

Emotional states of German high school students during physical education classes – gender and age comparison

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Abstract

Emotions are an integral part of human activity, which also includes sports and physical education. Various emotional states during physical education lessons may have major impact on pupils' attitudes towards these lessons, their attitudes towards exercise, and their motives and attitudes towards extracurricular sports activities. Therefore, the knowledge and ability to recognize and assess pupils' emotional responses to physical education may provide important organizational and methodological guidelines for the educational process. The aim of this paper is diagnosis and analysis of positive and negative emotions expressed by German high-school students during physical education classes, taking their age and sex into consideration. The study included a total of 502 secondary school students from southern Germany, divided in two age groups (13-14 and 17-18). The study used the PANAS (Positive and Negative Affect Schedule) research method to study the positive and negative emotional states of students during physical education classes. During these classes, the studied adolescents were mainly accompanied by positive emotional states such as: interested, excited, proud and active and to a lesser extent, negative emotions such as: distressed, ashamed, nervous and afraid. Gender and age significantly differentiate the intensity of both the positive and negative emotions experienced during physical education classes.

Key Words: positive emotions, negative emotions, sports activity, physical education classes

Introduction

The psychology of emotions derives from the main thesis that not only cognition and motivation drive and regulate human activity. Feelings also play a role in this area (Lewis/Haviland, 1993; Izard, 1994; Jenkins/Oatley/Stein, 1998; Otto/Euler/Mandl, 2000; Scherer, 2000). According to Bandura (1997), emotions influence the level of human activity, its motives for action and activate its cognitive processes. Kleinginna and Kleinginna (1981) define emotions as complex mental processes, dependent on subjective and objective factors. They are controlled by the neuro-hormonal system of the human body and can contribute to affective experiences, feelings of increased tension and willingness or unwillingness to act. These factors can also cause cognitive processes such as identification and evaluation of various situations as well as the ability to adapt to them. Rethorst (2000) uses the concept of emotional reaction that is a response to the effects of various emotional stimuli. According to Gabler (2000), emotions should be understood in the physical (appropriate bodily responses), sensory, cognitive and motivational context. Krech/Crutchfield (1968), taking the various factors of emotional development into account, created the following classification:

- basic feelings – e.g. joy, fear, anger, worry,
- feelings related to the reception of sensory stimuli – e.g. pain, disgust, terror, enchantment,
- feelings related to one's own self – e.g. embarrassment, pride, guilt,
- feelings related to others – e.g. love, hatred, compassion,
- aesthetic feelings – e.g. sense of humour, beauty, admiration,
- feelings related to mood – e.g. sadness, euphoria, certain types of anxiety.

Emotions are an important part of human activity, which also includes sports and physical education. Thomas (1995) points to both the intensity and variety of emotions in sports, but according to Ungerer-Röhrich (2000), emotions are related to the occurrence of experiences as well as specific physical responses of the body. Scherer (1992) considers that the greater a student's relevance to a particular event, the greater the intensity of the relevant emotions associated with this event. Rethorst (2000) adds that the importance of an event and the student's expectations towards it are cognitive processes (cognitions) which are formed before the action and have significant impact on the quality of emotional responses to the later outcome. Weiner's (1986) attribution theory suggests that success or failure in sport and thus, the corresponding emotions associated with it, depend

on the causal factors associated with the person involved in the sports activity (motor abilities, form of the day, responsibility) or not directly related to it (impact of the coach or teacher, technical condition of sports equipment, coincidence). Many authors classify emotions related to sports activity as positive (e.g. joy, pride, delight) and negative emotions (e.g. anxiety, disappointment, anger). According to Rethorst (2000), positive emotional reactions in school physical activity include joy, self-confidence and happiness, which apart from having a beneficial motivational effect in the process of physical education, can also play a significant role in shaping the attitudes conditioning systematic, leisure physical activity of the youth. Thomas (1995) states that positive emotions connected with the process of school physical education include, among others, joy, sense of mastery/self-confidence, aesthetic feelings and pride. Listing the negative emotions (anxiety, reluctance, tension, repulsion, hatred, anger), he emphasizes the negative role of anxiety experienced by students during physical education classes. Thomas (1995) is of the opinion that the intensity of the feeling of fear cannot exceed the level at which the student will not be able to deal with that feeling alone. At the same time, ways to overcome that feeling are highlighted, to which Klingen (2005) added, among others, better contact between the teacher and the student, the use of familiarizing exercises and more active mental support of the student. Alfermann and Stoll (2017) emphasize the close relationship between the emergence of positive emotions in sport, such as joy and pride, and the specific goal that was independently achieved. This relationship positively determines the level of motivation in sport and so-called – “positive reinforcement”. Rethorst (2000) believes that over-exercising physical feelings of disappointment, dissatisfaction and anger can have negative impact on the overall physical activity of students. In addition, it exposes feelings of indifference experienced by some students during physical education classes, which may be an indication of the lack of motivation for athletic activity, and thus, valuable information for physical education teachers. Ungerer-Röhrich (2000) emphasizes the importance of emotions in the context of a learner's subjective experiences in the sphere of his/her psyche, which can significantly determine his or her, both positive and negative behaviours and attitudes towards physical education and sport. Additionally, Hackfort (1999) distinguishes so-called pleasant feelings, which can stimulate an individual to undertake sports activity and maintain its performance, while unpleasant feelings cause the opposite phenomenon. The emotions accompanying athletic activity fulfill various functions, which Hackfort and Birkner (2006) regard as:

1. Preparatory function, which involves the activation or deactivation of stimulation processes in both the psychological and somatic sphere. This function can also be identified with protective and control functions related to the dosage of sports-training loads.
2. Signaling function, also referred to as the communicative function. It refers to the ability to receive various emotional signals from players on one's own or the opposite team (signs of anxiety, uncertainty, uneasiness, etc.). This makes it possible to improve performance efficiency being the result of proper responses to these signals.
3. Organizational function in which emotions play the role of a "mediator" between the coach and competitor during a sports competition. The purpose of this emotional contact is to increase the concentration and organization of the player's actions.
4. Control function. Thanks to positive emotional signals (confidence, lack of fear, etc.), continuity and stability of sports actions can be maintained. In the opposite situation, the action is terminated. Csikszentmihalyi (1992) also believes that positive emotions are the source of the flow phenomenon, providing euphoric experiences associated with the performance of certain sports disciplines.

In addition, Thomas (1995) and Schmidt-Atzert (1996) expose the regulative function of emotion, which consists in positive or negative stimulation of motor-sports activity. They believe that some emotional reactions can both help the athlete or the student, as well as limit, interfere or even prevent them. The value of self-confidence and emotional stability is vastly emphasized here – these feelings are of great importance before and during sports competitions. In the literature on sports psychology, the role and influence of sports activity on positive emotional states of humans is also underlined. In their empirical research, Ziemainz and Peters (2010) demonstrate the relationship between sports performance for health purposes and achieving a state of well-being. Alfermann and Stoll (1996) argue that particularly moderate and recreational athletic activity can cause feelings of better well-being or mood, while Schneider and Wydra (2001) also stress the positive effects of more intense activity on these emotional states.

As already mentioned, the physical activity of children and youth during physical education classes is accompanied by their emotional involvement. Not all students, however, experience them in the same way. In empirical studies on the emergence of sports-related emotions, some authors demonstrate dependencies in terms of both gender and age. With respect to these variables, there are often noticeable differences in the quality and intensity of emotional responses. Alfermann (1995, 1996) points to much larger gender differences in negative feelings. In her opinion, women show stronger feelings of vulnerability and sorrow, while men feel anger as a demonstration of their domination. Rethorst (2000) shows differences in the occurrence and intensities of some positive and negative emotions in sport, taking gender and age of the subjects into account (secondary school and university students). Particular attention should be paid to the feeling of indifference (determined by the effort and one's own expectations), much more strongly felt by the studied university students than the secondary-school pupils.

Numerous research papers (Bös, 2003; Burrmann, 2005a; Burrmann, 2005b; Gogoll et al., 2006; Züchner and Arnoldt, 2012) highlight gender- and age-related differences in many aspects of youth sports such as disciplines, motives and frequency of sport performance, as well as intensity of engagement and favourite forms of movement during physical education classes. It can be assumed that the degree of intensity of students' emotional states will also depend on their age and gender. In addition, the presence and severity of various emotional states during physical education classes may have major impact on the pupils' attitudes during physical education classes, their attitude towards exercise, and their motives as well as attitudes towards extracurricular sports activities. Therefore, a physical education teacher's knowledge and ability to recognize and assess pupils' emotional reactions can provide important organizational and methodological guidelines for the educational process. It should be emphasized that literature on sports sciences does not include many works on the issue of emotions in sport, and especially in the area of school physical education, thus, the main aim of this paper is diagnosis and analysis of positive and negative emotions expressed by German high-school students during physical education classes, taking their age and sex into consideration.

The following research questions were formulated:

1. What types of emotional states are experienced by German adolescents during school physical education classes?
2. Does the gender of the study participants differentiate the intensity of the emotional states?
3. Does the age of the study participants differentiate the intensity of the emotional states?

Material and methods

Participants

The study included a total of 502 secondary school students from southern Germany, divided into two age groups. The first group comprised of 221 students (114 girls and 107 boys) aged 13-14 years ($M=13.49$; $SD=0.28$), and the second, 281 students (147 girls and 134 boys) aged 17-18 years ($M=17.51$; $SD=0.29$). The adolescents participating in this study were selected in accordance with the rules of research sample random selection - school classes. The study was conducted in 2018 by the authors of this paper.

Research methods

The PANAS (Positive and Negative Affect Schedule) research method was used to study the positive and negative emotional states of high school students during physical education classes (Watson, 1988; Crawford and Henry, 2004). This method is widely used in social research, including sports sciences (v.d. Felsen, 2013; Breyer & Bluemke, 2016). It contains 20 adjectives, 10 of which diagnose positive emotions (interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, active) while the other 10 diagnose negative emotions (distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, afraid). All PANAS components contain a 5-grade response scale (not at all, a little, moderately, quite a bit, extremely); the respondents may only submit one answer. The mean values ranging from 1 (the weakest) to 5 (the strongest) indicate the intensity of a given emotion.

Statistical analysis

All the research results were statistically documented. The Statistics Program Pl was used for the statistical analyses of the questionnaires. In order to calculate the statistically significant differences regarding the intensity of emotional states within a given gender or age group, the Chi-squared test was used, while the global results (moods) were subjected to the Student's t-test. The level of significance was set at $p < 0.05$. Furthermore, to describe the association between variables as the effect size (ES), Cramer's V (ϕ_c) formula was used. This test defines the strength of a relationship between variables (Sheskin, 1997), and it was computed and interpreted according to conventions for describing the size of the associations between them (Rea and Parker, 1992). These are:

0.00 - 0.10 – negligible association

0.10 - 0.20 – weak association

0.20 - 0.40 – moderate association

0.40 - 0.60 – relatively strong association

0.60 - 0.80 – strong association

0.80 – 1.00 – very strong association

Results

Table 1 shows results regarding the positive emotional states of 13-14 year-old pupils during physical education classes. The strongest feelings, regardless of sex, were 'excited' ($M=3.68$, $SD=1.11$), 'enthusiastic' ($M=3.60$, $SD=1.20$) and 'strong' ($M=3.58$; $SD=1.15$), while 'interested' ($M=3.20$; $SD=1.22$) and 'inspired' ($M=3.27$; $SD=1.19$) were the weakest emotions. The results of the Chi-squared test did not show any statistically significant differences in the remaining emotional states, which is the basis for suggesting that positive emotions are similar in severity both among the studied boys and girls belonging to this age group.

Table 1 Positive emotions of 13–14-year-old students in relation to gender ($n = 221$)

	<i>M</i>	<i>SD</i>	χ^2	<i>P</i>	φ_c
interested					
male	3.31	1.23	8.09	.08851	.19
female	3.09	1.22			
Total	3.20	1.226			
excited					
male	3.82	1.04	4.41	.35392	.14
female	3.54	1.17			
Total	3.68	1.112			
strong					
male	3.60	1.12	1.18	.88079	.07
female	3.55	1.18			
Total	3.58	1.152			
enthusiastic					
male	3.68	1.17	1.37	.84966	.08
female	3.51	1.24			
Total	3.60	1.209			
proud					
male	3.69	1.11	5.57	.23347	.16
female	3.36	1.30			
Total	3.53	1.219			
alert					
male	3.67	1.06	5.26	.26137	.15
female	3.38	1.21			
Total	3.53	1.146			
inspired					
male	3.16	1.20	3.93	.41618	.13
female	3.38	1.19			
Total	3.27	1.198			
determined					
male	3.54	1.06	4.54	.33790	.14
female	3.47	1.18			
Total	3.51	1.123			
attentive					
male	3.18	1.23	6.88	.14257	.18
female	3.56	1.23			
Total	3.37	1.239			
active					
male	3.42	1.21	2.37	.66886	.10
female	3.47	1.22			
Total	3.45	1.211			

*statistically significant

According to the results presented in Table 2, the strongest negative emotional responses in the 13-14-year-old school students was feeling ‘distressed’ ($M=3.42$, $SD=1.20$), ‘nervous’ ($M=3.28$, $SD=1.31$) and ‘upset’ ($M=3.23$; $SD=1.33$). The weakest emotion towards physical education classes turned out to be ‘hostile’ ($M=2.00$; $SD=1.18$). In the case of this emotion, there was a significant difference in favour of the girls ($M=1.54$, $SD=0.78$), with the following values: $\chi^2=33.34$, $p=0.0000$ and $\varphi_c=0.21$ (moderate association).

A relatively weak feeling, especially in the studied boys, was found to be ‘jittery’, as shown by $\chi^2=10.15$, $p=0.0379$ and $\varphi_c=0.21$ (moderate association). There were no statistically significant differences in the case of the remaining negative emotional states accompanying physical education classes.

Table 2 Negative emotions of 13–14-year-old students in relation to gender ($n = 221$)

	<i>M</i>	<i>SD</i>	χ^2	<i>p</i>	φ_c
distressed					
male	3.39	1.21	0.30	.99002	.04
female	3.44	1.20			
Total	3.42	1.202			
upset					
male	3.21	1.29	0.74	.94590	.06
female	3.25	1.25			
Total	3.23	1.271			
guilty					
male	2.64	1.33	0.70	.95122	.06
female	2.68	1.34			
Total	2.66	1.335			
scared					
male	2.93	1.34	2.46	.65211	.11

female	3.10	1.38			
Total	3.01	1.357			
hostile					
male	2.46	1.36			
female	1.54	0.78	33.34	.00000*	.39
Total	2.00	1.189			
irritable					
male	2.88	1.38			
female	3.12	1.32	2.31	.67856	.10
Total	3.00	1.353			
ashamed					
male	3.21	1.31			
female	3.20	1.32	1.45	.83498	.08
Total	3.21	1.312			
nervous					
male	3.21	1.35			
female	3.34	1.30	3.43	.48810	.12
Total	3.28	1.319			
jittery					
male	2.91	1.24			
female	3.38	1.28	10.15	.03797*	.21
Total	3.14	1.279			
afraid					
male	3.08	1.41			
female	3.32	1.35	2.01	.73444	.10
Total	3.20	1.378			

*statistically significant

Table 3 presents the results on the severity of positive emotional states in the second age group (17-18-year-olds) during physical education classes. The strongest feelings, especially among male adolescents, were 'interested' (M=3.53, SD=1.18), 'strong' (M=3.44, SD=1.28) and 'excited' (M=3.38; SD=1.21), while the weakest emotions declared by the female adolescents were 'enthusiastic' (M=2.96; SD=1.31) and 'determined' (M=3.17; SD=1.22). In addition to the feeling - 'proud', the intensity of which is similar in both sexes, the Chi² test results confirmed the statistically significant differences in favour of the boys in the case of the remaining positive emotional states. And thus, the studied boys were more 'alert' Chi²=25.40, $p=0.0000$, 'inspired' Chi²=11.07, $p=0.0258$, 'determined' Chi²=11.91, $p=0.0180$, 'attentive' Chi²=23.48, $p=0.0001$ and 'active' Chi²=16.56, $p=0.0023$. Additionally, Cramér's V values were noted to be at a level from 0.20 to 0.30, indicating moderate associations between the analysed variables.

Table 3 Positive emotions of 17–18-year-old students in relation to gender ($n = 281$)

	<i>M</i>	<i>SD</i>	χ^2	<i>p</i>	ϕ_c
interested					
male	3.76	1.14			
female	3.30	1.20	14.62	.00556*	.23
Total	3.53	1.189			
excited					
male	3.66	1.10			
female	3.11	1.25	15.35	.00403*	.23
Total	3.38	1.212			
strong					
male	3.69	1.09			
female	3.18	1.39	17.44	.00159*	.25
Total	3.44	1.280			
enthusiastic					
male	3.19	1.32			
female	2.74	1.28	9.10	.05875	.18
Total	2.96	1.318			
proud					
male	3.36	1.36			
female	3.06	1.34	4.60	.33101	.13
Total	3.21	1.354			
alert					
male	3.71	1.15			
female	2.98	1.27	25.40	.00004*	.30
Total	3.34	1.268			
inspired					
male	3.51	1.20			
female	3.12	1.32	11.07	.02583*	.20
Total	3.32	1.276			

determined					
male	3.39	1.14	11.91	.01803*	.21
female	2.95	1.26			
Total	3.17	1.226			
attentive					
male	3.69	1.05	23.48	.00010*	.29
female	3.09	1.27			
Total	3.39	1.204			
active					
male	3.60	1.18	16.56	.00236*	.24
female	3.05	1.33			
Total	3.33	1.291			

*statistically significant

Similarly as demonstrated in Table 4, the strongest negative emotional reactions in the 17-18-year-old high-school students, independently of gender, included: 'distressed' (M=3.01; SD=1.25), 'upset' (M=2.86; SD=1.25) and 'jittery' (M=2.80; SD=1.39). The weakest emotion felt towards school physical education classes, also irrespectively of gender, was 'hostile' (M=1.91; SD=1.08). Moreover, the girls declared that during physical education classes, they were significantly more 'afraid' ($\chi^2=48.76$, $p=0.0000$, $\varphi_c=0.42$), 'ashamed' ($\chi^2=26.38$, $p=0.0000$, $\varphi_c=0.31$), 'nervous' ($\chi^2=16.16$, $p=0.0028$, $\varphi_c=0.24$) and 'irritable' ($\chi^2=10.65$, $p=0.0308$, $\varphi_c=0.19$).

Table 4 Negative emotions of 17–18-year-old students in relation to gender ($n = 281$)

	<i>M</i>	<i>SD</i>	χ^2	<i>p</i>	φ_c
distressed					
male	2.93	1.24	2.79	.59335	.10
female	3.10	1.28			
Total	3.01	1.259			
upset					
male	2.66	1.26	9.53	.04922*	.18
female	3.07	1.21			
Total	2.86	1.253			
guilty					
male	2.10	1.21	2.16	.70720	.09
female	2.29	1.31			
Total	2.20	1.263			
scared					
male	2.37	1.27	6.71	.15179	.15
female	2.65	1.25			
Total	2.51	1.268			
hostile					
male	2.02	1.17	3.51	.47584	.11
female	1.80	0.99			
Total	1.91	1.085			
irritable					
male	2.32	1.21	10.65	.03083*	.19
female	2.79	1.36			
Total	2.56	1.308			
ashamed					
male	2.12	1.26	26.38	.00003*	.31
female	2.90	1.37			
Total	2.51	1.371			
nervous					
male	2.51	1.24	16.16	.00281*	.24
female	3.07	1.35			
Total	2.79	1.329			
jittery					
male	2.51	1.40	16.04	.00297*	.24
female	3.09	1.34			
Total	2.80	1.397			
afraid					
male	2.12	1.06	48.74	.00000*	.42
female	3.15	1.29			
Total	2.63	1.292			

*statistically significant

Table 5 summarizes the results regarding the comparison of the severity of positive emotional states in both tested groups, separately for both males and females. Comparing the younger boys with the older ones, it is important to note that the 17-18-year-old boys reported a significantly higher ‘attentive’ emotional state, as confirmed by $\chi^2=13.07$, $p=0.0109$ and $\varphi_c=0.23$. Other positive emotions were felt by the male respondents during their physical education classes in a similar way, as evidenced by the lack of statistically significant differences in this regard. In the case of the studied girls, it was found that girls in the younger age group were significantly more ‘active’ during physical education classes ($\chi^2=10.21$, $p=0.0370$, $\varphi_c=0.20$), ‘attentive’ ($\chi^2=10.77$, $p=0.0292$, $\varphi_c=0.20$), ‘determined’ ($\chi^2=12.22$, $p=0.01581$, $\varphi_c=0.22$) and ‘enthusiastic’ ($\chi^2=22.95$, $p=0.0001$, $\varphi_c=0.30$). Based on the χ^2 test results, there were no statistically significant differences for the remaining the positive emotions.

Table 5 Positive emotions – comparison in relation to gender and age ($n = 502$)

	<i>M</i>	<i>SD</i>	χ^2	<i>p</i>	φ_c
interested					
male younger	3.31	1.23	8.92	.06318	.19
male older	3.76	1.14			
female younger	3.09	1.22	3.18	.52767	.11
female older	3.30	1.20			
excited					
male younger	3.82	1.04	8.88	.77541	.19
male older	3.66	1.10			
female younger	3.54	1.17	6.08	.07125	.18
female older	3.11	1.25			
strong					
male younger	3.60	1.12	2.07	.72319	.09
male older	3.69	1.09			
female younger	3.55	1.18	8.11	.08771	.18
female older	3.18	1.39			
enthusiastic					
male younger	3.68	1.17	9.24	.05532	.20
male older	3.19	1.32			
female younger	3.51	1.24	22.95	.00013*	.30
female older	2.74	1.28			
proud					
male younger	3.69	1.11	9.12	.05822	.19
male older	3.36	1.36			
female younger	3.36	1.30	4.76	.31314	.14
female older	3.06	1.34			
alert					
male younger	3.67	1.06	1.79	.77353	.09
male older	3.71	1.15			
female younger	3.38	1.21	6.94	.13922	.16
female older	2.98	1.27			
inspired					
male younger	3.16	1.20	6.52	.16326	.16
male older	3.51	1.20			
female younger	3.38	1.19	18.43	.10336	.11
female older	3.12	1.32			
determined					
male younger	3.54	1.06	3.00	.55811	.11
male older	3.39	1.14			
female younger	3.47	1.18	12.22	.01581*	.22
female older	2.95	1.26			
attentive					
male younger	3.18	1.23	13.07	.01095*	.23
male older	3.69	1.05			
female younger	3.56	1.23	10.77	.02929*	.20
female older	3.09	1.27			

active					
male younger	3.42	1.21			
male older	3.60	1.18	3.79	.43580	.13
female younger	3.47	1.22			
female older	3.05	1.33	10.21	.03701*	.20

*statistically significant

Table 6 summarizes the results for the comparison of negative emotion intensity in both groups. The girls and boys were tested separately. Comparing the younger boys to the older ones, it is an important observation that the 13-14-year-old boys experienced significantly stronger negative feelings than their older colleagues during physical education classes. This is mainly related to feelings such as ‘ashamed’ ($\text{Chi}^2=42.33, p=0.0000, \varphi_c=0.42$), ‘afraid’ ($\text{Chi}^2=37.83, p=0.0000, \varphi_c=0.40$) and ‘nervous’ ($\text{Chi}^2=17.17, p=0.0017, \varphi_c=0.27$). The younger boys also demonstrated more feelings such as ‘upset’ ($\text{Chi}^2=8.88, p=0.0108, \varphi_c=0.23$), ‘guilty’ ($\text{Chi}^2=12.31, p=0.0152, \varphi_c=0.23$), ‘scared’ ($\text{Chi}^2=13.17, p=0.0104, \varphi_c=0.23$), ‘irritable’ ($\text{Chi}^2=13.37, p=0.0096, \varphi_c=0.24$) and ‘jittery’ ($\text{Chi}^2=12.55, p=0.0136, \varphi_c=0.23$). Taking into account both age groups of the studied girls, it was found that younger girls felt ‘scared’ much more strongly their older colleagues during physical education classes ($\text{Chi}^2=10.90, p=0.0277, \varphi_c=0.20$). In the case of the other 9 remaining negative emotions, no statistically significant differences were found between the two age groups, which means that the intensity of these feelings is similar in both groups.

Table 6 Negative emotions – comparison in relation to gender and age ($n = 502$)

	<i>M</i>	<i>SD</i>	χ^2	<i>P</i>	φ_c
distressed					
male younger	3.39	1.21			
male older	2.93	1.24	8.88	.06428	.19
female younger	3.44	1.20			
female older	3.10	1.28	6.08	.19361	.15
upset					
male younger	3.21	1.29			
male older	2.66	1.26	8.88	.01085*	.23
female younger	3.25	1.25			
female older	3.07	1.21	6.08	.72920	.09
guilty					
male younger	2.64	1.33			
male older	2.10	1.21	12.31	.01520*	.23
female younger	2.68	1.34			
female older	2.29	1.31	6.57	.16068	.16
scared					
male younger	2.93	1.34			
male older	2.37	1.27	13.17	.01048*	.23
female younger	3.10	1.38			
female older	2.65	1.25	10.90	.02770*	.20
hostile					
male younger	2.46	1.36			
male older	2.02	1.17	8.46	.07615	.19
female younger	1.54	0.78			
female older	1.80	0.99	7.00	.13577	.16
irritable					
male younger	2.88	1.38			
male older	2.32	1.21	13.37	.00961*	.24
female younger	3.12	1.32			
female older	2.79	1.36	5.19	.26883	.14
ashamed					
male younger	3.21	1.31			
male older	2.12	1.26	42.33	.00000*	.42
female younger	3.20	1.32			
female older	2.90	1.37	5.77	.21728	.15
nervous					
male younger	3.21	1.35			
male older	2.51	1.24	17.17	.00179*	.27
female younger	3.34	1.30	3.21	.52366	.11

female older	3.07	1.35			
jittery					
male younger	2.91	1.24	12.55	.01368*	.23
male older	2.51	1.40			
female younger	3.38	1.28	5.19	.26854	.14
female older	3.09	1.34			
afraid					
male younger	3.08	1.41	37.83	.00000*	.40
male older	2.12	1.06			
female younger	3.32	1.35	4.09	.39336	.13
female older	3.15	1.29			

*statistically significant

Figures 1 and 2 show the results of comparisons of positive and negative emotional states in both sexes, regardless of age (Figure 1), and within two age groups regardless of sex (Figure 2). All positive and negative emotions are grouped into two blocks (block of positive feelings as a positive mood and block of negative feelings as a negative mood). For each block, mean (average) values from particular emotions were calculated. The Student's t-test results confirmed that, in general, the studied boys and girls, regardless of age, both experienced positive and negative moods during physical education classes in a similar way, that is, the intensity of these feelings is similar. Comparing both age groups, according to the Student's-t test results, it is important to note that young people, regardless of gender, also experience similar emotional states during physical education classes. In all cases, there were no statistically significant differences ($p > 0.05$).

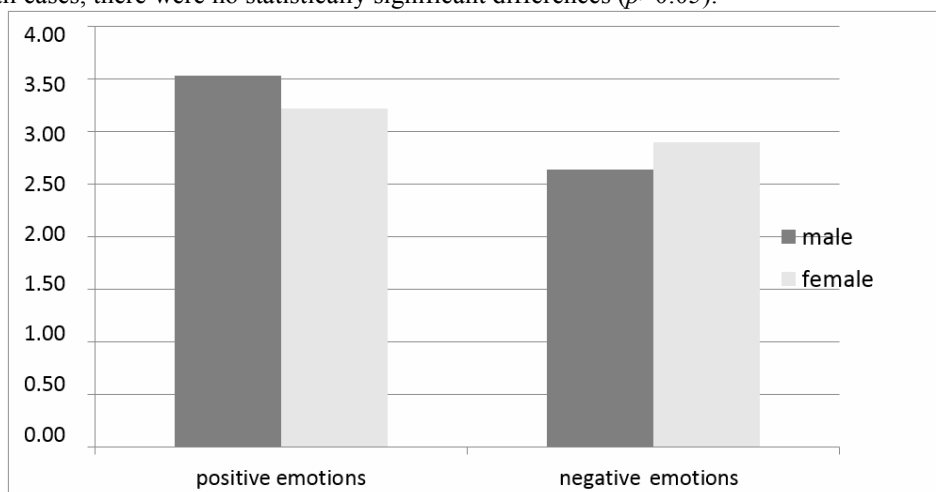


Fig.1 Positive and negative emotions as the moods (mean values) – comparison in relation to gender

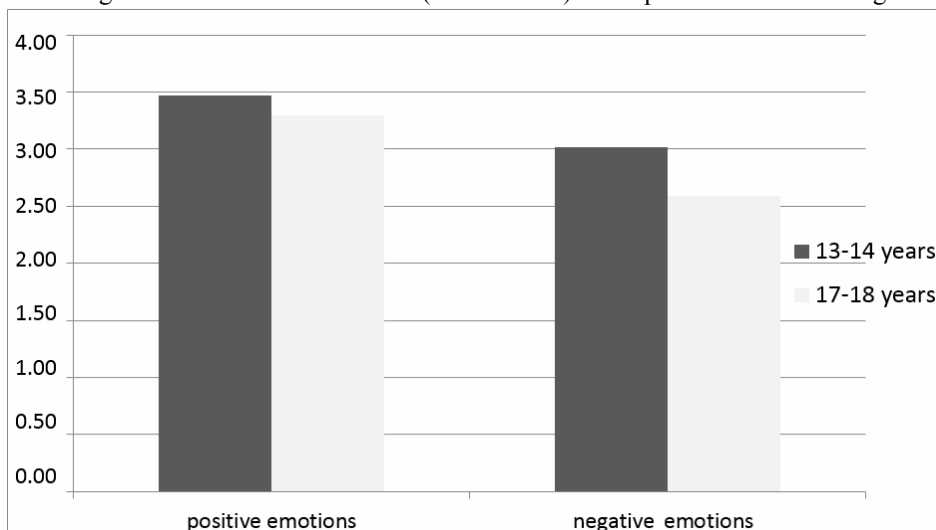


Fig.2 Positive and negative emotions as the moods (mean values) – comparison in relation to age

Discussion

Sport and motor activity of students during physical education classes is accompanied by permanently differentiated emotional reactions. They appear in various forms and are characterized by varying intensity. In the literature on psychology of emotion, there is emphasis on the division of emotions into those positive and

negative. The aim of this study was to determine the types of emotions experienced by the German secondary school students during physical education classes and to examine the differences in intensity of these emotions, taking the age and gender of the respondents into account. The results of the study conducted in the group of adolescents (13-14 years old) showed a high share of particularly positive emotions among the participants. During physical education classes, both the boys and girls declared the feelings of 'excitement (M=3.68), 'enthusiasm' (M=3.60), 'strength' (M=3.58) and 'pride' (M=3.53) to be the most intensely experienced. Negative emotional states, although less severe, were also declared by the youth. The presence of feelings of 'stress' (M=3.42), 'nervousness' (M=3.28) and 'anger' (M=3.23), which were slightly more severe in the boys, are also worth mentioning. Out of all negative emotions, the feeling of 'hostility' towards physical education (M=2.00) turned out to be the weakest and it was particularly low in the case of girls (M=1.54). Additionally, our results and statistical analysis showed that the girls (M=3.38) were much more 'jittery' than the boys (M=2.91) during physical education classes. Taking all the emotional states studied in the 13-14 year olds into account, it can be said that their intensity, regardless of gender, is generally similar. Significant differences in the intensity of both positive and negative feelings were observed among the studied youth (17-18 years) taking their gender into account. Our own research indicates much greater dominance of the majority of positive emotions in the studied boys. Compared to girls during physical education classes, they were much more 'interested' in these lessons ($p=0.0055$) as well as 'excited' ($p=0.0040$), 'determined' ($p=0.0180$), 'active' ($p=0.0023$), 'inspired' ($p=0.0258$), 'concentrated' ($p=0.0000$), experiencing more feelings of 'strength' ($p=0.0015$), etc. These results may indicate that older girls are no longer as interested in physical education as they were in the younger age group. Considering the negative emotional states of the older age group, statistically significant differences were found for six of the ten diagnosed emotions. Compared to their peers, the girls declared that they experienced more 'anxiety' ($p=0.0000$) and 'shame' ($p=0.0000$) during physical education classes. In addition, they were significantly more 'nervous' ($p=0.0028$), 'chaotic' ($p=0.0029$), 'irritated' ($p=0.0308$) and 'angry' ($p=0.0492$). Taking all of the emotional states in the 17-18 year olds into account, it can be stated that their intensity in the positive emotions category is higher in boys, whereas in the category of negative emotions, it is higher in girls. The results of our own research on the occurrence of various emotional states in adolescents during physical education classes are confirmed by Rethorst (2000), who examines the exacerbation of some emotions related to school physical education in Germany. Positive emotions include 'joy', 'happiness' and 'self-affirmation', while the negative feelings are 'disappointment', 'dissatisfaction' and 'anger'. Ungerer-Röhrich (2000) also emphasizes the importance of emotions in school physical education, especially in the context of positive attitudes toward sports. Bock (2014), conducting research on emotion in sports activities in a group of 15-17-year-olds, indicates the importance of positive emotions such as: 'satisfaction', 'joy', 'happiness', 'interest', 'pride'. She also highlights the negative emotions associated with athletic activity, including 'anxiety', 'disappointment', feelings of 'hatred', 'sadness', 'anger', etc. Klingen (2005) explains the relationships between 'anxiety' and 'motivation' during physical education giving practical guidelines for physical education teachers. Jekauc and Brand (2017) claim that well-being during or after physical activity can help to continue it. Some authors also emphasize the positive influence of sports activity on the intensification of various emotional states and moods (Birrer, 1999; Wydra, 2006; Szabo, 2003, Schneider and Wydra 2001; Wiesche, 2013, Müller-Koch, Schüler et.al. 2008; Wiesche, 2013; Wienke & Jekauc, 2016)

The analysis of our own research also referred to a comparison of the results for both age groups. Comparing the younger and older boys, the majority of positive emotions were felt in a similar way, except that the 17-18-year-old boys were much more 'attentive' during physical education classes than their younger colleagues ($p=0.0109$). During physical education classes, the girls from the younger age group were significantly more 'active' ($p=0.0370$), 'attentive' ($p=0.0292$), 'determined' ($p=0.0158$) and 'enchanted' ($p=0.0001$).

The studied boys from the 13-14-year-old age group experienced much stronger negative feelings than their older colleagues during physical education classes. They were more 'embarrassed' ($p=0.0000$), feeling 'anxious' ($p=0.0000$), 'nervous' ($p=0.0017$), 'angry' ($p=0.0108$), 'frightened' ($p=0.0104$), 'irritated' ($p=0.0096$), 'chaotic' ($p=0.0136$), and had more feelings of 'guilt' than the older boys ($p=0.0152$). The younger girls were significantly more 'frightened' during their physical education lessons than their older colleagues ($p=0.0277$), whereas the remaining negative feelings were similar in both age groups.

Summarizing the global results of the studied boys and girls, regardless of age, they both experienced positive and negative emotions (positive and negative moods) in a similar way during physical education classes, which means that the intensity of these feelings is similar ($p>0.05$). In both age groups, the adolescents experienced similar both positive and negative emotional states (also as single units) during physical education classes, irrespective of their gender ($p>0.05$).

Conclusions

During physical education classes, the studied school youth were mainly accompanied by positive emotional states and to a lesser extent, negative emotional states.

The gender of the respondents significantly differentiates the intensity of both positive and negative emotions (taken individually) experienced during physical education classes.

The age of the respondents significantly differentiates the intensity of both positive and negative emotions (taken individually) experienced during physical education classes.

Taking into account positive and negative feelings as the totality of all analysed types of emotions (moods), it is to be noted that the studied high school students, regardless of age and gender, perceive the emotions in a similar way.

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