains 38.5% of variance in the dependent variable.

When we take a closer look at the feelings towards the body, a significant influence on the severity of depression symptoms can be observed for the following two items: "My body worries me" and "My body shames me" (Table 5).

Table 5. Feelings towards a maturing body as predictors of the severity of depression symptoms

Items	B	β
My body makes me happy	-0.87	-0.15
My body feels alien to me	-0.01	-0.14
I find my body attractive	0.72	0.12
My body scares me	-0.00	0.00
I like my body	0.64	0.10
I feel emotionally attached to my body	0.08	0.01
I detest my body	-0.40	-0.07
My body worries me	-1.51	-0.26[*]
My body shames me	-1.58	-0.29[*]

B – non-standardized regression coefficient, *β* – standardized regression coefficient.

[*] $p < 0.05$

Discussion

The study's main objective was twofold. First, we wanted to determine the relationship between how well one accepts biological changes that occur during one's adolescence and the severity of depression symptoms one experiences. Second, we wished to check whether an individual's age (indicating either the initial or middle stage of maturity) and the current phase of changes in a maturing body are in any way linked to accepting the changes or the severity of depression symptoms.

The first research problem addresses the following issue: does accepting or not accepting biological changes during adolescence is indeed linked to how intense depression symptoms are? According to the results such a relationship exists and we can conclude that the less likely an adolescent is to accept that the maturing body undergoes changes, the more intense depression symptoms he or she will report. As expected, the link between one's mood and accepting one's body is more pronounced among girls than among boys (Nolen-Hoeksema & Girgus, 1994; Evans et al., 2008; Allison & Hyde, 2013). The differences may be due to cultural-related stereotypical trends that make girls combine their physical and psychological characteristics – as a result their self-esteem depends heavily on how attractive they are (Obuchowska, 2000; Marcotte et al., 2002; Grogan, 2008; Radziwiłłowicz, 2010), and in adolescence girls have to confront their changing and unexplainable bodies with the ideal of the female figure – something created by the media, among other things (Mirucka & Sakson-Obada, 2012). The discussed relationship was proven to be the strongest among older girls, whose age is indicative of the final, most advanced stages of maturation – in these stages an individual usually gets a full image of how a new female body will look like in the future, and how it will differ from the body one would dream to have.

Another goal was to verify the nature of the link between depression symptoms, accepting biological changes and early/late maturation in girls and boys (as compared with their peers). We had expected to observe two regularities. We hypothesized that – first, younger girls who mature early will show higher intensity of depression symptoms, and – second, a reverse rule will be true for boys. The results, however, reveal that a completely different phenomenon is at play. Younger girls in later stages of their biological changes were not found to differ significantly from their peers in terms of how well they accepted their bodies and how intense depression symptoms they experienced. For boys, it was assumed, early maturation will lead to a lower disposition to depression, but the results showed that the current phase of changes in the growing bodies has no effect on how intense depression symptoms are. This issue begins to look differently, however, when we consider to what extent boys accept these ongoing changes. The study yields surprising results. While no connection between Tanner stages and accepting one's body was found among older boys, in younger boys the following regularity was observed: the more advanced the biological changes an adolescent's body undergoes, the less accepted these changes are.

Younger girls mostly categorized themselves as belonging to either third ($N = 20$) or fourth ($N = 14$) Tanner stage. Our assumptions that younger girls who mature faster than their peers are less likely accept their bodies and more likely to report depression symptoms could have been confirmed, if the younger age group had been pre-chosen so that its vast majority were in the early stages of maturation (and declared the first two Tanner stages). The selected group (aged 12–13) is already in the middle stage of maturation, though.

Boys from the younger group mostly declared either third ($N = 22$) or second ($N = 8$) Tanner stage, so it can be theorized that individuals in their last phase of progressive biological changes differ significantly from their peers in terms of physical appearance. The results were surprising, as the relationship they point to contradicts what one would expect on the basis of previous research studies (Petersen et al., 1993). The analysis showed that boys in the age typical of initial and middle stages of puberty are the less likely to accept the changes their bodies undergo, the higher Tanner stages they declare. This link may be another factor supporting our observation that the issue of how one reacts to early maturation process is a very ambiguous one. It also prompts us to hypothesize that the most beneficial body image is formed by individuals who mature in due time and thus report highest levels of acceptance for biological changes.

Our next research problem revolves around intersexual differences in the severity of depression symptoms and accepting biological changes. Consistently with theories which emphasize a greater number of risk factor for depression among girls, we expected that during the adolescence period girls will experience more intense depression symptoms, at least compared with boys. But the study also shows that girls tend to accept their biological

www.czasopisma.pan.pl

PAN
POLSKA AKADEMIA NAUK

www.journals.pan.pl

400

Wioletta Radziwiłłowicz, Paulina Hrycyk, Beata Dutczak

changes less than boys. A significant difference in the "accepting biological changes" variable only exists between girls and boys from the older group (which we assumed to indicate later Tanner stages). It is possible that girls who face profound changes – changes that mostly involve putting on weight and that are impossible to control, too – report much less positive body image.

Our findings on how the severity of depression symptoms changes with one's age does not allow us to conclude that older girls experience more severe depression symptoms than younger girls. Though the claim we can make is that, as was expected, the mean level of depression symptoms among boys is the same across both age groups – whether an individual's age indicates initial, middle or final stage of puberty. For any differences to be found in the severity of depression symptoms in the context of accepting (or not) biological changes, particular age groups would have to demonstrate different signs of maturing, i.e. early stages in the case of the younger group and later phases in the case of the older group.

The analysis revealed that the level of acceptance for biological changes significantly influences the severity of depression. Of all signs of depression, how well adolescents tolerate the changes their bodies undergo most strongly affects the primary symptoms of depression, i.e. sadness and downheartedness, fears about the future, a sense of guilt, anhedonia, suicidal thoughts, weepiness, hypochondriacal tendencies, feelings of psychological damage, and – particularly associated with this study – feeling unattractive. Also affected are the symptoms from the group of diminished complex activity, such as losing interest in other people, inability to make decisions or to act. Other groups of symptoms (somatization, biological dysregulation – sleep disorders, eating disorders, losing weight – and intense anxiety) are influenced significantly, albeit to a lesser degree.

We analyzed which emotions towards the maturing body influence the severity of depression symptoms. We found that although every considered feeling contributed somehow to intensifying depression symptoms, the most significant of those were the feelings of anxiety and shame experienced in relation to one's body. Similarly, in women who have been diagnosed with anorexia, bulimia or depression, more intense depression symptoms are correlated with experiencing high levels of guilt and shame (Frank, 1991). Some researchers are of the view that a specific factor of depression exists – one which contains losing one's interests and/or inability to feel pleasure, anorexia, weepiness, a sense of hopelessness, loneliness, suicidal thoughts and depressive mood. Clearly, this factor is associated with the lack of positive affect, energy and vigor (Clark & Watson, 1991).

The study yielded inspiring results concerning the issue of dieting among the examined adolescents. Girls who are on diet accept their bodies much less than those who don't care about losing weight. What is more, dieting girls report lower acceptance for biological changes within their bodies than dieting boys. Interestingly, boys who keep a diet do not accept their bodies less than boys who don't. One can

argue that – particularly amongst girls – dissatisfaction with one's body may lead to certain attempts to cope with signs of maturity which involve putting on weight and increasing fatty tissue mass. Feelings of guilt and shame which young women experience towards food, hunger and appetite symbolizes, perhaps, a sense of guilt that results from the need to be taken care of (Casper, 1998). On the other hand, cross-sectional examinations of the general population of young people demonstrate that relationships between mood disorders, eating disorders and anxiety about body weight can be found not only among women, but also in men (Richards et al., 1990; Łuszczyńska, 2007; Stice et al., 2013; Goldschmidt et al., 2016).

Summing up, the tests that compared participants in terms of their age, brought results which were not in line with what we expected. By design, participating adolescents were supposed to be on different, rather outermost stages of maturation process. What we failed to foresee was that thirteen-year-olds would turn out to be so advanced in their puberty. Therefore, the changes between what the younger and the older group declared were not qualitatively different enough. In the future a different make-up of the participating group could be attempted. For the last stage of pubertal changes seventeen- and eighteen-year-olds could be examined (as they declare to be in the fourth and fifth Tanner stage); the middle stage would be covered by thirteen-year-olds, most of whom declare Tanner stage 3; in order to represent initial phases of maturity, however, children at the age of 11 should be included in the group – for them the pubertal processes have only just begun. Most likely, such preselection would make it possible to accurately determine how accepting one's biological changes evolves with time and progression of these changes, and how it is connected with depressive mood that occurs in adolescence.

Nonetheless, the results we obtained can still be of interest and may prove practically useful to psychologists, psychiatrists and pediatricians; they can be significant for both preventing and treating depression through psychotherapy. Preventive psychological health care concerning depressive disorders and eating disorders could be enhanced by studies which help understand the changes in a growing body, and the strong emotions they doubtlessly provoke.

References

Allison, C.M., & Hyde, J.S. (2013). Early menarche: Confluence of biological and contextual factors. *Sex Roles*, *68*(1/2), 55–64.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, *4*, 561–571.

Brooks-Gunn, J., & Warren, M.P. (1989). Biological and social contributions to negative affect in young adolescent girls. *Child Development*, *60*(1), 40–45.

Casper, R.C. (1998). Depression and eating disorders. *Depression & Anxiety*, *8*(1), 96–104.

Clark, L.A., & Watson, D. (1991). Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, *100*(3), 316–336.

Evans, R.R., Roy, J., Geiger, B.F., Werner, K.A., & Burnett, A. (2008). Ecological strategies to promote healthy body image among children. *Journal of School Health, 78*(7), 359–361.

Frank, E.S. (1991). Shame and guilt in eating disorders. *American Journal of Orthopsychiatry*, *61*(2), 303–306.

Goldschmidt, A.B., Wall, M., Choo, T.-H.J., Becker, C., & Neumark-Sztainer, D. (2016). Shared risk factors for mood-, eating-, and weight-related health outcomes. *Health Psychology*, *35*(3), 245–252.

Grogan, S. (2008). *Body image: Understanding body dissatisfaction in men, women and children*. New York, London: Routledge/Taylor & Francis Group.

Kelly, M.P., & Field, D. (1997). Body image and sociology: a reply to Simon Williams. *Sociology of Health & Illness*, *19*(3), 359–366.

Kiesner, J., & Poulin, F. (2012). Developmental associations between adolescent change in depressive symptoms and menstrual-cycle-phase-specific negative affect during early adulthood. *Journal of Youth & Adolescence*, *41*(10), 1325–1338.

Kittler, J. (2009). Body image and eating disturbances in adolescents with other mental health issues. *The Brown University Child and Adolescent Behavior Letter*, *25*(7), 5–7.

Łuszczyńska, A. (2007). *Nadwaga i otyłość. Interwencje psychologiczne* [*Overweight and obesity. Psychological interventions*]. Warszawa: Wydawnictwo Naukowe PWN.

Marcotte, D., Firtin, L., Potvin, P., & Papillon, M. (2002). Gender differences in depressive symptoms during adolescence: role of gender-typed characteristics, self-esteem, body image, stressful life events, and pubertal status. *Journal of Emotional and Behavioral Disorders*, *10*(1), 29–43.

Mendle, J., Harden, K.P., Brooks-Gunn, J., & Graber, J. (2010). Development's tortoise and hare: Pubertal timing, pubertal tempo, and depressive symptoms in boys and girls. *Developmental Psychology*, *46*(5), 1341–1353.

Mirucka, B., & Sakson-Obada, O. (2012). *Ja cielesne. Od normy do zaburzeń* [*Body self. From the norm to disorders*]. Sopot: Gdańskie Wydawnictwo Psychologiczne.

Nolen-Hoeksema, S., & Girgus, J.S. (1994). The emergence of gender differences in depression during adolescence. *Psychological Bulletin*, *115*(3), 424–443.

Obuchowska, I. (2000). *Adolescencja* [*Adolescence*]. In B. Harwas--Napierała & J. Trempała (Eds.) Psychologia rozwoju człowieka [Developmental psychology] (163–200). Warszawa: Wydawnictwo Naukowe PWN.

Parnowski, T., & Jernajczyk, W. (1977). Inwentarz Depresji Becka w ocenie nastroju osób zdrowych i chorych na choroby afektywne. *Psychiatria Polska*, *11*(4), 417–425.

Petersen, A.C., Compas, B.E., Brooks-Gunn, J., Stemmler, J., Ey, S., & Grant, K.E. (1993). Depression in adolescence. *American Psychology*, *48*(2), 155–168.

Pniewska-Siark, B. (2003). *Zaburzenia dojrzewania płciowego* [*Puberty disorders*]. In M. Pawlikowski (Ed.), Zaburzenia hormonalne [Hormonal disorders] (258–266). Warszawa: Wydawnictwo Lekarskie PZWL.

Price, B. (2009). Body image in adolescents: insights and implications. *Journal of Pediatric Nursing*, *21*(5), 38–43.

Radziwiłłowicz, W. (2010). *Depresja u dzieci i młodzieży. Analiza systemu rodzinnego – ujęcie kliniczne* [*Depression in children and adolescents. Clinical analysis of the family system*]. Kraków: Oficyna Wydawnicza Impuls.

Richards, M., Casper, R., & Larson, R. (1990). Weight and eating concerns among pre- and young adolescent boys and girls. *Journal of Adolescent Health Care*, *11*, 203–209.

Rudolph, K.D., Kurlakowsky, K.D., & Conley, C.S. (2001). Developmental and social-contextual origins of depressive control-related beliefs and behavior. *Cognitive Therapy and Research*, *25*, 447–475.

Stice, E., Becker, C.B., & Yokum, S. (2013). Eating disorder prevention: Current evidence-base and future directions. *International Journal of Eating Disorders*, *46*, 478–485.

Tomkiewicz, S. (2007). *Adolescencja a depresja* [*Adolescence and depression*]. In K. Walewska (Ed.), Psychoanaliza współcześnie. Nurt francuski [Psychoanalysis today. French perspective] (88–100). Warszawa: MediPage.