BIOFEEDBACK-ASSISTED RELAXATION AND PROGRESSIVE MUSCLE RELAXATION POTENTIAL FOR ENHANCING STUDENTS' DISTRESS TOLERANCE

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Abstract

This study is aimed at assessing biofeedback-assisted relaxation and progressive muscle relaxation potential for enhancing distress tolerance in students' population. 125 female undergraduate students aged between 18 and 27 participated in the study. Distress Tolerance Scale was used to evaluate distress tolerance. Participants of a study were randomly assigned into 3 different groups: 1) weekly biofeedback-assisted relaxation (n=40), 2) weekly progressive muscle relaxation training (n=43), and 3) comparison group without relaxation (n=42). The results of the study showed that biofeedback-assisted relaxation and progressive muscle relaxation were effective in enhancing students' distress tolerance. Progressive muscle relaxation helped to enhance distress tolerance for those students whose initial distress tolerance was low. Biofeedback-assisted relaxation helped to enhance distress tolerance in students with higher level of perceived stress.

Keywords: Biofeedback-assisted relaxation, progressive muscle relaxation, distress tolerance, perceived stress, students, Lithuania

Introduction

Students is a social group that, despite general sources of stress, face some specific challenges such as adaptation to a new place of residence, new social network, new duties, responsibilities and a load of academic requirements. Various studies show that 75-80 percent of students experience moderate stress, 10-50 percent – higher than average and 9-12 percent -

tremendous stress (Abouserie 1994, Hudd et al, 2000, Pierceall, Keim, 2007; Sohail, 2013; American College Health Association, 2013).

While moderate stress level is quite common in students' life, higher than average or high stress might be related with increased anxiety and depressive symptoms (Dyson, Renk, 2006), worse sleep quality, fatigue (Tanaka et al, 2009; Verlander, Benedict, 1999), unhealthy eating habits, low self-esteem, suicidal thoughts (Hudd et al., 2000; Compton, Carerra, Frank, 2008; Busari, 2012), substance abuse (Tavolaci et al, 2013), poorer academic performance (Sohail, 2013; Richlin-Klonsky, Hoe, 2003) or even drop out (American College Health Association, 2013).

Distress tolerance plays an important role in ones' vulnerability to stress and ability to avoid negative stress consequences. Distress tolerance is defined as perceived "capacity to experience and withstand negative psychological states" (Simons, Gaher, 2005, p.83). Individuals having low distress tolerance report inability to cope with being distressed or upset. They do not accept distress as a part of their life and perceive their coping abilities as inferior comparing to others. Moreover, individuals with low distress tolerance try to avoid negative emotions and whenever starting to feel distressed they use rapid means to allay negative emotions they are experiencing. They report on being concentrated on the feeling of being distressed and their functioning is disrupted by the experience of negative emotions (Simons, Gaher, 2005).

Individuals who have lower distress tolerance also have more difficulties to adapt to new changes and challenges that they face. In stressful situations such people tend to react with impulsive behavior which leads to abuse of psychotropic substances, overeating, physical violence, avoidance of situations such as class attendance and taking exams.

Studies show that low distress tolerance is related with depression (Ellis et al, 2010), anxiety (Keough et al, 2010) and impulsive behavior (Anestis et al, 2012). Low distress tolerance also have an impact of development, etiology and maintenance of eating disorders (Anestis et al, 2007; Corstorphine et al, 2007; Anestis at al, 2012), smoking (Nock et al, 2008), relapse following smoking cessation (Brown et al, 2002) and non-suicidal self-injury (Nock et al. 2008).

There are studies showing that low distress tolerance is a key risk factor for substance abuse among students (Simon, Gather, 2005; Buckner, Keough, Schmidt, 2007; Zvolensky et al., 2009; Dennhardt, Murphy, 2011; Kaiser et al., 2012).

University or College students represent a population at risk for the development of substance-related problems (Wechsler, Lee, Kuo, & Lee, 2000). Moreover, according to L. Sapranavičiūtė, A. Perminas and E.

Kavaliauskaitė (2011), psychotropic substance abuse is one of the strategies that students use to cope with stress.

V. Dobrovolskij and R. Stukas (2013) state, that 92.4 percent of students of Lithuanian higher education institutions consumed alcohol and 52.7 percent smoked tobacco in the last 12 months. 84.9 percent of students consumed alcohol and 40.2 percent smoked tobacco in last 30 days. 31 percent of students admitted using other illegal drugs at some point in their lives. According to L. Narkauskaitė and colleagues (2011), one of the main reasons for using substances which affect psyche is willingness to relax (39.2 percent).

According to B. E. Pozos-Radillo (2014) the implementation of stress reduction programs oriented towards prevention of stress and its negative effects is recommended in order to foster the capacity of students to withstand stressful situations and to lower negative stress-related outcomes.

Taking into account the cost-effectiveness, better and easier availability of services in primary care, the use of short-term interventions are encouraged (preferred). One of the possible interventions for stress reduction might be relaxation, such as biofeedback-assisted relaxation and progressive muscle relaxation.

Biofeedback is an evidence-based mind-body technique where individuals learn to consciously control their physiology (Frank, 2010; Shafer, Moss, 2006). Biofeedback makes people aware of and understand how their thoughts, feelings and behaviour are related to their physiology and due to the increased awareness they gain conscious control over it. Biofeedback is taught by a trained biofeedback practitioner (therapist) who uses specialized equipment which converts physiological signals, such as heart and breathing rate, heart rate variability, galvanic skin response, skin temperature or muscle tension into meaningful visual and/or auditory cues which are directly shown to a client on a computer monitor. After using biofeedback equipment for some time, a person learns to self-regulate without any feedback (Frank, 2010).

Biofeedback-assisted relaxation is a process in which patients are taught relaxation skills while allowing them to visualize their physiology. Biofeedback practitioner (therapist) can use any relaxation technique, which induces physiological and emotional relaxation response and can use any modality of physiology as feedback (Shafer, Moss, 2006). The goal of biofeedback-assisted relaxation is to develop self-awareness of a person‘s physiology being tense and relaxed, and learn a conscious control over their own physiology, so that in emotionally challenging situations he or she would be able to lower one’s tension and replace it with relaxation response without any feedback (Peper, Harvey, Takabayashi, 2009, Peira, Pourtois, Fredrikson, 2013).

The study by N. Peira, G. Pourtois and M. Fredrikson (2013) showed that biofeedback training could be used as an emotion regulation strategy. After heart rate biofeedback training, subjects learned to decrease heart rate reactivity when exposed to pictures inducing negative emotions without biofeedback. A. Khanna, M. Paul and J. S. Sandhu (2007) reported that skin conductance biofeedback training lowered high heart rate in female students having high stress level. P. Ratanasiripong, N. Ratanasiripong and D. Kathalae (2012) demonstrated that biofeedback training helped to reduce anxiety in nursing students. C. A. Prato and C. B. Yucha (2013) found that biofeedback-assisted relaxation training was effective in changing physiology either using diaphragmatic breathing or progressive muscle relaxation (respiratory rate or peripheral skin temperature) or autogenic training (heart rate, respiratory rate and peripheral skin temperature). Moreover, D. Hurley (1979) showed that biofeedback was effective for increasing ego strength.

Progressive muscle relaxation is a tool for helping ones' minds and body to relax. Progressive muscle relaxation is a technique where a person learns to monitor and control muscle tension. During relaxation, a person systematically tenses particular muscle groups in his/her body and then releases the tension and notices the feeling of the relaxed muscles. The method of progressive muscle relaxation was developed by E. Jacobson in 1938 and later was modified by J. Wolpe in 1958.

M. Matsumoto and J. Smith (2001) found that progressive muscle relaxation was effective for lowering students' cognitive and physiological stress symptoms. Progressive muscle relaxation lowered students' anxiety in Z. M. Rasid and T.S. Parish (1998), academic stress in P.P. Nair and K.P. Meera (2014), and social anxiety in F. E. Joy, T. T. Jose and A. K. Nayak (2014) studies. L.A. Pavlov and G.E. Jones (2005) states, that progressive muscle relaxation strengthens nervous and immune systems. Therefore, it may also enhance distress tolerance.

Thus, there is much evidence that biofeedback-assisted relaxation and progressive muscle relaxation is effective for lowering psychophysiological and introspection-based aspects of stress. These indicators are good measures of the effectiveness of psychological interventions. Still they basically show the change in momentary state and physiological variables during intervention, while distress tolerance is a personality characteristic which is used as a criterion of effectiveness of relaxation interventions and could demonstrate more stable changes in persons' self-regulation skills. Unfortunately, there is lack of studies assesing the effectiveness of relaxation intervention methods for enhancing distress tolerance.

Both biofeedback-assisted relaxation and progressive muscle relaxation teach self-regulation and awareness of mind-and-body-related reactions. When a person sees that he/she is able to relax and can successfully control his/her tension, it might enhance his/her distress tolerance.

This study aimed at assessing the potential of biofeedback-assisted relaxation and progressive muscle relaxation in enhancing students' distress tolerance.

Method

Participants

567 students were selected from 2560 1st-4th-year undergraduate students of Vytautas Magnus University on the basis of their scores on the Inventory of College Students' Recent Life Experiences (ICSRLE) (Kohn, Lafreniere, Gurevich, 1990). 177 students agreed to participate in a study. However, 34 of study participants dropped out and they were excluded from data analysis.

A total of 143 students (125 females and 18 males) aged 18 through 27 (mean age 20.83; SD=1.728) participated in a study. Various studies (Cohen, Williamson, 1988; Dunkel-Schetter, Lobel, 1990; Abouserie 1994; Hudd et al, 2000; Pierceall, Keim, 2007; Cohen, Janicki-Deverts, 2012) show that women report experiencing significantly higher levels of stress than men. Gender differences are also shown in distress tolerance. Men report more distress tolerance than women and this difference remains "significant after partialling out negative affectivity, suggesting that this difference is not related to characteristic differences in reported negative affect" (Simons, Gaher, 2005, p. 97). Because of small amount of males in a study and gender differences in distress tolerance and reported stress level, we excluded male participants from later data analysis.

Participants of the study were randomly assigned into 3 different groups: 40 students participated in biofeedback-assisted relaxation, 43 in progressive muscle relaxation training and 42 students formed a comparison group (no relaxation).

All participants were healthy, with no history of complicated medical conditions, free of cardio-active medicines, sedatives and antidepressants. There were no significant differences in any relevant background variables (such as depressive symptoms, level of subjectively perceived stress, number of exams per week or day in a study period) among students in different groups of the study.

Measures

Distress Tolerance Scale (DTS) (Simons, Gaher, 2005) was used to measure students' distress tolerance. DTS is a self-report 15-item measure assessing individuals' ability to experience and tolerate negative psychological states. Individuals are asked to rate their agreement in 5-point Likert-type scale, from 1 - „strongly agree" to 5 - „strongly disagree". The scale consists of four subscales (distress tolerance facets): tolerance, appraisal, absorption and regulation. Individuals having low tolerance of distress are expected to report distress as unbearable. The example of items in tolerance subscale is: "Feeling upset is unbearable to me" (tolerance subscale). Individual appraisal is expected to reflect lack of acceptance of distress and thinking of lacking abilities to cope with it (e.g. "Being distressed or upset is always a major ordeal for me") (appraisal subscale). It is expected that absorption of negative emotions takes all attention of individuals' having low distress tolerance (e.g. "My feelings of distress are so intense that they completely take over" (absorption subscale). Emotional regulation of individuals having low distress tolerance is expected to be defined by efforts to avoid distress or alleviate negative emotions immediately by using rapid means (e.g. "When I feel distressed or upset, I must do something about it immediately" (regulation subscale). Subscale scores are means of the items. The overall DTS score is calculated by computing the mean of the four subscales. J.F. Simons and R. M. Gaher (2005) report good internal consistency, test-retest reliability over 6 months period, as well as good convergent and discriminant validity in nonclinical sample. The internal consistency in the present sample was good (Cronbach's $\alpha = 0.842$), and internal consistency for the subscales were sufficient, Cronbach's α ranging from 0.558 to 0.732.

Inventory of College Students' Recent Life Experiences (ICSRLE) (Kohn, Lafreniere, Gurevich, 1990). The scale consists of 49 items measuring stressful experiences specific to college students. The items of the scale include such topics as developmental challenge, time pressure, academic alienation, romantic problems, assorted annoyances, general social mistreatment and friendship problems. Students rate their experiences related to stressful events in the last month using 4-point scale, where 1 – "Not at all part of your life over the past month" and 4 – "Very much part of your life over the past month". Various studies show high internal consistency of a scale. The internal consistency level in the present sample was high (Cronbach's $\alpha = 0.94$). This scale was used to include students in the study. The ones who scored one standard deviation above the mean were invited to participate in a study.

Perceived Stress Scale (PSS-10) (Cohen, Kamarck, Mermelstein 1983). PSS is a self-report 10-item measure assessing individuals'

subjectively perceived stress. Using this scale originally individuals are asked how often they felt or thought in a particular way during the last month. In our research we asked how study participants felt or thought in the last week (e.g. "In the last week, how often have you been upset because of something that happened unexpectedly?"). Responses varied from 0 – "never" to 4 – "very often". S. Cohen, T. Kamarck and R. Mermelstein (1983), S. Cohen, G. Williamson (1988) and S. Cohen, D.Janicki-Deverts (2012) report good internal consistency. The internal consistency in present sample was good (Cronbach's $\alpha = 0.880$).

Biofeedback device NeXus–10 (Mind Media) was used for performing biofeedback-assisted relaxation. NeXus-10 technology meets the requirements of European Community Council Directive 93/42/EEC for medical devices.

Biofeedback–assisted relaxation (BAR) was performed using skin surface conductance modality. Biofeedback sensors were placed on students' non-dominant hand fingers. The psychologist explained what each sensor would be measuring, assuring the student that sensors do not cause any pain but simply record psychophysiological signals from the body and display those signals on the computer monitor.

Before the first relaxation session while using some techniques, such as fast and calm breathing, muscle tension exercises, negative, stressful and calm and positive thoughts, it was shown to a student how her physiology changed during tension and relaxation phases. Also a student was taught some techniques how she can relax her body. Then followed a 5-minute introduction using some elements of passive muscle relaxation, autogenic training and visualization, and later she tried to relax while watching the direct feedback of skin-conductance changes during relaxation. She was taught to be aware of her thoughts and changes of physiology and use self-regulation to reach relaxation state.

During relaxation a student was sitting in front of a computer monitor and watching the puzzle pieces moving to form a picture. When a student began to feel tension, the puzzled pieces stopped moving, and when a person relaxed, the puzzle pieces continued to move (see Figure 1).

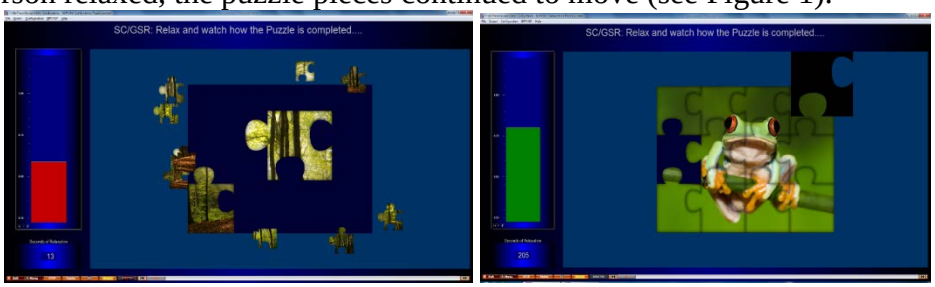

Figure1. An example of biofeedback-assisted relaxation screens (Nexus-10, MindMedia).

A shorter version of progressive muscle relaxation (PMR) was used in a study. It was modified in the Laboratory of Medical Psychology and Sociological Research, Institute of Cardiology, Kaunas Medical Institute (currently Lithuanian University of Health Science) (Goštautas, Daknys, 1982; Palujanskene, 1986; Gustainienė, 1995). This version includes all the key aspects of PMR. During relaxation a student was sitting in a comfortable chair and was taught to tense and relax 16 muscle groups of the body.

Procedure

Upon arrival to the laboratory, participants were greeted by the researcher, seated at a table in a comfortable chair and were asked to read and sign the informed consent form that described the procedures of the study and the rights of participants. The participants were informed that they can discontinue their participation at any time without having any physical, psychological or legal consequences, and that the data would be not analyzed separately and would be used only for generalized conclusions. Then the participants were asked to fill out the questionnaire including DTS and PSS. This part lasted approximately 15 min.

Relaxation training sessions started on the second meeting. Each weekly session lasted approximately 45 min. All relaxations were performed for each participant individually and were conducted by psychologists specially trained for the procedure in the Department of Theoretical Psychology, Vytautas Magnus University. Before each biofeedback-assisted or progressive muscle relaxation session the assessment of psychophysiological variables was performed and after relaxation each student was given feedback about her ability to relax and was encouraged by highlighting the positive changes.

After four relaxation training sessions, on the sixth (the last one) meeting with the psychologist, student filled in a packet of questionnaires, including DTS, once more. Students participating in a comparison group came for a second meeting approximately after a month and they filled the same packet of questionnaires as the participants from the relaxation groups. The whole study took place from April, 2013 till July, 2014.

The data of the study was analyzed using IBM Statistical Package for Social Sciences (SPSS 21). Shapiro-Wilk test showed that the data of DTS and its subscales had a normal distribution, so a paired-sample t-test was used to compare distress tolerance changes before and after relaxation trainings.

Results

The comparison of distress tolerance (DTS) its facets changes before (measurement 1) and after relaxation (measurement 2) training (on the 1st and the 6th meeting) is presented in Table 1.

Table 1. The comparison of distress tolerance changes before and after relaxation

Distress tolerance	Measure-ments	BAR Mean	t	PMR Mean	t	Control group Mean	t
DTS (general)	I	2.78	-0.860	2.71	-1.019	2.73	-0.738
	II	2.85		2.79		2.80	
Tolerance	I	2.82	-1.304	2.71	-1.237	2.85	-0.942
	II	2.97		2.88		2.97	
Appraisal	I	2.83	-1.927	2.88	-1.495	2.88	-2.92
	II	3.00		3.05		2.91	
Absorption	I	3.04	-0.539	2.73	-1.936	2.82	-0.437
	II	3.11		2.98		2.88	
Regulation	I	2.44	1.302	2.51	2.358*	2.39	-0.337
	II	2.32		2.25		2.43	

* $p<0.05$

The results (table 1) showed lower regulation scores after relaxation training in PMR group ($p<0.05$). This means that students which attended PMR try to avoid negative emotions and utilize rapid means to ease the negative emotions they are experiencing more often.

Further analysis included the changes in DTS and its components of the students' having lower and higher initial distress tolerance scores (table 2). Individuals who scored above the mean (M=2.74, SD=0.701) at the first meeting in DTS scale were assigned as having higher distress tolerance. The rest, who scored below or equal to the mean were assigned as having lower distress tolerance. The same procedure has been used with distress tolerance components – tolerance, appraisal, absorption and regulation.

Table 2. The comparison of distress tolerance before and after relaxation trainings in individuals with lower and higher distress tolerance

Distress tolerance	Level of distress tolerance	Measurements	BAR Mean	t	PMR Mean	t	Control group Mean	t
DTS (general)	Lower	I	2.20	-1.421	2.06	-2.858*	2.24	-1,819
		II	2.33		2.38		2.45	
	Higher	I	3.37	0.072	3.27	1.242	3.39	1.129
		II	3.36		3.15		3.26	
Tolerance	Lower	I	2.05	-2.881*	1.92	-4.640**	2.14	-1.693
		II	2.45		2.62		2.46	
	Higher	I	3.76	1.027	3.54	2.313*	3.56	0.488
		II	3.59		3.16		3.48	
Appraisal	Lower	I	2.33	-1.800	2.34	-3.278*	2.26	-2.072
		II	2.57		2.82		2.55	

Absorption	Higher	I	3.50	-0.723	3.56	1.824	3.58	1.980
		II	3.57		3.33		3.30	
	Lower	I	1.89	-1.992	1.95	-2.798*	1.92	-2.034
		II	2.18		2.40		2.33	
Regulation	Higher	I	3.73	0.383	3.81	0.088	3.64	1.906
		II	3.67		3.80		3.29	
	Lower	I	1.83	-0.679	1.88	-0.265	1.74	-1.486
		II	1.90		1.91		1.97	
	Higher	I	3.27	2.537*	3.01	3.191*	3.18	1.150
		II	2.88		2.51		2.98	

* $p<0.05$; **$p<0.001$

It can be seen from table 2 that in PMR group distress tolerance after relaxations increased in individuals with lower initial DTS ($p<0.05$). Tolerance increased and regulation decreased in students who had reported having less tolerance before relaxation in both PMR and BAR groups ($p<0.05$). This means they began to feel that they could handle being upset or distressed more often, but they also more often began avoiding stressful situations by using rapid means to ease the tension and negative emotions. However, tolerance decreased after PMR trainings in individuals who had higher tolerance before the study ($p<0.05$), i.e. they began feeling more insecure in stressful situations and had more doubts whether they could handle their distress. Students who had lower appraisal and absorption reported the increase of these distress tolerance components after PMR training ($p<0.05$) - students began to accept distress more often and trust their abilities to cope with distress more. Besides, they did not feel as much absorbed by negative emotions as before.

Students were selected to the study on the basis of their scores on the Inventory of College Students' Recent Life Experiences (ICSRLE) (Kohn, Lafreniere, Gurevich, 1990), which measure current stressful events in student's life. However individuals differ on how they perceive these stresogenic events (Lazarus, Folkman, 1984). Perceived stress indirectly shows how much stress person felt during stressful events. It is assumed that individuals having higher perceived stress have poorer coping skills, thus interventions related to stress management could be the most helpful for them.

Therefore, prior to the analysis students were distributed into two groups depending on mean PSS scores (M=20.11; SD=6.450): 1) higher perceived stress (scored above the mean) and 2) lower perceived stress (below or equal to the mean) (table 3).

Table 3. The comparison of distress tolerance before and after relaxation trainings in individuals with lower and higher perceived stress

Distress tolerance	Level of perceived stress	Measur-ements	BAR		PMR		Control group	
			Mean	t	Mean	t	Mean	t
DTS (general)	Lower	I	3.14	0.953	2.98	0.580	2.98	-0.691
		II	3.03		2.93		3.06	
	Higher	I	2.46	-2.559*	2.49	-1.501	2.41	-0.235
		II	2.68		2.68		2.44	
Tolerance	Lower	I	3.26	0.186	3.05	-0.181	3.14	-0.518
		II	3.23		3.09		3.23	
	Higher	I	2.41	-2.422*	2.44	-1.430	2.46	-0.631
		II	2.73		2.72		2.59	
Appraisal	Lower	I	3.01	-0.283	3.22	0.991	3.19	0.588
		II	3.04		3.09		3.09	
	Higher	I	2.67	-2.434*	2.61	-2.587*	2.45	-1.210
		II	2.95		3.01		2.63	
Absorption	Lower	I	3.70	1.333	3.12	-0.954	3.25	-0.496
		II	3.47		3.26		3.35	
	Higher	I	2.44	-2.092*	2.42	-1.677	2.30	0.000
		II	2.78		2.76		2.30	
Regulation	Lower	I	2.60	1.271	2.53	2.111*	2.33	-1.479
		II	2.39		2.28		2.58	
	Higher	I	2.30	0.449	2.50	1.541	2.43	1.192
		II	2.25		2.22		2.24	

* $p<0.05$

The results showed that for students who reported higher perceived stress, BAR was effective in enhancing distress tolerance in general, tolerance, appraisal and absorption ($p<0.05$). One can assume that students who had higher perceived stress, after BAR training were more able to experience and withstand negative psychological states, could tolerate and accept them more easily and their attention was not absorbed by negative emotions. After PMR more positive changes in appraisal can be seen in individuals with higher initial perceived stress ($p<0.05$). On the other hand, students who reported higher perceived stress before relaxations, had lower regulation scores after PMR ($p<0.05$). This means, that these students began to accept distress more and did not see their coping abilities as inferior comparing to others, but they also began avoiding stressful situations more often or began using rapid means (such as drinking alcohol, overeating, etc.) to allay negative emotions they are experiencing.

Discussion

The results of the study showed that after four relaxation sessions all students who attended PMR had lower regulation scores than before the

study. It means that students began to avoid stressful situations as a source of negative emotions and they began to use rapid means to allay from those emotions. We expected that PMR would be helpful in creating a coping skill to students and instead of trying to avoid negative emotions they would try to cope with them. On the other hand, we do not know what rapid means they use to escape the situation or allay negative emotions. This finding might mean that when facing stress and feeling lots of negative emotions students began to use PMR and that rapid mean might be a relaxation technique they have learnt. Nevertheless, it is only a hypothesis and it requires more research. Contrarily, having lower regulation scores might mean that students still do not trust themselves and think that they could not relax using PMR without the help of a psychologist and need more than four relaxation sessions to gain the skill.

The results of the study showed that PMR is an effective method for students with low distress tolerance in raising distress tolerance level and abilities to tolerate negative emotions and be less absorbed by negative emotions they are experiencing. PMR is a technique which helps to lower anxiety by performing muscle tension and relaxation exercises (Jacobson, 1938). So, having a concrete tool students learned to tolerate negative emotions and be less absorbed by them.

BAR was also effective in enhancing tolerance of negative emotions in students having low distress tolerance. BAR is based on awareness of ones' psychophysiology and voluntarily control of physiological reactions (Frank, 2010; Shafer, Moss, 2006). Students were taught to be aware of the present moment and be aware of current thoughts and physiological reactions. During relaxation they also might have felt negative emotions and were present in the moment, haven't escaped them, so their capability to be present with negative emotions and tolerate them could increase.

However, both relaxation techniques lowered regulation scores in DTS in students. They reported higher distress regulation skills before relaxation training than after it. As it was mentioned before, students might began to use relaxation techniques as a rapid means to alleviate negative emotions or they do not trust themselves that they could relax without a psychologist and biofeedback devise (in BAR group). These hypotheses require more research in one of distress tolerance facets – regulation.

BAR was found to be effective for ones who reported higher perceived stress. It helped to enhance distress tolerance in general and three of its components (tolerance, appraisal and absorption). As mentioned before, BAR is based on awareness of mind and body reactions and conscious control of physiology. With the help and encouragement of a psychologist, students saw that they were able to control their thoughts and body reactions and it might have given assurance that they had the abilities

to tolerate distress, control their minds, do not think about negative emotions they are experiencing and could shift their attention to other things. Besides, BAR was performed using skin-conductance modality and skin conductance is related to emotions, so they basically practiced how to control negative emotions they are experiencing.

The other lower score on regulation subscale by individuals having lower perceived stress after PMR could also be explained by the above mentioned assumptions.

This study has some limitations. First of all, only volunteers participated in a study and it might be that those who refused to participate in the study have some specific emotional features which could influence the results of the experiment. For example, participating in a study might be seen as distress and individuals having lower distress tolerance avoided to participate in it. Secondly, we did not measure students coping abilities as well as techniques they used for coping, which might answer the inconsistencies with regulation component of DTS. Moreover, we did not find studies assessing relaxation techniques potential for enhancing students' distress tolerance, so it is difficult to compare the results and make predictions about the outcomes of the study. Despite its limitations, this study provides evidence that BAR and PMR are effective for enhancing students distress tolerance.

Conclusion

Biofeedback-assisted relaxation and progressive muscle relaxation are effective in enhancing students' distress tolerance:

- progressive muscle relaxation helps to enhance distress tolerance (tolerance, appraisal, absorption) in students with low initial distress tolerance;
- biofeedback-assisted relaxation helps to enhance distress tolerance (tolerance, appraisal, absorption) in students with higher initial perceived stress.

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