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Cross Cultural Adaptation of Academic Emotion Regulation Questionnaire (AERQ) in the Indian Context

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ABSTRACT---*The researchers tried to adapt and validate the Academic emotion regulation questionnaire (AERQ) developed by Buric, Soric and Penezic (2016), in the present study in the Indian context. The sample of the study comprised of 496 students (330 boys and 5 girls from Mechanical engineering and 127 boys and 34 girls from Hotel management) of Lovely Professional University, India. The EFA performed using "SPSS Statistics Ver. 23.0" revealed the original factors as mentioned in the original tool with 53.402 % total variance explained. The factor structure was later tested using Confirmatory factor analysis with the help of "SPSS AMOS Ver. 23.0". The "goodness of fit" estimates were moderate but with strong factor loadings, akin to the original study. Internal consistency of the eight dimensions ranged from 0.594 to 0.833. Implications of the study are discussed.*

Keywords-- *Academic Emotion Regulation, Academic Emotion Regulation Questionnaire, Mechanical Engineering, Hotel Management.*

I. INTRODUCTION

The role of regulation of emotions to perform well in studies (Gumora and Arsenio, 2002) is studied scarcely partly due to the fact that a reliable tool to measure this vital construct did not exist until recently. A tool to measure academic regulation in university students, the Academic Emotion Regulation Questionnaire (AERQ) was constructed by Buric et al. (2016). It was based on the "Process model of emotion regulation" by Gross (1998). It comprised of eight dimensions which emerged from the works of Gross and the empirical exploratory work of Dr. Buric on Croatian university study. These eight dimensions are "situation selection, developing competence, redirecting attention, reappraisal, suppression, respiration, venting and social support", with details shown below:

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

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			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"

The students register their responses of 37 items on a five point "Likert scale" with 1= strongly disagree and 5= strongly agree.

As a recommendation for further studies, the researcher mentioned that the tool needs validation through its administration on students from multiple cultures and academic disciplines. Also, Yasir (2016) mentioned that adaptation of a foreign origin tool calls for its full-fledged validation owing to the difference in the cultures of country of tool construction and the country of tool adaptation. Adaption of tools, even though they belong to foreign countries, prove to be economical when compared to development of them from scratch owing to the saving of effort, time and money (Gjersing, Caplehorn and Clausen, 2010). Hambleton (2005) cited that such practices would increase in number with more number of cross-cultural research works conducted in multiple nations. On the basis of these reasons, the researchers of the present study conducted an analysis of the psychometrics of the Academic Emotion Regulation Questionnaire (AERQ) in a culturally diverse nation like India.

II. METHODOLOGY

Sample:

The researchers took formal permission from Dr. Buric for administering the tool developed by her and her colleagues for research purpose in the Indian context, through e-mail. The study was initiated after obtaining the permission from Dr. Buric.

The subjects of the study comprised of 496 students from the "School of Mechanical Engineering (330 boys and 5 girls)" and the "School of Hotel Management (127 boys and 34 girls)", of the Lovely Professional University, Phagwara, Punjab, India. The students were chosen by applying the "simple random sampling" technique in the study.

The data was collected after taking formal permission to apply the tool on the students from the Head of the respective departments, in the class room. The students took 25 to 30 minutes to fill the questionnaire and return it back to the investigators. The faculty members present in the class room also helped in maintaining the decorum of theclassduringthetooladministrat

Statistical Analys

III. RESULTS

Exploratory Factor Analysis:

In the initial trial of extracting the factors, all the 37 items were made to under “Principal component analysis” extraction method with “Varimax” rotation method. The item to loading of the factors was set at 0.32 (Tabachnick and Fidell, 2001), with a minimum of three items to load on a factor for it to be considered for confirmatory factor analysis.

The KMO was sufficient at 0.825 indicating the sample size to be sufficient. Berlett’s sphericity was desirably significant. Nine factors had eigen value greater than 1 well above Keiser’s criterion which explained 54.227 % variance. But, two items of the scale belonging to the dimension Redirecting attention (Item1 and Item 6) displayed split loading. These items were removed for the trail two of exploratory factor analysis.

The KMO in trial two of EFA was 0.822. The Berlett’s test of sphericity was significant. Eight factors displayed eigen values greater than 1 with 53.402 % of total variance explained. Hong’s Parallel analysis conducted using Watkins (2000) Monte Carlo PCA Parallel Analysis software also confirmed eight factors. The critical eigen value of eighth factor generated by the software was 1.2 which was less than the eigen value of the eight factor calculated by SPSS Statistics at 1.958. In this way, the original eight factors of the original study were extracted the present study as well, but with 35 items.

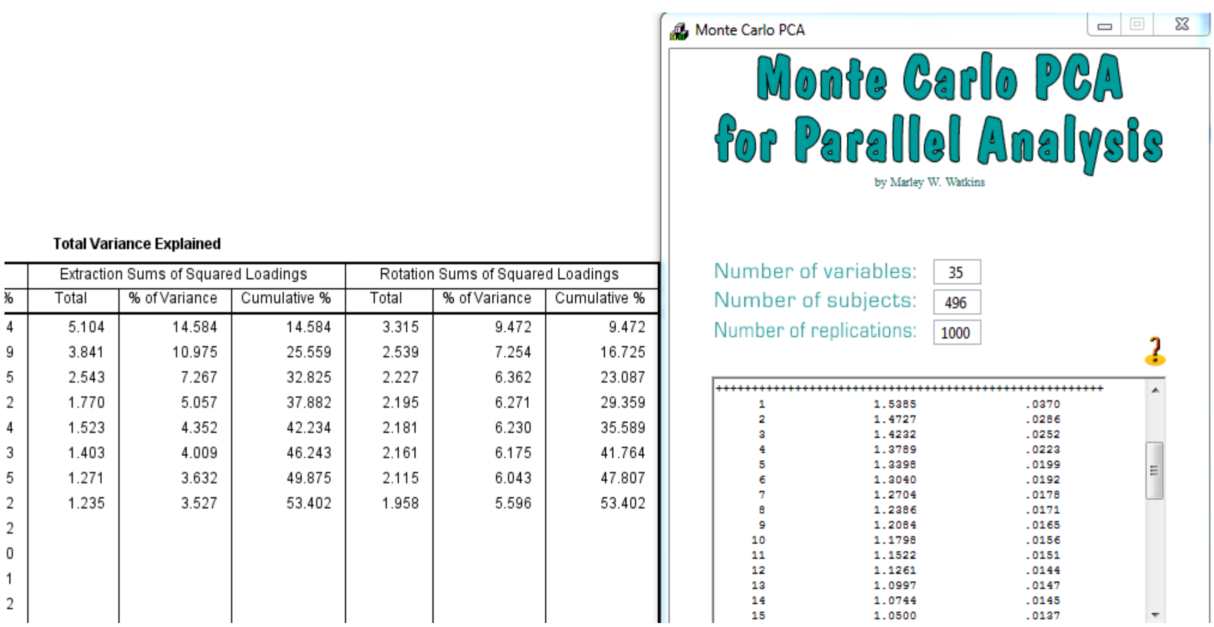

Figure 1: Hong’s Parallel Analysis

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Table1: Factor Loadings of the Extracted Eight Factors of AERQ

Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Venting5	.796							
Venting3	.781							
Venting2	.778							
Venting4	.740							
Venting1	.694							
Reapp3		.753						
Reapp5		.703						
Reapp2		.696						
Reapp4		.684						
Reapp1		.532						
Supp5			.684					
Supp4			.650					
Supp2			.634					
Supp1			.631					
Supp3			.523					
ReAtt2				.686				
ReAtt4				.674				
ReAtt5				.666				
ReAtt3				.652				
DevCom2					.640			
DevCom4					.632			
DevCom3					.609			
DevCom5					.590			
DevCom1					.483			
SocSupp4						.793		
SocSupp2						.788		
SocSupp1						.713		
SocSupp3	.404					.458		
Respi2							.812	
Respi3							.785	
Respi1							.745	
SitSelec1								.703
SitSelec3								.686
SitSelec2								.624

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SitSelec4								.476

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 7 iterations.

Table 2: Descriptive Statistics:

Under descriptive statistics, the measure of central tendency mean, the measure of dispersion standard deviation, the measures of asymmetry, skewness and kurtosis are reported along with their respective standard error.

Table 2: Descriptive Statistics

	N	Mean		Std. Deviation	Skewness		Kurtosis	
Item	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
SitSelec1	496	2.3206	.05687	1.26653	.692	.110	-.671	.219
SitSelec2	496	2.6290	.05635	1.25508	.284	.110	-1.115	.219
SitSelec3	496	1.9093	.04111	.91554	1.148	.110	1.219	.219
SitSelec4	496	2.3589	.05169	1.15130	.639	.110	-.455	.219
DevCom1	496	3.4698	.04765	1.06130	-.710	.110	-.029	.219
DevCom2	496	4.0383	.04301	.95798	-1.323	.110	1.903	.219
DevCom3	496	3.3367	.04872	1.08504	-.423	.110	-.458	.219
DevCom4	496	3.7782	.04212	.93809	-.945	.110	.977	.219
DevCom5	496	3.6613	.04580	1.02010	-.752	.110	.045	.219
ReAtt1	496	3.3992	.04380	.97541	-.449	.110	-.291	.219
ReAtt2	496	3.8508	.04729	1.05310	-.929	.110	.412	.219
ReAtt3	496	3.8750	.04523	1.00730	-.831	.110	.178	.219
ReAtt4	496	3.6452	.04808	1.07078	-.565	.110	-.373	.219
ReAtt5	496	3.7681	.04978	1.10859	-.765	.110	-.114	.219
ReAtt6	496	3.3145	.04964	1.10548	-.277	.110	-.677	.219
Reapp1	496	3.4032	.05840	1.30063	-.475	.110	-.878	.219
Reapp2	496	3.1855	.05618	1.25121	-.249	.110	-1.011	.219
Reapp3	496	3.5242	.05262	1.17182	-.505	.110	-.657	.219
Reapp4	496	3.7681	.05091	1.13381	-.688	.110	-.348	.219
Reapp5	496	3.0605	.05550	1.23598	-.006	.110	-1.032	.219
Supp1	496	3.3649	.04746	1.05692	-.296	.110	-.481	.219
Supp2	496	3.5222	.04893	1.08967	-.574	.110	-.237	.219
Supp3	496	3.6915	.04521	1.00685	-.652	.110	.200	.219
Supp4	496	3.4415	.05139	1.14442	-.493	.110	-.501	.219
Supp5	496	3.4637	.05111	1.13827	-.484	.110	-.536	.219
Respi1	496	3.7883	.04570	1.01779	-.767	.110	.203	.219
Respi2	496	3.6895	.04656	1.03688	-.705	.110	.043	.219

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Respi3	496	3.5786	.04490	.99993	-.455	.110	-.249	.219
Venting1	496	2.3831	.04989	1.11121	.505	.110	-.530	.219
Venting2	496	2.1996	.05275	1.17485	.680	.110	-.523	.219
Venting3	496	2.5665	.05208	1.15977	.298	.110	-.803	.219
Venting4	496	2.2621	.05184	1.15464	.654	.110	-.469	.219
Venting5	496	2.4012	.05390	1.20030	.442	.110	-.852	.219
SocSupp1	496	3.6815	.05215	1.16139	-.748	.110	-.197	.219
SocSupp2	496	3.7258	.04813	1.07187	-.751	.110	.034	.219
SocSupp3	496	2.7843	.05549	1.23576	.094	.110	-1.045	.219
SocSupp4	496	3.5907	.05041	1.12269	-.589	.110	-.401	.219
Valid N (listwise)	496							

To confirm the factor structure of the instrument SPSS AMOS software Ver. 23.0 was used. As the recommendations of Kline (2004), the selected goodness of fit estimates like CMIN/DF was kept to be less than 3, RMR and RMSEA were kept below the recommended value of 0,08 and GFI, IFI, TLI and CFI were kept at the recommended value of above 0.93 (Leech et.al, 2008). However, certain studies reported that estimates above 0.9 also display acceptable goodness of fit (Bentler, 1990; Hays, Marshall, Wang and Sherbourne, 1990; Barkoukis, Tsorbatzoudis, Grouios and Georgios, 2008). The path diagram the AERQ with its dimensions and the factor loadings of its respective items is shown below:

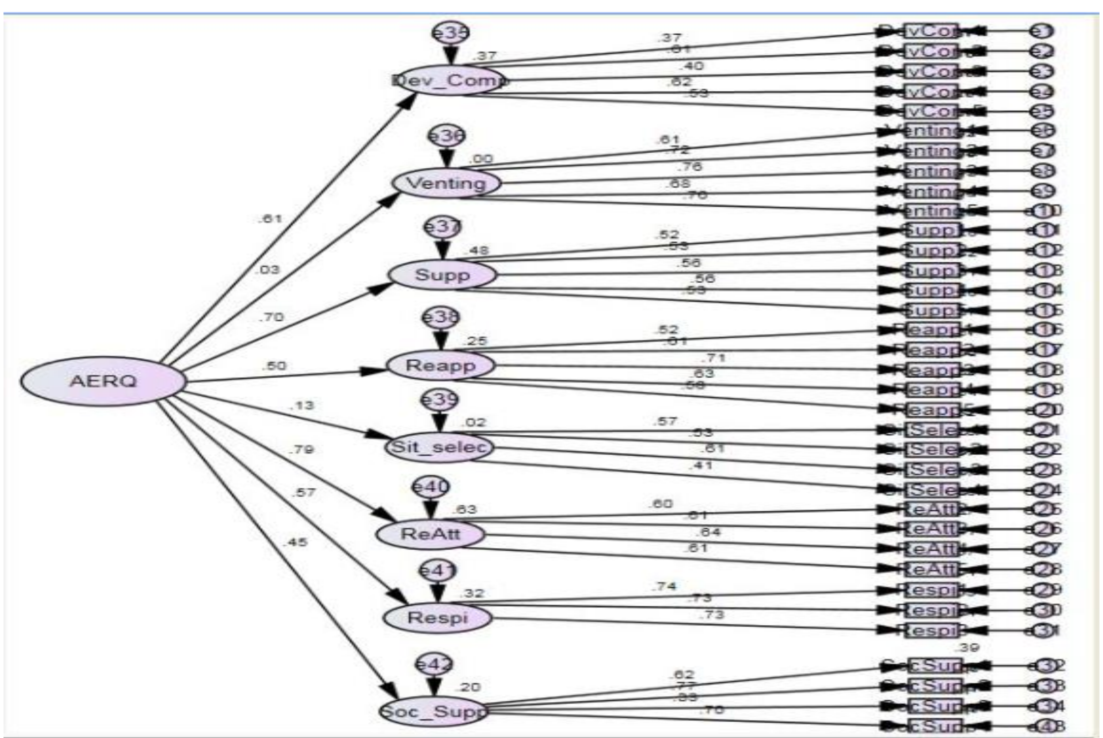

Figure 2: Path Diagram of AERQ

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Table 3: Standardized Regression Weights

			Estimate
DevCom1	<---	Dev_Comp	.372
DevCom2	<---	Dev_Comp	.605
DevCom3	<---	Dev_Comp	.397
DevCom4	<---	Dev_Comp	.616
DevCom5	<---	Dev_Comp	.529
Venting1	<---	Venting	.607
Venting2	<---	Venting	.718
Venting3	<---	Venting	.762
Venting4	<---	Venting	.682
Venting5	<---	Venting	.763
Supp1	<---	Supp	.525
Supp2	<---	Supp	.526
Supp3	<---	Supp	.562
Supp4	<---	Supp	.561
Supp5	<---	Supp	.534
Reapp1	<---	Reapp	.519
Reapp2	<---	Reapp	.605
Reapp3	<---	Reapp	.707
Reapp4	<---	Reapp	.627
Reapp5	<---	Reapp	.580
SitSelec1	<---	Sit_selec	.569
SitSelec2	<---	Sit_selec	.533
SitSelec3	<---	Sit_selec	.609
SitSelec4	<---	Sit_selec	.410
ReAtt2	<---	ReAtt	.600
ReAtt3	<---	ReAtt	.609
ReAtt4	<---	ReAtt	.640
ReAtt5	<---	ReAtt	.610
Respi1	<---	Respi	.738
Respi2	<---	Respi	.725
Respi3	<---	Respi	.734
SocSupp1	<---	Soc_Supp	.622
SocSupp2	<---	Soc_Supp	.773

			Estimate
SocSupp3	<---	Soc_Supp	.331
SocSupp4	<---	Soc_Supp	.700

Except two items of the dimension developing competence and one item each of the dimensions situation selection and social support, the factor loadings of all the remaining 31 items are strong above 0.5 (Brown, 2006) and loaded on their respective factors.

Table 4: Goodness of Fit Estimates of the AERQ

Estimate	"P Value"	"CMIN/DF"	"RMR"	"RMSEA"	"GFI"	"IFI"	"TLI"	"CFI"
Standards	"> 0.05"	"<3"	"<0.08"	"<0.05"	">0.9"	">0.9"	">0.9"	">0.9"
Present Study (2019) Result	0.000	1.943	0.093	0.044	0.884	0.872	0.86	0.87
Original Study (2016) Result	0.01	2.09	0.07	0.06	-	-	-	0.85

Except RMSEA, all the goodness of fit estimates fell short of meeting their respective benchmark values. The model displayed moderate goodness of fit, though the estimates are better than the estimates of the original study by Buric et al. (2016). The reasons cited by the researchers of the original tool for retaining the model is that when there are multidimensional factor structures with items more than 5, to be tested for the validity using conventional fit indices, they prove to be too strict (Marsh, Hau and Wen, 2004). Also, when the sample size is small, estimates like CFI show lesser value (Anderson and Gerbing, 1991; Kenny and McCoach, 2003). No help of modification indices were taken as it would create an obstacle in the replication of the factor structure in future studies involving subjects from different cultures and academic levels.

Table 5: Reliability Analysis of AERQ

S.No.	**Dimension**	**Item**	**Item-total Correlation**	**Cronbach's Alpha when Item Deleted**	**Composite Reliability**
1.	Situation Selection	1	0.395	0.594 (0.508)	0.612
2.		2	0.382	0.594 (0.519)	
3.		3	0.458	0.594 (0.482)	
4.		4	0.296	0.594 (0.582)	
5.	Developing Competence	1	0.287	0.618 (0.609)	0.636
6.		2	0.441	0.618 (0.53)	
7.		3	0.320	0.618 (0.593)	
8.		4	0.459	0.618 (0.523)	
9.		5	0.372	0.618 (0.564)	
10.	Reappraisal	1	0.425	0.741 (0.728)	0.749

11.		2	0.531	0.741 (0.686)	
12.		3	0.585	0.741 (0.666)	
13.		4	0.492	0.741 (0.701)	
14.		5	0.497	0.741 (0.698)	
15.	Suppression	1	0.42	0.675 (0.628)	0.673
16		2	0.41	0.675 (0.632)	
17.		3	0.421	0.675 (0.628)	
18.		4	0.453	0.675 (0.612)	
19.		5	0.439	0.675 (0.619)	
20.	Respiration	1	0.596	0.776 (0.716)	0.777
21.		2	0.625	0.776 (0.684)	
22.		3	0.615	0.776 (0.695)	
23.	Venting	1	0.547	0.833 (0.822)	0.824
24.		2	0.653	0.833 (0.793)	
25.		3	0.676	0.833 (0.787)	
26.		4	0.609	0.833 (0.806)	
27.		5	0.676	0.833 (0.787)	
28.	Social Support	1	0.471	0.683 (0.615)	0.707
29.		2	0.562	0.683 (0.56)	
30.		3	0.29	0.683 (0.735)	
31.		4	0.575	0.683 (0.547)	
32.	Redirecting Attention	2	0.488	0.708 (0.649)	0.709
33.		3	0.49	0.708 (0.648)	
34.		4	0.509	0.708 (0.636)	
35.		5	0.49	0.708 (0.649)	

Cronbach's alpha (1951) along with Raykov's composite reliability (1997) of the eight dimensions are mentioned in this study. Though alpha is the most popular mesaure of internal consistency reliability (Sijtsma, 2009; Peters, 2014), it represents the lower bound of reliability only when the assumptions of tau-equivalence is satisfied. Under this condition, the measured scale must be unidimensional, the data of the items must be normal (Green and Yang, 2009) and the items must load on the factor with equal factor loading (Teo and Fan, 2013).

Since the violation of these conditions of tau-equivalence is quite prevalent and leads to under-estimation of true reliability of the scale (Raykov, 1997; Graham, 2006), the researchers report composite reliability. The under estimation of the true reliability of the scale can range from 0.6 to 11 percent depending on the extent of the violation of the assumptions of tau-equivalence. When items load on a factor with different factor loading, such a measurement model is said to be congeneric and Raykov's composite reliability can be used to report the reliability of congeneric models as it is immune from the limitations of Cronbach alpha's lower estimation of true reliability property. The composite reliability of all the sub-scales of AERQ have acceptable reliability of above 0.6. The underestimation of the true reliability of the sub-scales by Cronbach's alpha is evident as the magnitude of this estimate is less than composite reliability for all the sub-scales of AERQ.

IV. DISCUSSION

Emotions are defined as cognitive, affective, motivational, expressive and physiological phenomena (Shuman and Scherer, 2015). Emotional regulation involves processes which help us to identify, keep tab, evaluate and change emotional reactions (Thompson, 1994).

One of the least known realms of teaching and learning is the role of emotions in academics. Though it is intuitively known to the educators that affective factors play an important role in enabling the students deal competently with the demands of studies, there are scare empirical evidences to substantiate the same. The regulation of emotions and academic emotions in particular need further attention.

Pekrun et al. (2002) contributed vitally in the identification of academic emotions. However, not much was known regarding the strategies the students used in handling or regulating these emotions. Schutz, Benson and DeCuir (2008) and Schutz, DiStefano, Benson and Davis (2004) contributed further by developing tools which measured emotional regulation in academics but only experienced during examinations and test by the students. A tool which was theoretically sound and comprehensive enough to measure academics related emotions and their regulation strategies was non-existent until AERQ was developed by Buric et al., (2016). It was based on the Process model of emotional regulation by Gross (1998) and the emotional regulation tool developed by Gross and John (2003).

While the number of studies on academic emotional regulation is on the rise in recent years, nothing significant in this regard has taken place in the academic landscape of India. The replication of the psychometric results of AERQ in the Indian context, further confirms the validity of Gross's Process model of emotion regulation. It can serve as the theoretical starting point in the development of new and refinement of existing tools on emotional regulation in the academic context.

The present study addressed the original study of 2016 by Buric et al. by confirming the internal consistency of the sub-scales of AERQ in different population. While the subjects in the original study were from Psychology discipline, in the present study, the subjects belonged from the disciplines of Mechanical engineering and Hotel Management. Another limitation of the original study, addressed in this study, is the replication of the factor structure of AERQ in a different country like India.

V. LIMITATIONS

The number of subjects in future studies can be increased and students from multiple disciplines and locality other can urban areas can be included. The present study was conducted with mostly boys as the sample subjects. Future studies can include sufficient number of girl students in their study. Validity and reliability of the sub-scales in the tool can be improved. Also, it is important that measurement invariance of the tool with respect to gender and culture be performed for ensuring the stability of the eight dimensions factor structure of the scale across multiple groups.

VI. CONCLUSION

Though there is ample room for the improvement of the psychometrics of AERQ tool, the replication of results of the original Croatian scale in the Indian context, is a welcoming development. The tool can play a seminal role in progressing the research on academic emotional regulation in a young and vibrant country like India.

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