

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

Esmael Soleymani¹, Mojtaba Habibi², Mani B. Monajemi³

ABSTRACT

Background: Dyscalculia tends to be debilitating for children with respect to their social interactions and learning process. Although it can cause so many problematic consequences in developmental stages of children, by implementing precise and in time therapeutic intervention, it can be mitigated. Current paper examines the efficacy of emotional regulation techniques among students who suffer from dyscalculia.

Materials and Methods: This study was an experimental study with pre-test and post-test and control group. Statistical Society of this study included all students (4th, 5th, 6th grader), who suffered from dyscalculia in Bileh town (Urumieh Province/Iran) during 2013-2014 (N=76). This study consisted of 34 students, who suffered from dyscalculia. These students were chosen via systematic random sampling. Data were collected using Raven IQ test, Shalev mathematical Test, Alexithymia Scale, Psychological wellbeing questionnaire. Regarding analyzing data, MANOVA was used.

Results: The results of multivariate analysis of covariance show that between case group and control, significant difference in components of alexithymia and psychological wellbeing were noticed. Hence, it can be inferred that emotional regulation strategies improve component of alexithymia and psychological well-being of students with dyscalculia.

Conclusion: According to results, teaching emotion regulation strategies to students considered to be effective in promoting awareness and positive attitudes. Thus, it is plausible that implementing these strategies tend to play a major role as an intervention among students with dyscalculia.

Keywords: *Emotion regulation, Alexithymia, Psychological well-being, Mathematics disorder*

A learning disability (LD) is a problem that interferes with how a person receives and processes information. People with learning disabilities may have trouble with any of the following: Reading, Writing, Doing math, Understanding directions. LD should not better be explained by physical impairment (e.g. internal year dysfunction, MR, adverse environmental circumstances)

¹ Assistant Professor of Psychology, Urmia University, Email: e.soleimani@urmia.ac.ir

² Family Therapy Institute, Shahid Beheshti University, Tehran, Iran (Email: mo_habibi@sbu.ac.ir)

³ Department of Clinical Psychology, University of Tehran, Tehran, Iran
(Email: mani.b.monajemi@warwickgrad.net, mani.b.monajemi@ut.ac.ir)

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

(APA, 2013). LD is heterogeneous group of disorders, which interfere with normal function of individuals in various areas such as: Talking, Reading, Hearing, Writing and Calculation (Gartland & Strosnider, 2007). Dyscalculia is a subgroup of LD, which affects a person's capability to do math. Math disorders can take various forms and have different symptoms from person to person. In young children, dyscalculia may affect learning to count and recognize numbers. As a child gets older, he or she may face difficulty solving rudimentary math problems or memorizing things. Poor teaching procedure, environmental deprivation, psychological inflexibility and brain's malfunctioning in processing the concept of numbers may be number of factors causing dyscalculia (Ashkenazi et al., 2009). According to DSM IV, an individual who maintains weaker performance in spite of calendar age, IQ or educational level could be diagnosed by dyscalculia (Bauminger & Kimhi-Kind, 2008). The major problem in dyscalculia is problem in acquiring and remembering mathematical concepts; second problem is difficulty in completing tasks, applying ineffective problem solving skills, wasting a lot of time on solving mathematical tasks and having high rate of errors. Various hypotheses have been discussed with respect to etiology of this problem and combination of environmental factors and genetic predisposition may justify this disorder more efficiently (Henderson, 2012). Learning disorders cause difficulties in individuals' social, emotional and educational contexts (Freilich & Shechtman, 2010), which can only be understood under precise understanding of social, emotional and behavioral aspects of individuals' life. Among students, one of the variables that can be impaired due to dyscalculia is "Psychological Wellbeing". Psychological wellbeing is an effort regarding reaching integrity toward potential abilities of an individual (RYFF & Keyes, 1995). Much of related literature stresses that children with dyscalculia, tend to have low satisfaction toward life and low psychological wellbeing (Shalev, 2004). On a related note, dyscalculia is linked to low satisfaction from life (Koenen, Ranke & Honkoop, 2008), social anxiety and impaired social interactions (Richardson & Suinn, 1972). Given students tend to demonstrate more aggression and misbehave in class which will lead to their abandonment by others, this low self-esteem and self perception will affect their educational process in negative way (B Johnson, 2001); Lavoie (2005) states that probably impairment in social skills and social wellbeing are two most prominent problems of this group of children, since this problem will unfavorably influence other aspects of their lives. Raskind (2007) showed that these children have difficulty regarding initiating and continuing their relationships and these impairments may lead to low self-esteem, sense of loneliness, depression and other psychosocial problems, which eventually will cause suppressed psychological wellbeing.

Other psychological factor is Alexithymia, which can be probably stemmed from dyscalculia. Students with learning disorders tend to possess elevated level of social and emotional problems comparing to normal children (Auerbach, Gross-Tsur, Manor & Shalev, 2008). Literatures show that between 38% to 78% of children with alexithymia tends to have learning disorders as well (Fristad et al., 1992). Thus, one of the probable problems in children with learning disorders is alexithymia. Alexithymia is a personality construct characterized by the sub-clinical inability to identify and describe emotions in the self. Early studies indicate that an inter hemispheric

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

transfer deficit among alexithymics may be one the hypothesis regarding pathogenesis of this disorder; that is, the emotional information from the right hemisphere is not being properly transferred to the language regions in the left hemisphere , as can be caused by a decreased corpus callosum. Another hypothesis which can be discusses is limbic malfunctioning (Madadi & Ghaedi, 2003).The core characteristics of alexithymia are evident dysfunction in emotional awareness, social attachment, and interpersonal relating. Moreover, individuals suffering from alexithymia also have difficulty in distinguishing and appreciating the emotions of others, which is thought to lead to unempathic and ineffective emotional responding (Besharat, 2007).Considerable data indicate that students with learning problems tend to have less consistent emotion and they have problem regarding regulating their emotions. This phenomon is less seen in normal population and these individuals tend to demonstrate more dramatic reactions when faced a normal situations (Bauminger et al., 2005). Results of former study suggest that students with learning disorders have problems in indentifying, describing and concrete thinking compared to normal students. In this context, they demonstrate inappropriate animosity, impulsive attitude, aggression, excessive self-assurance, envy and dissociability. It appears plausible that due to specific psychological attributes, behavioral problems, mood states and other psychological impairments, proper prophylaxis/interventional procedure should be facilitated regarding this group of people. According to Wagaman(2008), there is no effective medications for this group of children; though with following suitable procedured a child may be able to cope with associated problems. One of the effective methods regarding psychological wellbeing of students with dyscalculia which have not been mentioned by scholars, are Emotional Regulation Training. Emotional Regulation reffers to ability of understanding, modulating the experience and expressing the emotions (Feldman-Barrett et al., 2001; Gross, 2001, 1998).Adaptive emotional regulation tend to share a relationship with adaptation, psychological wellbeing and positive social interaction (Gross, 2002; Saarni, 1990) and elevating rate of positive experiences will lead to effective confrontation with traumatic situation (Gross, 2002) and additionally it will impact necessary actions in social interactions (Tugade & Frederickson, 2002). Reviewing literature and psychological researches demonstrate that emotional regulation is a prominent factor regarding psychological wellbeing and social interactions and flawed process of them may cause internal disorders (e.g. depression, anxiety and social isolation) and external disorders(e.g. crime activities, behavioral aggression). According to Jill(2002) and Schnitzer and Colleagues(2007), cognitive intervention may be effective regarding boosting intellectual ability of students with dyscalculia regarding hypothesizing and understanding humor in social interactions (Diefendorff, Richard & Yang, 2008). Furthermore, group emotional intervention maintain a positive effect on reducing self harm attitude and reducing depression signs, anxiety and stress (Gratz K & Gunderson, 2006).According to aforementioned necessities, current study is trying to answer to this question: Is teaching emotional regulation techniques is effective regarding elevating psychological wellbeing and reducing alexithymia in students with dyscalculia?

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

MATERIALS AND METHODS

The design of this study was experimental with pretest-posttest. In current study, alexithymia and psychological wellbeing considered as dependent variables and emotional regulation and no-teaching (Control group) considered as active independent variables. Hence variables of this study are as mentioned below: **Independent variable:** Teaching emotional regulation techniques; **Dependent variables:** Alexithymia and psychological wellbeing; **Control variables:** Forth, 5th and 6th grades of primary school; **Mediating variable:** Gender.

Statistical Society, Sampling method and Sample size: Statistical society of current study consisted of all the students with dyscalculia (Forth, 5th and 6th grades) in a primary school located in Bileh town (Urumieh Province/Iran) during 2014-2015 (N=76). Current sample consisted of 32 students having dyscalculia who were chosen via systematic random sampling. It is worth mentioning that sample size in experimental design would suffice as minimum 15 individuals for each subgroup (Cohen, Manion & Morrison, 2007). Although, in current study, due to probability of recession in number of sample, we decided to allocate 16 individuals for each group (n=32) which is demonstrated on Table-1:

Group	Frequency	Percentage
1st Group: Emotional Regulation Intervention	16 students(boy and girl) with Dyscalculia(n=16)	50%
2nd Group: Control Group	16 students(boy and girl) with Dyscalculia(n=16)	50%
Total	32	100%

Table-1 Frequency and Percentage of case-group/contro-group

Inclusion Criteria: Average IQ or higher; Educational level (Forth, 5th and 6th grades); No history of mental illness(e.g. MR) or acute disease; Not being diagnosed as ADHD; Not using drugs at least 6 months prior to current study; Nonexistence of co morbid situation(e.g. dysgraphia).

Exclusion Criteria: Child being in cooperative or his/her family during study; Restlessness of child during steps of current study; Dyscalculia due to sensory impairments; Dyscalculia due to environmental/cultural/educational deprivations.

Tools: In current study we used below mentioned questionnaires for gathering data:

Shalev Math test: This test was designed by Shlalev and Colleagues(1993) based on numerical processing model of McCloskey, Caramazza & Basili in 1985 (quoted by Barahmand et al., 2007) and it was used vastly with respect to diagnosing dyscalculia. It contains three sections: 1. Numerical understanding: Consisted of 8 subtests about counting, understanding, matching, reading numbers, writing numbers alphabetically or as numbers' symbols, comparing numbers, using mathematical symbols; 2. This section is about producing numbers and it is consisted of

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

subtests, which examines simple(one digit) summation, subtraction, division and multiplying. 3. This section is about numerical calculation. Total score of this subtest is 100. Validity of this test estimated 0.92 among 703 individuals as sample (Shalev et al., 2005).In Iran, Barahmand and Colleagues (2005) estimated validity coefficient of this test via chronbach's alfa as 0.95. Criterion score regarding diagnosing dyscalculia in students (6th grade) was 34/68 ((quoted by Barahmand et al., 2007).

Raven IQ Test:

The tests were originally developed by John C. Raven in 1936 in the UK in order to assess IQ between 9-18 years old. It is consisted of 5 items (each items have 12 questions). Internal consistency coefficient and retest validity coefficient assessed as mean of mean of 0.90 and 0.82 respectively. Correlation of this test with Wechsler, Goodenough test, Stanford-Binet and Proteus maze estimated to be in a range of 0.40 to 0.75. Correlation of this test announced to be more with nonverbal test. In this study, individuals with IQ higher than 90 were chosen (Raven et al., 2003).

The Ryff Scales of Psychological Well-Being:

Ryff designed this test (1989) in Medical School of Wisconsin University and it was revised in 2002 (Hosser and Colleagues).The Ryff inventory consists of either 84 questions (long form) or 54 questions (medium form). There is also a short form, but it is statistically unreliable and therefore should not be used for assessment. Both the long and medium forms consist of a series of statements reflecting the six areas of psychological wellbeing: autonomy, environmental mastery, personal growth, positive relations with others, and purpose in life, and self-acceptance. Respondents rate statements on a scale of 1 to 6, with 1 indicating strong disagreement and 6 indicating strong agreement. Ryff (1989), estimated internal consistency coefficient of this test as 0.91. Validity of this questionnaire claimed to be 0.81 in Michaeli (2009) study. In current study, internal consistency coefficient is 0.87.

Toronto Alexithymia Scale 20(TAS-20):

TAS (Bagby et al., 1994) is compromised of 20 questions and it assesses three subscales of ¹DIF (Difficulty Identifying Feeling), which has 7 questions, ²DDF (Difficulty Describing Feelings), which has 5 questions, ³EOT(Externally Oriented Thinking), which has 5 questions. Items are rated using 5-point Likert scale whereby 1=Strongly disagree and 5=Strongly agree. The total Alexithymia score is sum of all responses to all 20 items (Bagby et al., 1994). In Farsi version of TAS-20 (Besharat, 2007), Cronbach's alpha regarding total score of Alexithymia and 3 subscales (DIF, DDF, EOT) estimated as 0.85, 0.82, 0.75, and 0.72 respectively, which showed proper internal consistency of this scale. Retest validity of this scale in a sample of 67 individuals in period of 2 weeks was confirmed as $r=0.80$ and $r=0.87$ regarding total score of Alexithymia and subscales respectively. Synchronic Reliability based on Pearson correlation coefficient between Alexithymia and emotional quotient, Alexithymia and psychological wellbeing, Alexithymia and

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

psychological helplessness were confirmed and assessed as ($r=0.80, P<0.001$), ($r=0.78, P<0.001$) and ($r=0.44, P<0.001$) respectively.

Independent Variable: Teaching methods of Emotional Regulation

Emotional regulation training takes approximately 8 sessions and each session lasts 90 minutes.

First Session: Conducting pretest, maintaining rapport, conceptualizing and explaining the necessity of teaching these techniques

Second Session (Main focus is on how be aware of positive emotions): Brief review of former session, Teaching techniques of maintaining and being aware of positive emotions and its type (e.g. happiness, love), how to attend positive emotions and how to visualize them (e.g. visualizing happy event), homework regarding writing about our main positive emotions and writing it on relevant form.

Third Session (Main focus is on how be aware of negative emotions): Brief review of former session, Teaching techniques of maintaining and being aware of negative emotions and its type (e.g. anger, disgust), how to attend negative emotions and how to visualize them (e.g. visualizing anxiety inducing event), homework regarding writing about our main negative emotions and writing it on relevant form.

Forth Session (Teaching methods of accepting the positive emotions): Brief reviews of former session, acceptance of positive emotions without judging the level (High/Low) of them and their positive/negative consequences, homework regarding parents or friends ideas about level (High/Low) of positive emotions and writing them on relevant form.

Fifth Session (Teaching methods of accepting the negative emotions): Brief review of former session, acceptance of negative emotions without judging the level (High/Low) of them and their positive/negative consequences, homework regarding parents or friends ideas about level (High/Low) of negative emotions and writing them on relevant form.

Sixth Session (Teaching reassessment techniques and expressing positive emotions): Brief review of former session, teaching psychological experience of positive emotions via visualization (e.g. happiness, love), psychological inhibition and teaching proper expression methods.

Seventh Session (Teaching reassessment techniques and expressing positive emotions): Brief review of former session, teaching psychological experience of negative emotions via visualization (e.g. anger, anxiety), inhibiting unsuitable expression of these emotions.

Eighth Session: Concluding training sessions and conducting posttest.

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

Procedure: After getting acceptance of authorities, we referred to primary school located in Bileh town (Urumieh Province/Iran). Although, teachers of the school confirmed dyscalculia of students, for reassurance we conducted Shalev Math test, raven IQ test and Toronto Alexithymia scale. Then, via systematic random sampling method and with mentioning distribution frequency of boy and girls and their educational stage, sample was chosen. In next step, tools of gathering data were conducted as pretest and after that, 8 interventional sessions were hold in case group and 8 normal sessions (included routine conversation) were hold in control group. By the end of sessions, posttest was conducted among both case and control groups. At last, all gathered data were analyzed with SPSS16 and via MANCOVA.

Analyzing data procedure:

In current study, in additional to implementing descriptive statistical tests (e.g. Frequency, mean and SD), MANCOVA was used. Additionally, with respect to noticing pre-hypotheses of MANCOVA; one-sample Kolmogorov Smirnov test was used and for assessing the equality of variances, levene’s test was used and BOX tests were used for assessing congruity of covariance.

RESULTS

According to finding data, among students with dyscalculia, 31.25%(5 individuals) were 4th grader, 37.5%(6 individuals) were 5th grader and 31.25%(5 individuals) were 6th grader. Regarding control group, 37.50%(6 individuals) were 4th grader, 43.75%(7 individuals) were 5th grader and 18.75%(3 individuals) were 6th grader.

Alexithymia’s Components		Case-Group		Control-Group	
		Mean	SD	Mean	SD
Difficulty Identifying Feeling (DOF)	Pretest	27/31	3/32	26/93	1/73
	Posttest	13/06	2/29	26/43	2/39
Difficulty Describing Feelings (DDF)	Pretest	27/50	2/36	26/56	2/42
	Posttest	27/50	2/36	26/56	2/42
Externally Oriented Thinking (EOT)	Pretest	20/62	2/15	19/93	2/51
	Posttest	10/43	2/22	19/78	2/33

Table-No1 Mean and SD of Alexithymia’s components in Pretest and Posttest stages

According Table-No1, mean and (SD) of posttest in Case group are as mentioned below:

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

1.Difficulty Identifying Feeling (DOF): 13.06(2.29); 2.Difficulty Describing Feelings (DDF): 27.50(2.36); 3.Externally Oriented Thinking (EOT): 10.43(2.22).

Psychological Wellbeing's components		Case-group		Control-group	
		Mean	SD	Mean	SD
Autonomy	Pretest	15/00	2/33	15/00	2/78
	Posttest	29/43	3/11	15/75	3/13
Environmental Mastery	Pretest	14/81	2/61	15/62	3/36
	Posttest	36/56	2/44	15/50	4/78
Personal Growth	Pretest	15/31	2/52	14/37	3/81
	Posttest	26/56	3/09	14/75	3/12
Positive relations with others	Pretest	14/62	2/62	15/62	3/26
	Posttest	26/43	2/42	15/00	4/87
Purpose in Life	Pretest	15/00	2/33	14/27	3/71
	Posttest	23/43	3/11	15/57	3/31
Self-acceptance	Pretest	14/81	2/61	15/00	3/41
	Posttest	26/65	2/44	15/05	3/78

Table-No2 Mean and SD of psychological wellbeing's components in Pretest and Posttest level

As it can be seen in Table-No2, mean and (SD) of post-test in case-group is as mentioned below: 1.Autonomy: 29/43(3.11); 2.Environmental Mastery: 36.56(2.44); 3. Personal Growth: 26.56(3.09); 4. Positive relations with others: 26.43(2.42); 5.Purpose in Life: 23.43(3.11); 6.Self-acceptance: 26.65(2.44)

In order to assess the similarity of variances, Levene's test was implemented and results showed that level of (F) is not meaningful for any components of current study ($P \geq 0.005$); so it is plausible that variance error of these variables between case-group and control-group does not differ. Furthermore, regarding assessing similarity of covariance, BOX test was conducted and results showed that difference is not meaningful ($P=442$, $F=0.973$, $BOX=6.973$).

Source	Test	Value	F	df hypothesis	df error	P	Eta
Group	Pillai's trace	0/917	92/15	3/00	25/00	0/000	0/917
	Wilk'sLambada	0/083	92/15	3/00	25/00	0/000	0/917
	Hattling Effect	11/05	92/15	3/00	25/00	0/000	0/917
	Error largest Root	11/05	92/15	3/00	25/00	0/000	0/917

Table-No3: Results of validity indexes of meaningfulness test of MANCOVA on

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

Components of Current study

According to Table-No3, meaningfulness levels of all tests justify applicability of MANCOVA. This assessment shows that there is a meaningful difference, at least regarding one of dependent variables between case-group and control-group. In order to identify the component (Alexithymia/Psychological wellbeing), which caused a meaningful difference, we used MANCOVA. Details are shown on Table-No4.

Source	Dependent Variable	Components	SS	df	MS	F	P	Eta
		Difficulty Describing Feelings (DDF)	1003/83	1	1003/83	146/01	0/000	0/844
		Externally Oriented Thinking (EOT)	708/03	1	708/03	153/97	0/000	0/851
	Psychological Wellbeing	Autonomy	2809/94	1	2809/94	250/00	0/000	0/912
		Environmental Mastery	2897/70	1	2897/70	175/64	0/000	0/880
		Personal Growth	2745/24	1	2745/24	205/07	0/000	0/668
		Positive relations with others	2920/94	1	2920/94	174/79	0/000	0/879
		Purpose in Life	2890/44	1	2890/44	255/00	0/000	0/914
		Self-acceptance	2879/70	1	2879/70	157/46	0/000	0/725

Table-No4: MANCOVA results on components of variables

As it can be seen on Table-No4, there are meaningful differences in significance level of ($P \leq 0.0001$), between case-group and control-group with respect to DOF, DDF and EOT. In other word, it can be inferred that mean of DOF, DDF and EOT in case tend to differ comparing to control group due to emotional regulation training intervention.

Additionally, there are meaningful differences in significance level of ($P \leq 0.0001$), between case-group and control-group with respect to Autonomy, Environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Thus, it can be concluded that emotional regulation training intervention had a major role in causing difference between case-

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

group and control-group.

DISCUSSION AND CONCLUSION

Main purpose of current study was to assess the efficacy of teaching emotional regulation techniques on alexithymia and psychological wellbeing of students with dyscalculia. According to MANCOVA results, there was meaningful difference with regard to three levels of alexithymia (DOF, DDF and EOT), between case-group and control-group. Hence, its plausible that teaching emotional regulation technique is efficient in reducing alexithymia among students diagnosed with alexithymia. These results are consistent with the results of the study conducted by Gratz and Gundersoon, 2006; Skinters et al., 2007; Dayfanrof et al., 2008; Martini and Bosseri, 2010). As Dayfanrof's (2008) shows that emotional regulation techniques has a positive correlation with decrease in negative emotions and focusing of positive emotional regulation techniques will elevate understanding of individuals in managing their emotions. Furthermore, it can be helpful in identifying aggression, fear, humility and sadness and accordingly regulating the emotions (Yoo et al., 2006). Additionally, group intervention may provide positive impact on self-harm attitudes, borderline personality disorder, depressive symptoms, anxiety and stress (Gratz and Gundersoon, 2006). Jill (2002), Skinters et al., 2007 and Andrise and laber (2007) claimed in their studies that cognitive interventions maintain a positive influence regarding elevating understanding, modifying difficult attitudes of children with dyscalculia. They believe that these interventions are prominent factors in boosting thinking power of students regarding hypothesizing and understanding humor in social interactions. Study conducted by Martini & Busseri (2010) suggests that negative emotional regulation techniques are predictive of negative emotion, low satisfaction and vice versa.

Furthermore, regarding second dependent variable, results of MANCOVA showed that among students with dyscalculia in both case and control groups; there is meaningful difference regarding autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self acceptance. As introducing emotional regulation techniques cause positive effects among psychological wellbeing's components in case group comparing to control. Hence, second hypothesis of this study is confirmed. Current results are consistent with the results of the study conducted by Gross & John (2003); Quoidbach and Colleagues (2010); Nykliček and Colleagues (2011); Sylvester (2012). Quoidbach and Colleagues studied effect of emotional regulation techniques on psychological wellbeing (reducing distress, life satisfaction) and they demonstrated that telling someone (sharing positive event with someone) will lead to life satisfaction and involvement with positive rumination will lead to distress reduction. Sylvester (2012) showed that positive effects on psychological wellbeing will lead to improvement in physical wellbeing. Gross & John(2003) claimed that different approach to emotional regulation will lead to difference psychological, emotional and social states among individuals.

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

In confirming the results of current study, it can be inferred that emotional regulation is process of modulating one or various aspects of experiences with specific emotional responses (Gross, 1998). Emotional regulation plays a major role in psychological wellbeing (Nykliček et al., 2011). Emotional regulation considered being prominent factor in proper functioning and implementing maladaptive methods would lead to negative consequences such as low psychological wellbeing (Gross & Muñoz, 1997) and even somatic problems (Gross & John, 2003; Denollet et al, 2008). Emotional regulation and psychological wellbeing are concepts, which are connected and entangled in various ways. Same brain regions are aroused with respect to aforementioned concepts, which play major role in interaction with other individuals. These two concepts cause dramatic impacts on psychopathology, social isolation and somatic symptoms (Nykliček et al., 2011).

In some forms of psychopathology such as emotional disorder or personality disorders, role of emotional regulation has been highlighted (Gross & Muñoz, 1997). Furthermore, psychological interventions such as CBT and DBT have been used regarding emotional regulation and they have founded to be effective in reducing problematic symptoms (Linehan, 1993).

Nevertheless, current study examined which approach to emotional regulation is effective and some studies showed that some of the emotional regulation techniques are effective with respect to psychological wellbeing (Nykliček et al., 2011). One the methods which was used in current study was emotional inhibition which is intentional inhibition of an emotion by the time of emotional arousal (Gross, 1998). In clear sense, this method can be used in different societies in social interactions. In contrast, some studies discuss role of emotional inhibition in decreasing positive emotions (Gross & Levenson, 2007), impaired interpersonal function (Butler et al., 2003) and decreased psychological wellbeing (Gross & John, 2003). In addition, this method may boost rumination about negative emotions (Gross & John, 2003). Although, rumination and worrying may cause a distraction regarding emotional experience (Roemer et al., 2009). Some evidences suggest that there is close relationship between emotional inhibition and activating sympathetic nervous system which may led to Cardio vascular diseases (Butler et al., 2003). In this sense, mentioning one exception seem to be vital, both expressing and inhibition of anger in excessive way may lead to cardio vascular diseases (Nykliček, I., 2011).

One of the limitations, which can be discussed regarding this study, is that no interview was conducted regarding diagnosis of dyscalculia among students. Another limitation was not controlling educational and financial status of parents. Another limitation worth mentioning is ADHD as common comorbid situation with LD.

It is advised to hold follow up sessions regarding long-term assessment of emotional regulation training procedure. Due to substantial effects of dyscalculia on various aspects of students' life, interventional programs should be facilitated and they should be followed precisely by authorities.

Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students Who Suffer From Dyscalculia

Authors' contributions

ES and MH conceived and designed the evaluation and they conducted whole process of this study. MBM collected and interpreted the clinical data and drafted the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We would like to thank all patients who participated in the study.

Declaration of interest

None declared

REFERENCE

- APA, 2013. Diagnostic and Statistical Manual of Mental Disorders 5th edn (Text Revision). Washington, DC: American Psychiatric Association.
- Ashkenazi, S., O. Rubinsten, and A. Henik. 2009. Attention, automaticity, and developmental dyscalculia. *Neuropsychology* 23 (4): 535–540, <http://dx.doi.org/10.1037/a0015347>
- Auerbach, J. G., Gross-Tsur, V., Manor, O., & Shalev, R. S. (2008). Emotional and
- Bagby, R.M, Parker, J.D.A, Taylor, G.J, (1994), The twenty-item Toronto Alexithymia Scale I.Item selection and cross-validation of the factor structure, *Journal of Psychosomatic Reserch*, 38: 23-32.
- Bagby, R.M; Parker, J.D; Taylor, G.J. (1994). The Twenty-item Toronto Alexithymia Scale: Iitem Selection and Cross-validation of the Factor Structure. *Journal Psychosom Res*; PP.38(1); 23-32.
- Barahmand , U. , Narimani , M. * , Amani , M. . (2007). *The Prevalence of Arithmetic Disorder among Elementary School Children in Ardebil*. Available: <http://payam-aet.ir/view.asp?Type=pdf&ID=705156&l=en>. Last accessed 20/07/2015.
- Bauminger, N., &Kimhi-Kind, I. 2008. Social information processing, security of attachment, and emotion regulation in children with learning disabilities. *Journal of Learning Disabilities*, 41, 315–332.
- Bauminger, N., Edelsztein, H. S., & Morash, J. (2005). Social information processing and emotional understanding in children with LD. *J. Learn. Disabil.*, 38, 45–61.
- Besharat, M. A. (2007). Reliability and factorial validity of Farsi version of the Toronto Alexithymia Scale with a sample of Iranian students. *Psychological Reports*, 101, 209-220.
- B Johnson. *Behaviour Problems In Children and Adolescents with Learning Disabilities*. The Internet Journal of Mental Health. 2001 Volume 1 Number 2.
- Butler EA, Egloff B, Wilhelm FH, Smith NC, Erickson EA, Gross JJ. 2003. *The social consequences of expressive suppression*. *Emotion*; 3(1): 48–67.

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

- Denollet, J., Nyklíček, I., & Vingerhoets, A., 2008. Introduction: Emotions, emotion regulation, and health. In A. Vingerhoets, I. Nyklíček, & J. Denollet (Eds.), *Emotion regulation: Conceptual and clinical issues*. New York: Springer. pp. 3-11.
- Diefendorff JM, Richard EM, Yang, J. 2008. Linking emotion regulation strategies to affective events and negative emotions at work. *J VocatBehav*; 73: 498–508.
- Feldman-Barrett, L., Gross, J., Christensen, T.C., & Benvenuto, M. 2001. Knowing what you're feeling and knowing what to do about it: mapping the relation between emotion differentiation and emotion regulation. *Cognition and Emotion*, 15: 713-724.
- Freilich, R., & Shechtman, Z. 2010. The contribution of art therapy to the social, emotional, and academic Adjustment of children with learning disabilities. *The Arts in Psychotherapy*, 37: 97–105.
- Fristad, M. A., Topolosky, S., Weller, E. B., & Weller, R. A. (1992). Depression and learning disabilities in children. *Journal of Affective Disorders*, 26, 53–58.
- Gartland, D. & Strosnider, R. 2007. Learning disabilities and young children: Identification and intervention. *Learning Disability Quarterly*, 30: 63-72.
- Gratz K.L, Gunderson J.G. 2006. Preliminary Data on an Acceptance-Based Emotion Regulation Group Intervention for Deliberate Self-Harm Among Women With Borderline Personality Disorder. *BehavTher*; 37(1): 25–35.
- Gross J.J. 1998. The emerging field of emotion regulation: an integrative review. *Rev Gen Psychol*; 2: 271–299.
- Gross, J. J. 2002. Wise emotion regulation. In: L. Feldma- Barrett & P. Salovey (Eds.), the wisdom in feeling. New York: *The Guilford Press*, 297-318.
- Gross, J. J., & Levenson, R. W., 1997 Hiding feelings: the acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology*. 106: 95–103.
- Gross, J. J., & Muñoz, R. F., 1997. Emotion regulation and mental health. *Clinical Psychology: Science and Practice*. 2: 151–164.
- Gross, J. J., 1998. Antecedent-and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology*. 74: 224–237.
- Gross, J.J. 2001. Emotion regulation in adulthood: timing is everything. *Current Directions in Psychological Science*, 10: 214-219.
- Gross, J.J., John, O.P., 2003. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85: 348-362.
- Henderson, Anne. *Dyslexia, Dyscalculia and Mathematics: A Practical Guide*. 2nd ed. London: Routledge, 2012. Print.
- Jill, P. 2009. Group activity therapy with learning disabled preadolescents exhibiting behavior problems. *Unpublished doctoral dissertation, University of North Texas*.

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

- Kloomok, S. & Cosden, M. 1994. Self- concept in children with learning disabilities: the relationship between global self-concept, academic discounting, nonacademic self-concept and perceived social support. *Learning disability quarterly*, 17: 140-153 .
- Koenen, E. L. & Ranke, A. H., & Honkoop, P.C. 2008. Precipitating and aggravating factors of migraine versus tension-type headache. *Headache*, 41: 554-558.
- Lavoie, R. D. 2005. It's so much work to be your friend: Helping the child with learning disabilities find social success. *New York: Simon & Schuster*.
- Lerner, J. 1997. *Learning disabilities: Theories, diagnosis and teaching strategies*. Boston: Houghton Mifflin
- Marsha Linehan. (1993). *Dialectical Behavior Therapy (DBT) for Borderline Personality Disorder*. Available: http://dbtselfhelp.com/html/linehan_dbt.html. Last accessed 20/05/2015.
- Madadi, AA, Ghaeli P. (2002). Effect of fluoxetine on alexithymia in patient with major depression disorder. Available from: http://www.iranpa.org/second_congress_of_clinicalpsychology.htm
- Martini T. S, & Busseri M. A. 2010. Emotion Regulation Strategies and Goals as Predictors of Older Mothers' and Adult Daughters' Helping-Related Subjective Well-Being. *Psychol Aging*; 25: 48-59.
- Michaeli. (2009). *Basic relationships between psychological wellbeing and emotional intelligence*. Available: <http://www.ensani.ir/storage/Files/20120507085927-2182-16.pdf>. Last accessed 20/07/2015.
- Nykliček. I., Vingerhoets, A.D., Marcel Zeelenberg, M., 2011. Emotion Regulation and Well-Being. New York, Dordrecht Heidelberg London. pp. 101-115.
- Quoidbach, J., Berry, E.V., Hansenne, H., Mikolajczak, M. 2010. Positive emotion regulation and well-being: *Comparing the impact of eight savoring and dampening strategies*, *Personality and Individual Differences*, 49: 368–373.
- Raskind, M. 2007. Research trends: Social information processing and emotional understanding in children with LD. Available from: <http://Schwab learning.org. articles. aspxr>.
- Raven, J., Raven, J.C., & Court, J.H. (2003). *Manual for Raven's Progressive Matrices and Vocabulary Scales. Section 1: General Overview*. San Antonio, TX: Harcourt Assessment.
- Richardson FC, Suinn RM. The mathematics anxiety rating scale. *J Couns Psychol*. 1972;19:551–554. doi: 10.1037/h0033456.
- Rieffe, C; Oosterveld, P; Meerum, M. (2006). An Alexithymia Questionnaire for Children: Factorial and Concurrent Validation Results. *Personality and Individual Differences*, PP.(40),123-133.
- Riggio, E.R. (1989). Assesment of basic social skills. *Journal of Personality and Social Psychology*. 51: 649-660.
- Roemer, L., Lee, J. K., Salters-Pedneault, K., Erisman, S. M., Orsillo, S. M., & Mennin, D. S., 2009. Mindfulness and emotion regulation difficulties in generalized anxiety disorder:

**Assessing Efficacy of Emotional Regulation Techniques on Alexithymia among Students
Who Suffer From Dyscalculia**

- preliminary evidence for independent and overlapping contributions. *Behavior Therapy*, 40:142–154.
- Ryff, C. D. & Keyes, C. L. M. 1995. The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, 69: 719–727.
- Saarni, C. 1990. Emotional competence: how emotions and relationships become integrated. In: Thompson, R. A. (Ed.). Nebraska symposium on motivation. Socio emotional development. Lincoln: *The University of Nebraska Press*, 36: 115-182.
- Schnitzer, C., Andries, C., & Lebeer, J. 2007. Usefulness of cognitive intervention programmes for socio-emotional and behavior problems in children with learning disabilities. *Journal of Research in special Education Needs*, 7: 161-171.
- Shalev RS. Developmental Dyscalculia. *Journal of Child Neurology* 19:765-71, 2004
- Shalev. S. R, Manor. O & Gross-Tsur. V. 2005. Developmental dyscalculia: a prospective six-year follow-up. *Developmental Medicine and Child Neurology*, 47: 121-126.
- Sylvester, M. 2012. Emotional Regulation *therapy for improving adaptive functioning in persons with a history of pediatric acquired brain injury*. Doctor of Philosophy in Clinical Psychology Dissertation, University of Nevada, Reno.
- Tugade, M.M., Frederickson, B.L. 2002. Positive emotions and emotional intelligence. In: L. Feldman-Barrett & P. Salovey (Eds.), *the wisdom in feeling*. New York: The Guilford Press. 3: 319-340.
- Wagaman, J. 2008. Diagnose and Treat Dyscalculia: Understanding Math Blindness. <http://www.Suite, 101. com>.
- Yoo S.H, Matsumoto, D, LeRoux J.A. 2006. The influence of emotion recognition and emotion regulation on intercultural adjustment. *Int J IntercultRelat*; 30: 345–363.