BALTIC JOURNAL OF SPORT & HEALTH SCIENCES
No. 4(127); 2022; 4–13; ISSN 2351-6496 / eISSN 2538-8347
DOI: https://doi.org/10.33607/bjshs.v127i4.1293

Associations Between Emotion Regulation Strategies and Anxiety in Lithuanian Medical Students

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ABSTRACT

Background. Appropriate emotion regulation is crucial for medical students to properly prepare for the practical part of their career. Emotion dysregulation, however, is associated with maladaptive emotion regulation strategies, which in turn often causes higher levels of anxiety. This could lead to difficulties concerning the studying process and preparation for the future career. This research is conducted due to the lack of previous studies.

Methods. Medical students of Lithuanian University of Health Sciences participated in an online survey. There were a total of 98 female and 18 male students, mean participant age M = 21,6 (SD = 2,21). The survey consisted of 3 questionnaires – Cognitive Emotion Regulation Questionnaire – Short Form (CERQ-SF), GAD-7 and sociodemographic questions. Scales were used to assess emotion regulation strategies and subjective anxiety levels.

Results. Female students experience higher levels of anxiety compared to their male counterparts. High levels of anxiety are associated with year 2–6 students; 1st year students are the only ones experiencing low levels of anxiety. However, it is worth mentioning that no statistical significance was found in those groups. Results suggest a weak negative correlation between adaptive ER strategies and anxiety, with a moderate positive correlation between maladaptive ER strategies and anxiety. No statistical significance was found between genders, years of study or age concerning the use of ER strategies.

Conclusion. Our findings suggest weak negative correlation between adaptive ER strategies and anxiety; moderate positive correlation between maladaptive ER strategies and anxiety was also found.

Keywords: medical students, emotion regulation, anxiety.

INTRODUCTION

Although a growing interest in the relationship between emotion regulation and anxiety has been captured over the years, there is a lack of research regarding medical students. Some studies have shown higher levels of anxiety in medical students (Saleem et al., 2019; Quek et al., 2019), which could be interpreted as an outcome of emotional difficulties and the need for academic endurance throughout the study years. Effective emotion regulation is crucial for medical students, since it could be used as a protective, anxiety alleviating, feature.

The conceptualization of emotion regulation and anxiety constructs. Emotion regulation could be described as the ability to detect, understand and accept one's feelings, which in turn helps to regulate impulsive behavior (Bomysoad and DeMatteo, 2022). Ability to regulate one's emotions is one of the key socio-emotional skills (Young, Sandman, Craske, 2019). Generally, emotion regulation could be differentiated into strategies used every day. Emotion regulation strategies reflect a person's ability to change discomforting emotions into more acceptable ones, and regulate their duration or

intensity (Koole, 2009). Scientists, based on diverse theoretical models and empirical criteria, present different emotion regulation strategies. According to some researchers, despite different points of view, emotion regulation strategies like self-blame, rumination, and catastrophizing are often associated with negative emotions like anxiety, depression, stress or anger. Despite mentioned strategies, the absence of positive reappraisal could also be mentioned (Garnefski and Kraaij, 2006). In later research, Garnefski and Kraaij (2018) explain that cognitive emotion regulation is crucial not only to control or modify one's emotions or feelings, it also helps to prevent emotional influx when facing potentially dangerous or stressful situations. Authors also present two theoretical categories – adaptive emotion regulation strategies (e.g., positive reappraisal, positive refocusing, putting into perspective, acceptance and planning) and maladaptive or less adaptive emotion regulation strategies (e.g., self-blame, other-blame, catastrophizing and rumination) (Garnefski and Kraaij, 2006). Overall, emotion regulation strategies could be useful not only on a regular basis, but are often helpful when dealing with emotionally negative experiences associated with anxiety or other negative emotions or feelings.

Some of the most often experienced consequences of emotion dysregulation are anxiety (Gross, 2013; Kashdad and Farmer, 2014) and depression (Paulus et al., 2018; Young, Sandman, Craske, 2019). Anxiety and depression are often encountered when a person is unable to control his negative emotions, although depression also could be characterized by the absence of positive emotions. Anxiety can be described as a negative emotional state often complemented with physical symptoms, which could also be presented as physiological arousal. Usually, anxiety is felt when one finds himself/herself in a dangerous, threatening or undefined situation, hence the feeling of uncertainty (Albertson, Gadarian, 2015). Someone experiencing anxiety tries to comfort oneself by creating as safe environment as possible. It should be mentioned that experiencing anxiety is subjective, which means different people could experience different levels or intensity of anxiety in the exact same situation (Klemanski and Curtiss, 2016). Excessive or uncontrolled anxiety could worsen proper functioning, thus prolonged feeling could potentially escalate into a mental illness.

Previous studies have suggested that anxiety is closely related with the use of certain emotion regulation strategies (Mohammadkhani et al., 2016, Liu et al., 2021). Furthermore, research on emotion regulation has shown that strategies adequate to a given situation could help create a proper and healthy emotional reaction and/or experience. Not all strategies are equally effective; however they are crucial when overcoming anxiety (Klemanski and Curtiss, 2016).

The risk of anxiety and emotion regulation features in medical students. When it comes to the importance of medical students' mental health, a meta-analysis by Quek et al. (2019) should be mentioned. As stated by said authors, the prevalence of anxiety in medical students around the globe is much higher compared to the general population, to be exact, authors suggest that it affects 33.8% of medical students. As reported by the authors, such prevalence could be explained by the personality traits of a number of medical students. Personality traits like neuroticism or perfectionism are often found in medical students, but these traits are also often associated with the risk of anxiety. Anxiety often occurs when ambitious goals of students are impossible to accomplish. Other factors, like a tremendous amount of academic workload, prolonged sleep deprivation, financial difficulties, psychological violence or the effect of patients' death, could also play a role in experiencing higher levels of anxiety (Quek et al., 2019).

As mentioned earlier, an effective way of overcoming anxiety might be a proper use of emotion regulation strategies. Not only does emotion dysregulation increase the risk of anxiety, it also reinforces other factors harmful for one's mental health. Ardenghi et al.'s (2021) study has shown that dysfunctional emotion regulation could affect students' empathy and patient-centeredness. According to authors, study programs that include emotion recognition and teach how to properly use emotion regulation strategies, prepare students better for the upcoming emotional challenges in the clinical part of their career (Ardenghi et al., 2021). The Ewing et al. (2019) cohort study showed a mutual relationship between stressful situations, non-suicidal self-injury and emotion regulation. Authors' findings might suggest that stressful situations increase the risk of non-suicidal self-injury because of inability to regulate one's emotions (Ewing et al., 2019). Furthermore, authors, who studied the relationship between test anxiety and emotion regulation, have found that test anxiety is significantly associated with emotion

regulation and psychological resilience. It is worth mentioning that psychological resilience played a mediating role between test anxiety and emotion regulation (Liu et al., 2021). All things considered, proper emotion regulation is essential for medical students not only in case of anxiety but also when dealing with other related risks.

Aim of the study. The aim of this study is to assess the relationship between emotion regulation and anxiety in students of the Lithuanian University of Health Sciences, Medical Faculty.

Research hypotheses:

1. to examine emotion regulation features of medical students;
2. to detect anxiety features of medical students;
3. to investigate the relationship between emotion regulation strategies and anxiety.

METHODS

Participants and process of the study. The research was conducted in April, 2022, online, i.e., sharing the online survey via the Lithuanian University of Health Sciences email or the Medical students' groups of said University in social media. Chosen type of sampling – non-probability convenience sample. Medical students (year 1–6) of the Lithuanian University of Health Sciences participated in our online survey. Response rate was not evaluated because it is unknown how many students deliberately decided not to participate in the study. A total of 116 students participated in the survey. Main sociodemographic characteristics are presented in Figure 1.

As it is presented in Figure 1, participants regarding age or year of study are distributed equally, however, this does not apply to gender. According to the Department of Statistics in Lithuania in 2017 72.55% – 74.84% of students in the health science programs were female. Thus, the study partially resembles the distribution of gender in health sciences in Lithuania.

Figure 1. **Sociodemographic characteristics**

Gender, *%*	
Female	84.48
Male	15.52
Age, *N*	
19–21	57
21 and older	59
Year of study, *N*	
1	38
2–3	40
4–6	38
Total, N	**116**

Study instruments. The survey consists of 3 questionnaires – Cognitive Emotion Regulation Questionnaire – Short Form (CERQ-SF), Generalized Anxiety Scale (GAD-7) and sociodemographic questions (regarding age, gender and year of study).

Cognitive Emotion Regulation Questionnaire – Short Form (CERQ-SF) consists of 18 questions or 9 subscales reflecting emotion regulation strategies (self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing and other-blame). A more detailed review of mentioned strategies is shown in Figure 2. Subjects were assessed using a 5-point Likert scale (1 – (almost) never, 5 – (almost) always). The use of strategies was calculated summing up the points collected of every subscale; higher results suggest the higher chance of using a certain ER strategy. Participants could have collected 10–50 points in adaptive ER strategies subscale and 8–40 points in maladaptive ER strategies scale. Adaptive ER strategies subscale *Cronbach's* α = 0.78, maladaptive ER strategies subscale *Cronbach's* α = 0.77. Generalized Anxiety Scale (GAD-7) was chosen to assess subjective levels of anxiety using 4-point Likert scale (0 – "not at all", 3 – "nearly every day"), *Cronbach's* α = 0.91. Sum of points suggests subjective level of anxiety, higher result suggesting high anxiety level. Results could vary 0–21 points. The level of anxiety was put into 2 categories – high or low level of anxiety. Considering the distribution of points in the sample of study, 11 points were the splitting bar between high and low levels of anxiety, 11 points and higher indicating high level of anxiety.

Statistical analysis. The statistical analysis was conducted using IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp. To assess the differences between genders concerning emotion regulation use and anxiety levels, a non-parametric Mann Whitney U test for independent samples, was used. To assess the difference between age groups, Spearman correlation was used; the relationship between the use of emotion regulation strategies and anxiety was also calculated using Spearman correlation. since the distribution did not fulfill Gaussian distribution conditions. Differences in

Figure 2. **Adaptive and Maladaptive Emotion Regulation strategies according to Garnefski and Kraaij (2006)**

Adaptive ER strategies		Maladaptive ER strategies	
Positive refocusing	Thinking about positive experiences instead of thinking about the actual event	**Self-blame**	Thoughts of putting the blame of what you have experienced on yourself
Positive reappraisal	Thoughts of giving the event a positive meaning in terms of personal growth	**Other-blame**	Thoughts of putting the blame of what you have experienced on the environment or another person
Planning	Thinking about what steps to take and how to handle the negative event	**Rumination**	Thinking about the feelings and thoughts associated with the negative event
Acceptance	Thoughts of resigning yourself to what has happened	**Catastrophizing**	Thoughts of explicitly emphasizing the terror of what you have experienced
Putting into perspective	Downgrading the importance of the event		

Figure 3. **Criteria used for statistical analysis**

Differences between	Genders	*Mann Whitney U test for Independent Samples*
	Years of Study	*Analysis of Variance (ANOVA)*
	Age	*Spearman correlation*
Correlation between Emotion Regulation Strategies and Anxiety		*Spearman correlation*

year of study groups were calculated using Analysis of Variance (ANOVA) since the distribution did fulfill Gaussian distribution conditions.

Ethical permission. Ethical permission to conduct the study was given by the Lithuanian University of Health Sciences Bioethical center, #BEC-SP(B)-95.

RESULTS

Emotion Regulation

Overall, medical students are more likely to use adaptive emotion regulation strategies (M = 35.86, SD = 5.49) compared to maladaptive strategies (M = 24.88, SD = 4.88), $p < 0{,}001$. Furthermore, findings suggest that students are most likely to use positive reappraisal (M = 8.02, SD = 1.52) as an adaptive ER strategy and self-blame (M = 3.98, SD = 1.75), when it comes to the use of maladaptive ER strategies. A more detailed review of ER strategies used in medical students is shown in Figure 4 and Figure 5.

Our findings also suggest that students tend to use similar emotion regulation strategies despite their gender, in other words, the results between male and female groups, concerning the use of adaptive emotion regulation strategies (acceptance, positive refocusing, planning, positive reappraisal, putting into perspective) did not differ significantly (p = 0.53). Median result in the male group was found to be Mdn = 35 (30–40), whereas in female – Mdn = 36 (32–40).

Furthermore, similar outcome was captured while analyzing maladaptive strategy use between mentioned groups, i.e., the results between male and female groups, concerning the use of maladaptive emotion regulation strategies (self-blame, catastrophizing, rumination and other-blame) did not differ significantly (p = 0.092) (Mdn_{male} = 21, Q_1-Q_3 =16-24, Mdn_{female} = 25, Q_1-Q_3 = 22-29) (Figure 6).

While comparing age groups (19–21 years old and 21≥) and their use of adaptive (p = 0.492) and maladaptive (p = 0.648) emotion regulation

Figure 4. **Means and Standard Deviations of Adaptive and Maladaptive Emotion Regulation Strategies**

Characteristic	*M, (SD)*	*P*
Adaptive ER strategies	**35.86 (5.49)**	
1. Positive reappraisal	*8.02 (1.52)*	
2. Planning	*7.92 (1.60)*	
3. Acceptance	*7.52 (1.88)*	
4. Putting into perspective	*6.49 (1.68)*	
5. Positive refocusing	*5.91 (1.94)*	$p < 0{,}001$
Maladaptive ER strategies	**24.88 (4.88)**	
1. Self-blame	*7.88 (1.53)*	
2. Rumination	*7.30 (2.05)*	
3. Catastrophizing	*5.72 (2.07)*	
4. Other-blame	*3.98 (1.75)*	

Figure 5. **Comparison of adaptive and maladaptive emotion regulation strategies**

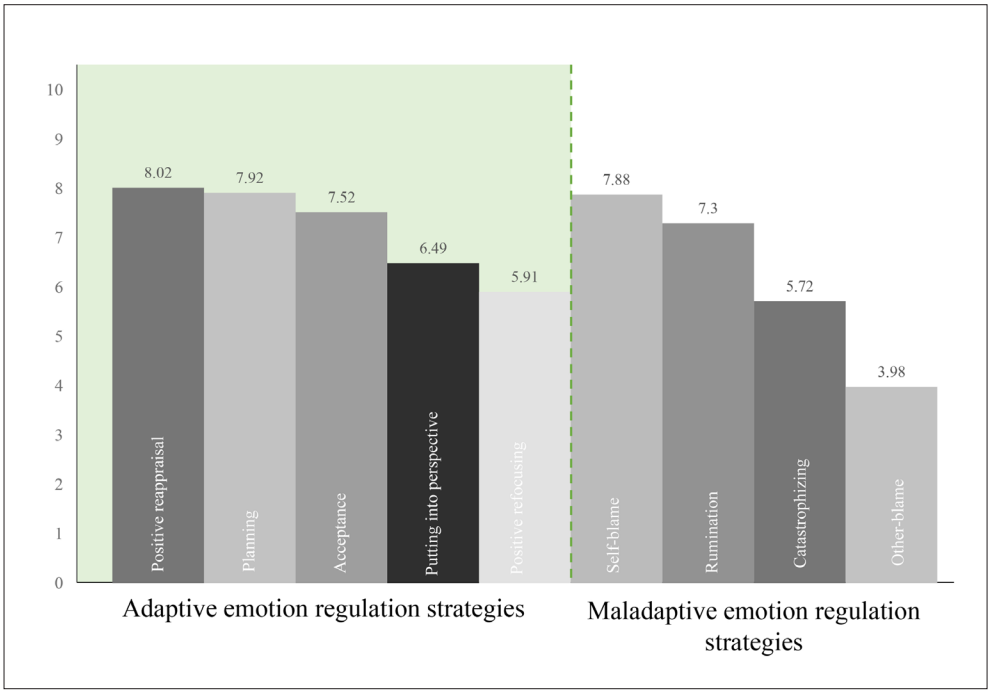

Figure 6. **Adaptive and Maladaptive Emotion Regulation Strategies Use Between Genders**

		Adaptive ER strategies		Maladaptive ER strategies		*p*
		Mdn	Q_1-Q_3	*Mdn*	Q_1-Q_3	
Gender	*Female*	36	32–40	25	22–29	0.532
	Male	35	30–40	21	16–24	0.092

Figure 7. **Adaptive and Maladaptive Emotion Regulation Strategies Use Between Years of Study**

		Adaptive ER strategies		Maladaptive ER strategies	
		M	*SD*	*M*	*SD*
Year of study	*1*	36.84	4.72	24.39	4.73
	2–3	35.05	6.10	25.20	5.25
	4–6	35.74	5.53	25.03	4.70
P		0.492		0.648	

strategies no statistically significant differences were found. These findings might imply that age is not a significant feature when it comes to explaining the use of emotion regulation strategies.

Similarly, comparing the results between years of study, no statistically significant differences in terms of the use of adaptive emotion regulation strategies, $p = 0.352$, were found. In other words, findings suggest, that first year students ($M = 36.84$, $SD = 4.72$), 2–3 year students ($M = 35.05$, $SD = 6.10$), as well as 4–6 year students ($M = 35.74$, $SD = 5.53$) use similar adaptive emotion regulation strategies. Findings concerning maladaptive emotion regulation use in different years of study, also have shown no statistical significance ($p = 0.751$), i.e., 1st year students ($M = 24.39$, $SD = 4.73$), 2–3 year students ($M = 25.20$, $SD = 5.25$), as well as 4–6 year students ($M = 25.03$, $SD = 4.7$) use similar adaptive emotion regulation strategies (Figure 7).

Anxiety characteristics

In regard to anxiety characteristics in the sample of study, it is worth mentioning that the mean result of anxiety was $M = 11.16$ ($SD = 5.65$). Considering the distribution of points in the sample, 11 points were the splitting bar between high and low level of anxiety, 11 points and higher indicating high level of anxiety.

Our findings suggest that female students experience higher levels of anxiety compared with their male counterparts. However, it should be taken into consideration that no statistically significant difference between genders was found ($Mdn_{male} = 15.5$ (11.75–21); $Mdn_{female} = 19$ (13.75–22.25); $p = 0.089$) (Figure 8).

Furthermore, statistically significant differences between age groups (19–21 years old and 21≥) also were not found.

Findings, regarding differences between years of study, suggest that year 1 students experience low levels of anxiety ($M = 10.74$, $SD = 5.71$). However, this does not apply to 2–3 year ($M = 11.06$, $SD = 5.90$) and 4–6 year ($M = 11.68$, $SD = 5.44$) students. In addition, it is worth mentioning that no significant differences were found while comparing mentioned groups, $p = 0.515$ (Figure 9).

Figure 8. **Comparison of Anxiety Levels Between Gender**

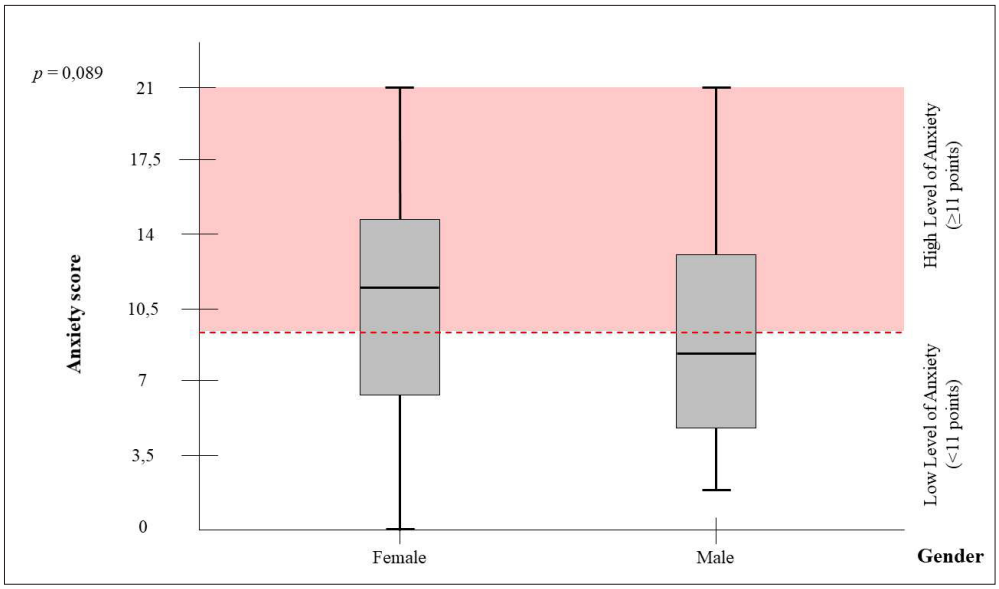

Figure 9. **Comparison of Anxiety Levels between Years of Study**

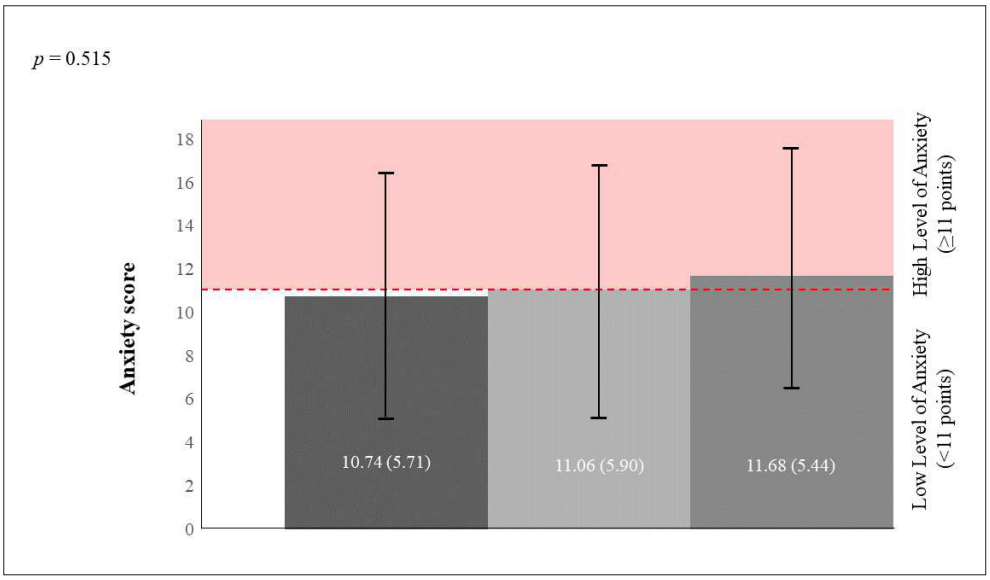

Figure 10. **Correlation Between Adaptive, Maladaptive Emotion Regulation Strategies and Anxiety**

		Anxiety	Adaptive ER strategies	Maladaptive ER strategies
Anxiety	*r*	1.000	**-0.228**	**0.442**
	p		0.014	$p < 0.001$
Adaptive ER strategies	*r*	**-0.228**	1.000	-0.086
	p	0.014		0.36
Maladaptive ER strategies	*r*	**0.442**	-0.086	1.000
	p	$p < 0.001$	0.36	

Relationship Between Emotion Regulation and Anxiety

To assess the relationship between the use of emotion regulation strategies and anxiety, Spearman correlation was used because, as mentioned earlier, the distribution of samples did not fulfill Gaussian distribution conditions. Findings suggest weak negative correlation between adaptive ER strategies and anxiety, r = -0.228, $p = 0.014$; moderate positive correlation between maladaptive ER strategies and anxiety was also found, r = 0.444, $p < 0.01$ (Figure 10). These findings might imply that a relationship between emotion regulation strategies and anxiety does exist. In other words, our findings suggest that the more students are likely to use adaptive emotion regulation strategies, the more likely they will experience lower levels of anxiety, and *vice versa*, the more they are likely to use maladaptive emotion regulation strategies, the more likely they might face higher levels of anxiety.

DISCUSSION

Emotion regulation. When it comes to comparing the results with previous studies regarding the use of emotion regulation strategies among different genders, few differences occur. For example, according to Saleem and colleagues (2019), female students are more likely to use expressive inhibition (a maladaptive emotion regulation strategy) compared with their male counterparts. Similarly, another study, conducted in 2016 by Esmaeilinasab et al., also found that differences do occur when comparing genders and their use of emotion regulation strategies: women are more likely to use rumination (a maladaptive emotion regulation strategy), whereas men tend to use adaptive emotion regulation strategies (e.g., positive reappraisal or positive refocusing). However, current findings do not match the tendency described in previous studies, since no significant differences were found when comparing the use of emotion regulation strategies among genders.

As mentioned earlier, no statistically significant differences were found when comparing year of study or age. Unfortunately, previous studies, comparing mentioned groups and their use of emotion regulation strategies, were also not found.

It is quite difficult to discern why no differences among genders in the current study were found. On the other hand, over the last few decades there has been a decrease of a difference between gender roles, thereby, psychosocial factors might play a role in describing mentioned cultural change. It is worth noting an earlier presented tendency of specific personality traits among medical students (Quek et al., 2019), i.e., one might take a guess that when it comes to social differences personality traits may have more impact on use of emotion regulation strategies rather than gender.

Anxiety. The current study partially reflects previous research regarding anxiety differences among genders. According to Saleem et al. (2019), female students tend to deal with anxiety more when compared with male students. A coherent difference was found in the present study; unfortunately, differences were not statistically significant. Furthermore, earlier-mentioned authors also acknowledge differences among different age groups. As stated in the Saleem et al. (2019) study, older students (21–25 years old) tend to experience anxiety more. However, the present study does not correspond with the Saleem et al. (2019) findings, since no significant differences were found. Moreover, a study, comparing anxiety characteristics among different years of study by Inam et al. (2003), was found. According to authors, levels of anxiety, among medical students, decrease over the year, except year 6 (Inam et al., 2003). Unlike the mentioned study, present findings do not suggest such decrease. Although no statistical differences were found, current findings show that all medical students except year 1 deal with high level of anxiety.

One of the possible explanations behind no statistically significant differences found in age or year of study groups might be the earlier-mentioned lack of opportunities to learn about and practice emotional hygiene. According to Runyan (2017), although medical students receive professional and diverse training concerning their practical skills and theoretical knowledge, there is still much to do when it comes to mental health. Therefore, as mentioned earlier, one of possible reasons why anxiety levels or the use of emotion regulation strategies do not significantly change throughout the years might be lack of skills practicing proper emotional hygiene due to lack of knowledge or dialogue within the medical community (Medisauskaite and Kamau, 2019).

Relationship between Emotion Regulation and Anxiety. As mentioned earlier, present findings show weak negative correlation between adaptive ER strategies and anxiety, together with moderate positive correlation between maladaptive ER strategies and anxiety. That being said, the present study partially reflects the results of previous meta-analysis conducted by Schäfer et al. (2017). Findings in previous research have shown weak and moderate negative correlation between the use of adaptive emotion regulation strategies and anxiety symptoms (Schäfer et al., 2017). According to the mentioned authors, their findings suggest a weak negative relationship when cognitive reappraisal (adaptive ER strategy) is in use and moderate negative correlation between acceptance (adaptive ER strategy) and anxiety symptoms. Data considering maladaptive emotion regulation strategies, suggests weak correlation between anxiety symptoms and inhibition but a moderate correlation between rumination and said symptoms (Schäfer et al., 2017). Current findings also partly reflect the previous study conducted by Harley et al. (2019). According to those authors, a moderate relationship between anxiety and emotion inhibition (maladaptive ER strategy) exists. Furthermore, it is worth mentioning a literature review (Sloan et al., 2017) and meta-analysis (Picó-Pérez et al., 2017) on said relationship. Picó-Pérez et al. (2017) also complement current data with neuropsychology research. According to authors, people who tend to experience anxiety or mood swings experience a development of dysfunctional brain signals, which in turn interfere with the activation of cognitive reappraisal (adaptive ER strategy) (Picó-Pérez et al., 2017).

Limitations of the study. Some limitations should also be discussed. First of all, the sample represents students of a single university; also, international students were not included because of sociocultural differences that might compromise the quality of the study. It should also be mentioned that the sample is relatively small in order to adequately represent the medical students' population in Lithuania. Furthermore, regrouping of age and year of study groups was required since the distribution was not appropriate.

The prospects for further research. It is recommended to continue research concerning the anxiety and emotion regulation features of medical students,. However, it is recommended that future studies should include a wider spectrum of universities, and international students should be included in the study. A more detailed study is required, since there is still a lack of data concerning practical implications that would help medical students learn how to use more appropriate emotion regulation strategies and, in turn, lower their anxiety levels.

Overall, comparing current findings with previous research, it is worth mentioning significant differences presented in the use of emotion regulation strategies among genders. Furthermore, previous studies have shown significant differences in anxiety among genders, different age groups or years of study. The current study, however, does not present statistically significant differences as found in earlier research.

CONCLUSION

Findings concerning emotion regulation features show that medical students are similarly likely to use adaptive and maladaptive emotion regulation strategies, whilst their anxiety levels are not significant. Results concerning emotion regulation show no statistical significance in age, gender or year of study. Findings also suggest that medical students experience similar anxiety levels whatever their age, gender or year of study. In addition, our results show weak negative correlation between adaptive ER strategies and anxiety. Moderate positive correlation between maladaptive ER strategies and anxiety was also found.

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Received on September 30, 2022
Accepted on October 13, 2022