

# Validation Of Revised Academic Emotion Regulation Questionnaire (AERQ) In The Indian Context

Rajib Chakraborty, Dr. Vijay Kumar Chechi

**Abstract:** The present study tried to validate the Academic emotion regulation questionnaire (AERQ) developed by Buric, Soric and Penezic (2016), in the Indian context. The sample of the study comprised of 355 students (330 boys and 5 girls) of IInd and IIIrd years "School of Mechanical Engineering, Lovely Professional University", Phagwara, Punjab, India. The original tool had eight dimensions, measured by 37 items on a five point Likert scale. In the present study, exploratory factor analysis conducted using SPSS Statistics Ver. 23.0 software, extracted seven dimensions, with 49.045 percent of variance explained. The dimension Situation selection was dropped owing to its poor reliability estimates. Confirmatory factor analysis was used to validate the factor structure of AERQ with the help of SPSS AMOS Ver. 23.0 software. The good fitness of indices like CMIN/DF, GFI, TLI, CFI, RMR, RMSEA were used as the estimates. The tested model had excellent goodness of fit estimates and thus displayed construct validity. Since one of the notorious limitations of the Cronbach alpha is underestimation of the true reliability of a scale under the violation of Tau-equivalence condition, a rarely reported the greatest lower bound (GLB) reliability, was used in this study, calculated using FACTOR software, which revealed acceptable reliability estimates for the seven extracted dimensions. The revised version AERQ, with its 30 items and seven dimensions is thus found to possess the required psychometrics for administration on the Indian university students. A parsimonious model of academic emotion regulation using two of the mostly studied dimensions of academic emotion regulation, was also validated to present a parsimonious version of the construct..

**Index Terms:** Academic Emotion Regulation, Academic Emotion Regulation Questionnaire, Engineering Students, FACTOR Software, Greatest Lower Bound Reliability, Model Parsimony, Tau-equivalence.

## 1 INTRODUCTION

Though academic researchers are aware of the role of emotions and their regulation in academics on learning outcomes and growth and development [1], scarce theoretical and empirical work exists in the literature on this subject [2]. It is due to the lack of a reliable measuring instrument of emotions and their regulation in academic setting [3]. The existing instruments primarily measured the emotions which evoked during specific events like test situations in students. However, for a complete understanding of the relationship between emotions, their regulation and successive impact on academic outcomes, the presence of specific tools of emotional regulation strategies in academics is required. According to [4] emotion regulation involves certain processes which are both intrinsic and extrinsic in nature. These processes help in learning to the identification, recording, evaluation and manipulation of emotions reactions. [5] reported that these processes are conscious or unconscious, automatic or controlled and associated with both good and bad emotional experiences. [6] reported that it is possible to observe emotions and manipulate them to reach pre-set goals in studies. [7] found that though emotions determined the thoughts and actions of an individual, they can be controlled and regulated. The incorporation of the emotional component into self regulated learning framework was missing until recently [8]-[12]. Such an attempt was done by [8] based on the Process model theory of emotion regulation by [13] and empirical tools developed by [14] and [15]. In a recent comprehensive empirical study to develop and validate an instrument to measure trait emotional self regulated learning strategies, [3] developed an instrument the

Academic Emotion Regulation Questionnaire (here after AERQ), consisting of 37 items and eight dimensions. The study found all the eight emotional regulation strategies to be related to certain unpleasant academic emotion. This finding is owing to the fact that emotional regulation strategies are primarily employed by students to deal with unpleasant academic emotions. The AERQ scale developed by the researchers needs validation with respect to age group, educational level and culture or country as mentioned in the limitations of the study [3]. This study needs further validation in global context and in Indian context in particular. The aim of the present study is to achieve the same.

## 2 METHODOLOGY

### 2.1 Sample

The subjects of the study comprised of 355 IInd and IIIrd year students (330 boys and 05 girls) from the "School of Mechanical Engineering, of the Lovely Professional University", Phagwara, Punjab, India. The students were selected through simple random sampling technique in the study.

### 2.2 Instrument: The Academic Emotion Regulation Questionnaire (AERQ)

The Academic Emotion Regulation Questionnaire (AERQ), with 37 items measuring eight dimensions of emotional regulation strategies in academic context for high school and university students in Croatia, based on the Process model of [5] in a 5-point Likert scale, with responses ranging from 1 to 5, where 1 is strongly disagree, 2 is disagree, 3 is neither agree nor disagree, 4 is agree and 5 is strongly agree. These eight dimensions are situation selection, developing competence, redirecting attention, reappraisal, suppression, respiration, venting and social support, the details of which are shown below:

- Rajib Chakraborty, Research Scholar & Assistant Professor, School of Education, Lovely Professional University, Punjab, India.
- Dr. Vijay Kumar Chechi, Professor & HOD, School of Education, Lovely Professional University, Punjab, India.

Factor No.	Factor Label	No. of Items	Description
1.	Redirecting Attention	6	"attempts to refocus one's attention in order to avoid or to block the emotional experience"
2.	Venting	5	"students' behavioural manifestations and expressions of unpleasant emotions as a way of releasing the negative energy"
3.	Situation selection	4	"circumventing academic situations that can trigger unpleasant emotions"
4.	Developing competencies	5	"behaviours and actions students implement to develop capabilities and competences which will prevent or lessen unpleasant emotional experiences"
5.	Reappraisal	5	"students' attempts to undermine the relevance of a situation that evokes unpleasant emotions"
6.	Respiration	3	"students' attempts to reduce subjective feelings of tension accompanied by unpleasant emotions through deep breathing"
7.	Seeking Social Support	4	"sharing unpleasant emotions and seeking comfort from close members of the student's social milieu"
8.	Suppression	5	"students' attempts to suppress subjective and behavioural manifestations of unpleasant emotions in academic situations in order to hide them from others"

### 2.3 Procedure

Permission to conduct a validation study on the AERQ tool was sought and obtained from the main author Dr. Irena Buric through e-mail. The researcher approached the head of the department of the "School of Mechanical Engineering in Lovely Professional University" and asked for the permission to administer the tool on the subjects, when they had a free period. The purpose of the visit was explained to the students. The instructions on the filling of the responses were clearly provided to the subjects and their help in the gathering of the data was sought and well appreciated. The students took fifteen to twenty minutes to fill the questionnaire and returned it to the researcher.

## 3 RESULTS

Tool adoption, though of foreign origin, is an economical practice over construction of it from scratch, as it saves time,

money and effort [16]. According to [17] such practices would pick up pace in future leading to a rise in cross-cultural research. However, such studies would require thorough validation of the instruments in the local settings owing to cultural sensitivity of the variable of interest [18]. As a result, the researcher initiated the data analysis by conducting exploratory factor analysis of the adopted tool. Trial 1 of EFA was conducted using SPSS Statistics software Ver. 23.0 under principal component analysis with Varimax rotation. The determinant was 0.000 indicating that the data is good enough to undergo factor analysis. The KMO sampling adequacy was adequate at 0.738 indicate the sample of n=335 was sufficient for the study. The Barlett's test of sphericity was significant, which meant that the items co-varied with each other. 11 dimensions were extracted with 58.589 variance explained and split loading observed for the items from dimensions of Suppression, situation selection and developing competencies. For conducting further trials of EFA, the item-total correlation of the items was analyzed.

**Table I: Item-total Correlation of the Items under Each Dimension**

Factor	Item	Item-total Correlation	Initial Cronbach's Alpha	Item Status	Final Cronbach's Alpha
Venting	Item 1	0.501	0.805	Retained	0.805
	Item 2	0.598		Retained	
	Item 3	0.642		Retained	
	Item 4	0.548		Retained	
	Item 5	0.662		Retained	
Respiration	Item 1	0.577	0.748	Retained	0.748
	Item 2	0.559		Retained	
	Item 3	0.591		Retained	
Redirecting Attention	Item 1	0.15	0.603	Removed	0.628
	Item 2	0.403		Retained	
	Item 3	0.383		Retained	
	Item 4	0.434		Retained	
	Item 5	0.409		Retained	
	Item 6	0.257		Retained	
Social Support	Item 1	0.394	0.637	Retained	0.637
	Item 2	0.494		Retained	
	Item 3	0.286		Retained	
	Item 4	0.520		Retained	
Situation Selection	Item 1	0.333	0.526	Retained	0.526
	Item 2	0.29		Retained	
	Item 3	0.401		Retained	
	Item 4	0.262		Retained	
Suppression	Item 1	0.337	0.584	Retained	0.584
	Item 2	0.299		Retained	
	Item 3	0.334		Retained	
	Item 4	0.362		Retained	
	Item 5	0.371		Retained	
Developing Competencies	Item 1	0.213	0.559	Removed	0.565
	Item 2	0.393		Retained	
	Item 3	0.307		Retained	
	Item 4	0.374		Retained	
	Item 5	0.329		Retained	
Reappraisal	Item 1	0.325	0.677	Removed	0.677
	Item 2	0.47		Retained	
	Item 3	0.52		Retained	
	Item 4	0.432		Retained	
	Item 5	0.43		Retained	

The items under the dimensions of social support, venting, respiration, situation selection and suppression showed moderate to strong inter-item correlation and there was no change in the Cronbach's alpha of these dimensions. Though item 1 of reappraisal was removed, there was no change in its reliability. When item1 under redirecting attention dimension was removed, there was improvement in the reliability from 0.603 to 0.628. Also, removal of item1 under developing

competencies dimension, increased its reliability from 0.559 to 0.565. Since Cronbach's alpha is known to under estimate the reliability of scale by 11 % under the violation of Tau-equivalence condition and normality of data [19]-[24], the researcher estimated the greatest lower bound reliability [25] of the eight dimensions using FACTOR software [26]-[27] The details are shown below:

**Table II. Reliability Analysis:**

S.No.	Factor	Cronbach's Alpha	GLB	Status of the Factor
1.	Venting	0.805	0.831	Retained
2.	Respiration	0.748	0.748	Retained
3.	Redirecting Attention	0.603	0.667	Retained
4.	Social Support	0.637	0.697	Retained
5.	Reappraisal	0.677	0.705	Retained
6.	Developing Competencies	0.565	0.618	Retained
7.	Suppression	0.584	0.636	Retained
8.	Situation Selection	0.526	0.585	Removed

There was improvement in the reliability of the dimensions developing competencies and suppression when their GLB was estimated, along with five other dimensions. They were thus retained. The dimension situation selection had poor Cronbach's alpha and greatest lower bound reliability. It was dropped from further analysis. The second trail of exploratory factor analysis is initiated by dropping an item each of the dimensions Reappraisal, redirecting attention and developing competencies on the grounds of poor item-total correlation and the entire dimension of situation selection with its four items owing to its poor reliability estimates. The thirty items underwent exploratory factor analysis under principal

component analysis with varimax rotation. Based on the guidelines provided by [28], the item to factor loading was set at 0.32 and factor with minimum of three items and maximum of five or more items loading on it was retained or considered for confirmatory factor analysis. The determinant was 0.001. The KMO was adequately at 0.743. Berlett's sphericity was desirably significant. When two items of the dimension suppression and an item of the dimension developing competencies were force loaded, it lead to an extraction of seven factors with eigen values 3.033, 2.097, 2.073, 2.066, 2.013, 1.734 and 1.697, well above Keiser's criterion of eigen value greater than 1 condition, which explained 49.045 % variance.

**Table III:**  
Rotated Component Matrix<sup>a</sup>

	Component								
	1	2	3	4	5	6	7	8	9
Venting5	.801								
Venting3	.793								
Venting2	.751								
Venting4	.691								
Venting1	.664								
Reapp3		.724							
Reapp5		.718							
Reapp4		.708							
Reapp2		.634							
Respi2			.806						
Respi3			.776						
Respi1			.774						
ReAtt4				.693					
ReAtt2				.677					
ReAtt3				.635					
ReAtt5				.622					
ReAtt6				.390				.344	.332
SocSupp4					.773				
SocSupp2					.767				
SocSupp1					.669				
SocSupp3	.368				.485				
DevCom4						.325			
DevCom2						.655			
DevCom5						.637			
Supp4						.634			
Supp5							.678		.324
							.671		

Supp3						.616		
Supp1							.692	
Supp2							.679	
DevCom3								.710

The descriptive statistics of the selected items are shown below:

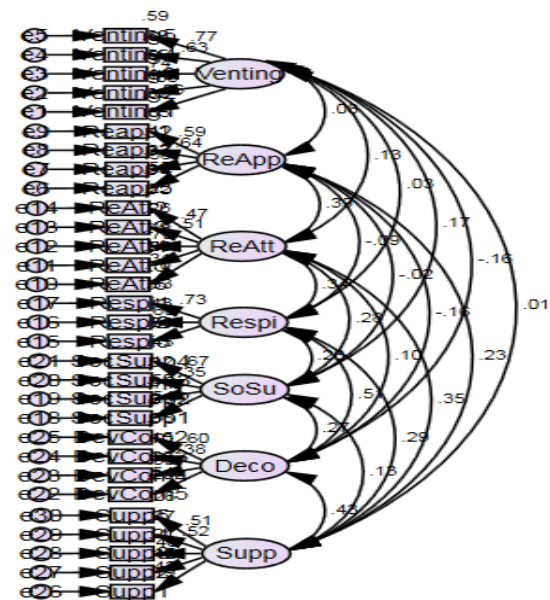
Extraction Method: Principal Component Analysis.  
 Rotation Method: Varimax with Kaiser Normalization.  
 a. Rotation converged in 11 iterations.

**Table IV:**

*Descriptive Statistics*

	N	Mean		Std. Deviation	Skewness		Kurtosis	
		Statistic	Std. Error		Statistic	Std. Error	Statistic	Std. Error
DevCom2	335	4.1254	.05150	.94256	-1.504	.133	2.548	.266
DevCom3	335	3.4478	.05970	1.09276	-.544	.133	-.438	.266
DevCom4	335	3.8866	.05018	.91836	-1.126	.133	1.450	.266
DevCom5	335	3.7164	.05813	1.06392	-.825	.133	-.024	.266
ReAtt2	335	3.9940	.05704	1.04393	-1.243	.133	1.174	.266
ReAtt3	335	4.0149	.05471	1.00138	-1.164	.133	.931	.266
ReAtt4	335	3.7791	.05901	1.08011	-.799	.133	-.053	.266
ReAtt5	335	3.9612	.05831	1.06734	-1.067	.133	.549	.266
ReAtt6	335	3.4299	.06243	1.14267	-.462	.133	-.644	.266
Reapp2	335	3.3075	.07233	1.32382	-.408	.133	-1.101	.266
Reapp3	335	3.7075	.06351	1.16245	-.712	.133	-.478	.266
Reapp4	335	3.9433	.05964	1.09151	-.915	.133	.043	.266
Reapp5	335	3.1851	.06989	1.27918	-.135	.133	-1.171	.266
Supp1	335	3.4388	.06057	1.10862	-.441	.133	-.624	.266
Supp2	335	3.5731	.05964	1.09155	-.730	.133	-.085	.266
Supp3	335	3.8000	.05558	1.01722	-.896	.133	.598	.266
Supp4	335	3.5045	.06354	1.16298	-.631	.133	-.450	.266
Supp5	335	3.4866	.06311	1.15516	-.547	.133	-.606	.266
Respi1	335	3.8418	.05630	1.03040	-.951	.133	.496	.266
Respi2	335	3.7493	.05773	1.05668	-.909	.133	.324	.266
Respi3	335	3.6746	.05669	1.03752	-.692	.133	-.036	.266
Venting1	335	2.3851	.06165	1.12846	.533	.133	-.619	.266
Venting2	335	2.1970	.06718	1.22962	.727	.133	-.598	.266
Venting3	335	2.6209	.06704	1.22701	.315	.133	-.984	.266
Venting4	335	2.2776	.06585	1.20526	.722	.133	-.498	.266
Venting5	335	2.3821	.06824	1.24906	.516	.133	-.933	.266
SocSupp1	335	3.6716	.06522	1.19365	-.821	.133	-.199	.266
SocSupp2	335	3.8209	.05883	1.07677	-.999	.133	.516	.266
SocSupp3	335	2.8030	.07106	1.30062	.050	.133	-1.230	.266
SocSupp4	335	3.5881	.06503	1.19022	-.639	.133	-.510	.266
Valid N (listwise)	335							

In Confirmatory factor analysis, the goodness of fit estimates selected were CMIN/DF (to be below 3 for a good fit [29]), RMR, GFI, IFI, TLI, RMSEA and CFI. While the recommended values of RMR and RMSEA below 0.08, the rest of the estimates are desired to have values are above 0.93 [30]. SPSS AMOS software Ver.23.0 was used to conduct the CFA. The path diagram consisting of the revised AERQ with seven dimensions and their respective item in the form of a first order factor structure and factor loadings is shown below:



**Fig 1:** Path Diagram of Revised AERQ:

**Table V: Standardized Regression Weights:**

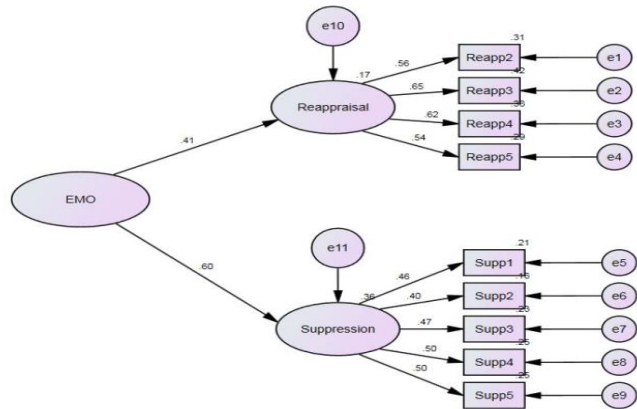
		Estimate
Venting1	<--- Venting	.564
Venting2	<--- Venting	.662
Venting3	<--- Venting	.743
Venting4	<--- Venting	.625
Venting5	<--- Venting	.769
Reapp5	<--- ReApp	.549
Reapp4	<--- ReApp	.577
Reapp3	<--- ReApp	.639
Reapp2	<--- ReApp	.594
ReAtt6	<--- ReAtt	.313
ReAtt5	<--- ReAtt	.540
ReAtt4	<--- ReAtt	.700
ReAtt3	<--- ReAtt	.508
ReAtt2	<--- ReAtt	.473
Respi3	<--- Respi	.732
Respi2	<--- Respi	.654
Respi1	<--- Respi	.730
SocSupp1	<--- SoSu	.540
SocSupp2	<--- SoSu	.707
SocSupp3	<--- SoSu	.350
SocSupp4	<--- SoSu	.670
DevCom5	<--- Deco	.536
DevCom4	<--- Deco	.498
DevCom3	<--- Deco	.383
DevCom2	<--- Deco	.596
Supp1	<--- Supp	.431
Supp2	<--- Supp	.417
Supp3	<--- Supp	.460
Supp4	<--- Supp	.524
Supp5	<--- Supp	.510

**Table VI: Goodness of Fit Estimates of the Revised AERQ:**

Measure	P Value	CMI N/DF	RM R	RM SE A	GFI	IFI	TLI	C.
Benchmark	>0.05	<3	<0.08	<0.05	>0.9	>0.9	>0.9	>0.9
Result	0.000	1.317	0.073	0.031	0.908	0.932	0.921	0.958

Except p-value which is sensitive to sample size, all the obtained estimates are well consistency with the desirable benchmarks. It indicates that the hypothesized model fits the obtained data well, confirming the construct validity of the revised AERQ tool. Estimation of Goodness of Fit of the Parsimonious Model of Academic Emotion: Though there are

three commonly studied types of emotional self-regulation strategies in the psychology literature, namely, reappraisal, suppression and rumination [31],[8], the two dimensions, reappraisal and suppression, are present in the available tools used to measure emotional self regulation strategies, which are in turn based on theoretical and empirical grounds. While suppression is found to be associated with unpleasant emotions like powerlessness and frustration, reappraisal is associated with positive emotions like openness [14]. These dimensions are included in the validation of a parsimonious version of academic emotion regulation.



**Fig 2: Path Diagram of the Parsimonious Model of Academic Emotion**

**Table VII: Goodness of Fit Estimates of the Parsimonious Model of Academic Emotion:**

Measure	P Value	CMI N/DF	RMR	RMSEA	GFI	IFI	TLI	CFI
Benchmark	>0.05	<3	<0.08	<0.05	>0.9	>0.9	>0.9	>0.9
Result	0.000	1.519	0.06	0.039	0.974	0.96	0.943	0.958

While the dimension reappraisal reflects the construct academic emotion regulation strategies moderately at 0.41, the dimension suppression reflects the construct strongly at 0.6. This result is consistent with literature which confirms that academic emotion regulation strategies are mostly employed by students to deal with negative maladaptive emotions like suppression although positive adaptive emotions like reappraisal also require regulation [32]. All the items of the two dimensions reflect their respective factors well since their factor loadings are strong at 0.4 and above. The absolute, comparative and parsimonious goodness of fit indices are also well consistent with their desirable benchmarks confirming the validity of the above parsimonious factor structure.

**4 DISCUSSIONS**

IJSTR style is to not citations in individual brackets, followed by a comma, e.g. “[1], [5]” (as opposed to the more common “[1, 5]” form.) Citation ranges should be formatted as follows: [1], [2], [3], [4] (as opposed to [1]-[4], which is not IJSTR style). When citing a section in a book, please give the relevant page

numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use “Ref. [3]” or “reference [3]” At the beginning of a sentence use the author names instead of “Reference [3],” e.g., “Smith and Smith [3] show ... .” Please note that references will be formatted by IJSTR production staff in the same order . The academic emotion regulation questionnaire is a new tool to measure the vital component of emotion regulation in academic setting. Owing to its foreign origin and newness, validation studies when it is adopted in different countries and when administered on different sample subjects, is warranted. The present study found the dimension situation selection, not to posses enough reliability in the Indian context. Its item statements are:

Item No.	Statement
1.	“When I am very nervous about an exam, I decide to skip classes that day.”
2.	“When going to university is stressful to me, I stay at home”.
3.	“When I am afraid of an oral exam, I stay at home that day”.
4.	“When I am feeling too much pressure from university obligations, I ‘get sick’ for a couple of days.”

Since reliability is also the measure of variance in the relative position of subjects in a group, expressed through correlation coefficient, low reliability indicates heterogeneity among subjects. Hence, students in the Indian context, probably differ from one another vastly in dealing with exam related anxieties and study related work pressure. Though split loading of a couple of items was observed in the case of dimensions like suppression and developing competencies, they were force loaded to obtain a factor structure as close to the original factor structure of the Croatian study. The revised factor structure of AERQ in the Indian context has good fitness of estimates to support its construct validity. The parsimonious model of academic emotion regulation, comprising of suppression and reappraisal dimensions is also found to possess excellent goodness of fit estimates.

## 5 LIMITATIONS

The study sample size can be increased and students from disciplines other than engineering and locality other than urban areas can be included. One of the major limitations of this study was that it was conducted with mostly boys as the sample subjects. Reliability of certain scales in the tool can be improved.

## 6 CONCLUSION

The revised AERQ tool needs to go through multiple investigations in a culturally diverse nation like India, on student subjects of different populations in various academic settings. However, the presence of such a tool in the Indian context is very useful to the researchers and educators involved in the understanding and promotion of self-regulated learning among students at secondary and tertiary levels.

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