6.0 RESULTS

6.1 Data screening and extraction

Three sets of data, pilot (n=63), general population (n=313), musicians (n=44) were separately analysed. The data were initially extracted to an excel sheet and checked for any typo using double entry method (Barchard and Verenikina, 2013) and screened for any possible outliers. It led to removal of 9 cases where there were clear indications of inappropriate entry or too many missing values. The final sample size used to report the results is 313, which is in the ratio of 13 cases per item, more than the recommended 10 cases per item. All the analyses were done using R statistical software, version 3.4.2 (R Development Core Team, 2020) and its packages psych (Revelle, 2019).

6.2 Qualitative analysis of interviews and focus group discussions

To refine the construct of music receptivity, and to get inputs for item generation, we conducted unstructured in-depth interviews and focus group discussion.

Some of the ideas that emerged from the in-depth interviews were: the need to standardize the music and its duration appropriate to the clinical condition of an individual, the need to identify confounding factors in clinical application of music therapy, societal and cultural bases of emotion induction through music, precision of delivery of music, instrumental music may be therapeutically superior to other modes, necessity to account for a person's internal state while assessing degree of music receptivity (excerpts of the in-depth interview are provided in the supplementary materials for more information).

Some of the key ideas that came up from the FGD were: the need to match the music intervention to the mental state of the participant, the need to assess musical preferences beforehand in music therapy, music sense is a differential ability, pure instrumental music could invoke sublime emotions, choice of music should be based on the personality and the preference of the person, perfection in music performance is necessary to induce strong emotions in listeners, layman may not understand the finer nuances of a piece of music yet still have an ability to appreciate music, importance of knowing any negative associations that one may have to certain types of music or a particular piece of music, trained musicians may prefer music over

lyrics, innate interest greatly influences attention towards music, lyrics may not be necessary to bring out emotional experiences, etc. Further, the experts equivocally opined that such an instrument which could measure the depth of internalization to music and also appraise the nature and intensity of subjective experiences in music listening was absolutely necessary (See appendix).

6.2.1 Item generation

Items were generated based on the inputs obtained from the in-depth interviews and the FGD. One of the authors of this article is a post-graduate in Applied Psychology, trained as an Indian classical vocalist with over 15 years of performance experience and also an audiophile, prepared the items of the music receptivity scale. Two psychometric experts from the department of Psychology, University of Kerala, were also consulted. The consolidated questionnaire had 23 items designed to capture the domains of attention, interest, lyrical appraisal, emotional experience and hurdles. The first item had 35 items to capture the various emotions experienced, and had the rating scale of one to five, least to maximum experienced level of emotion. All other 22 items had responses on a 5-point Likert scale, strongly agree to strongly disagree. They were coded in such a way that higher score indicated higher music receptivity.

6.3 Factor analysis

As the aim of this study was to evaluate the structure of music receptivity scale (MRS), we used exploratory factor analysis to determine the number and nature of underlying factors of MRS. We used parallel analysis to determine the number of factors to retain (Horn, 1965); principal axis factoring was performed to evaluate the number of underlying factors by employing oblique rotation (oblimin) as the domains were anticipated to be correlated. Maximum iterations for convergence were fixed at 1000. The analyses revealed more than one solution. We report two possible solutions and another two-factor model with reduced items. We based our theoretical construct as the prime factor to decide upon the factor structure and then to check if it is further supported by the empirical data.

6.3.1 Factor analysis of pilot data (n=63)

Exploratory factor analysis on a sample of 63 was performed. Parallel analysis revealed two factors to be extracted. Bartlett's test of sphericity was performed to check suitability of performing factor analysis, and the result was statistically

significant showing that factor analysis can be performed. The Kaiser-Meyer-Olkin (KMO) test, a measure of sampling adequacy revealed that values for all the items were greater than 0.75 except for item number 3 (0.53), 16 (0.43) and 18 (0.62). The mean sampling adequacy was 0.84. Minimum value expected is 0.50, and 0.60 is mostly recommended. Pilot study data were used to optimize field administration, deduce adequate sample size, and probable structure of the music receptivity construct. It was observed that the ambiance of the study setup including sound system needed improvement.

6.3.2 Factor analysis of main data (n=313)

Parallel analysis suggested three factors to be extracted. Overall mean sample adequacy (MSA) was 0.88. MSA for individual items ranged from 0.40 to 0.94. MSA for item 18 alone was lower (0.40) and all other items' MSA were above 0.70. Bartlett's test of sphericity was significant (χ^2 (231) = 2468.79, $p < .001$). Principal axis factoring was performed on all the 22 items to determine the underlying factors by employing oblique rotation (oblimin) as we anticipated that the factors will be intercorrelated. We however, started by extracting five factors as per our theoretical predictions and later tried four-factor solution. The four-factor solution was closer to our theoretical model. Also, the two items, item 3 (*I was comfortable with my posture while listening to the given music*) and item 18 (*The music played was loud for my ears*) were removed as they weakly loaded. We accommodated these two items as a part of the instruction statement. It was obvious that we must take care of external environmental conditions before we attempt to measure music receptivity. Principal axis factoring was again performed on the reduced 20 items. Overall MSA was 0.89 and for individual items it ranged from 0.74 to 0.94. Bartlett's test of sphericity was also significant (χ^2 (190) = 2397.69, $p < .001$). Table 1 shows four factor and two factor solutions for the 20 item MRS.

Table 2: Four factor and two factor solutions for the 20 item MRS

Exploratory factor analysis showing the factor loadings from the pattern matrix for the 20-item MRS scale (n = 313), with four-factor and two-factor solutions

Items		Four-factor solution					Two-factor solution		
		Emotion	Interest	Attention	Hurdle	Communality	Affect	Attention	Communality
I17	The music 'moved me' / 'Touched my heart'.	**0.84**				0.73	**0.83**		0.68
I23	The lyrics of the music 'moved me' / 'touched my heart'.	**0.77**				0.61	**0.77**		0.58
I15	The music took me to another world.	**0.67**				0.58	**0.77**		0.58
I11	The music brought back good memories.	**0.62**				0.5	**0.67**		0.45
I21	While listening to the music, I was imaginative / creative.	**0.62**				0.42	**0.64**		0.41
I8	I got emotionally triggered while listening to the given music.	**0.54**				0.39	**0.6**		0.38
I19	The music evoked images and /or connected thoughts in my mind.	**0.4**				0.3	**0.55**		0.3
I20	I understood the meaning of the lyrics	**0.33**				0.16	**0.35**		0.12

	well.								
I14*	I did not like the lyrics of the given music.	**0.31**				0.31	**0.42**		0.27
I13	I would love to listen to this music again.	0.44	**0.5**			0.69	**0.79**		0.65
I2*	The given music was not interesting to me.		**0.54**			0.57	**0.68**		0.52
I5*	The given music sounded boring to me.		**0.77**			0.71	**0.66**		0.53
I4*	I was distracted due to daydreaming while listening to the given music.		**0.35**			0.26		**0.49**	0.24
I7*	My intensity of focus was varying while listening to the given music.			**0.55**		0.42		**0.5**	0.35
I22*	While listening to the music, I was disturbed / distracted by external factors.			**0.57**		0.3		**0.4**	0.16
I6*	It was difficult for me to be attentive while I was listening to the given music.		0.36	**0.45**		0.41		**0.53**	0.37
I9*	Although I wanted to be attentive on the whole, my attention was not up to the mark.			**0.63**		0.43		**0.56**	0.31
I16*	I associated disturbing /				**0.7**	0.43		**0.39**	0.16

	unpleasant memories or events with this music.								
I10*	Disturbing thoughts came into my mind while listening to the given music.				**0.58**	0.5		**0.64**	0.4
I12*	While listening to the given music, I was losing focus, going back and forth on daydreaming.		0.38		**0.31**	0.48		**0.68**	0.45
	Cumulative Variance	0.2	0.31	0.4	0.46		0.27	0.39	

Note: Items marked with * are reverse coded. Loadings less than 0.30 are suppressed.

The total variance explained by this 20 item scale is 46%.

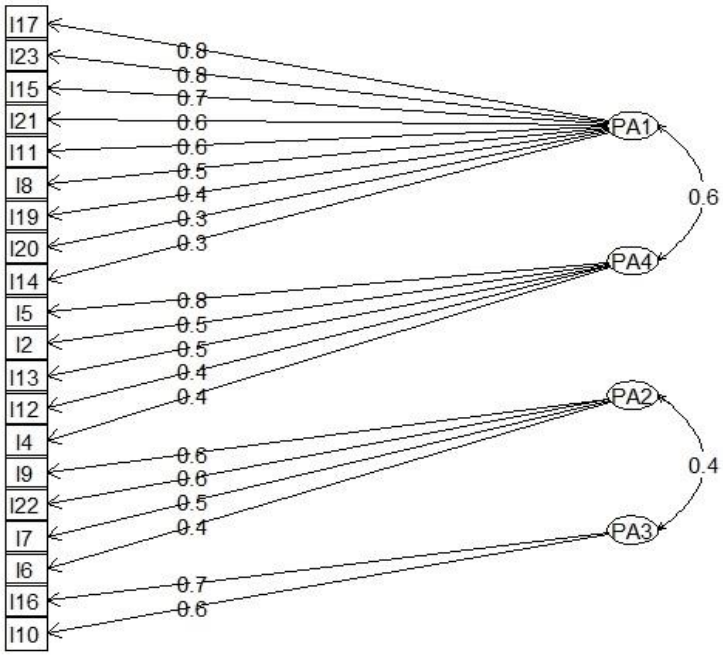

Fig. 2: Four factor solution for the 20 item MRS

Upon careful observation, we also noticed that some of the factors in the four-factor model are inter correlated and they can be converged to a two-factor solution. Figure 3 depicts the two-factor solution. The cumulative variance for this 20-item two-factor solution is 39%.

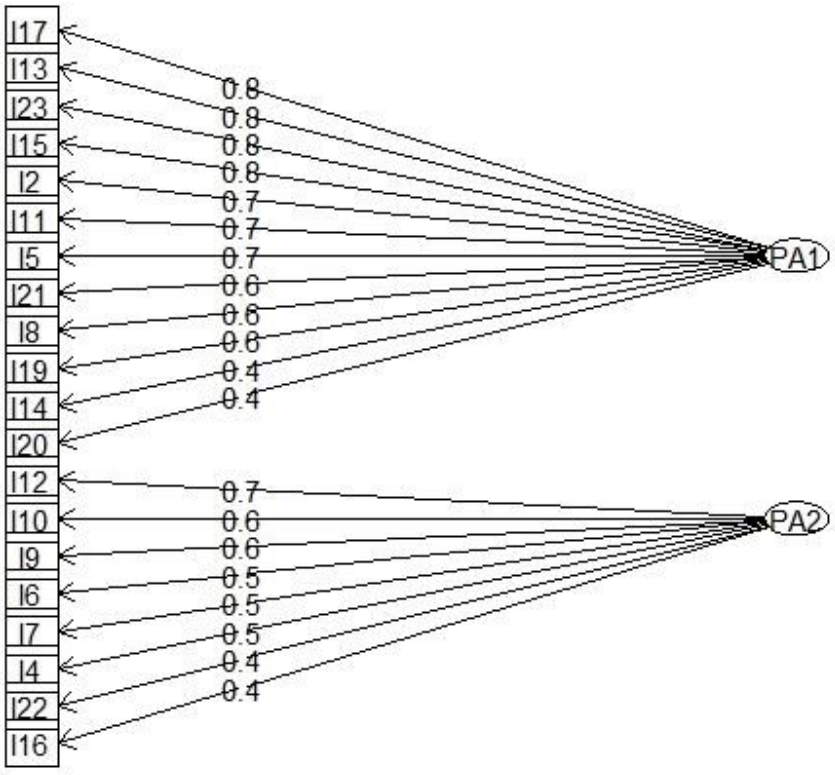

Fig. 3: Two factor solution for the 20 item MRS

Scale given below (table 2) had two factors with total variance explained of 45%. We further refined the two-factor model by removing certain items that had relatively weaker loadings or that had considerable cross-loadings. For this, items 3, 4, 6, 12, 13, 14, 16, 18, 19, 20 from the 22-items MRS were deleted. The resultant 12-item MRS explains with two factors explains 45% variance.

Table 3: Two factor solution for the 12 item MRS

Exploratory factor analysis showing the factor loadings from the pattern matrix for the 12-item short version of MRS scale (n = 313), with two-factor solution

		Two-factor solution		
	Items	Affect	Attention	Communality
I17	The music 'moved me' / 'Touched my heart'.	**0.84**		0.72
I23	The lyrics of the music 'moved me' / 'touched my heart'.	**0.79**		0.62
I15	The music took me to another world.	**0.76**		0.57
I2*	The given music was not interesting to me.	**0.68**		0.49
I11	The music brought back good memories.	**0.64**		0.44
I5	The given music sounded boring to me.	**0.63**		0.44
I21	While listening to the music, I was imaginative / creative.	**0.62**		0.38
I8	I got emotionally triggered while listening to the given music.	**0.61**		0.4
I9*	Although I wanted to be attentive on the whole, my attention was not up to the mark.		**0.66**	0.44
I7*	My intensity of focus was varying while listening to the given music.		**0.57**	0.42

I10*	Disturbing thoughts came into my mind while listening to the given music.		**0.53**	0.28
I22*	While listening to the music, I was disturbed / distracted by external factors.		**0.49**	0.24
	Cumulative Variance	0.33	0.45	

Note: Items marked with * are reverse coded. Loadings less than 0.30 are suppressed.

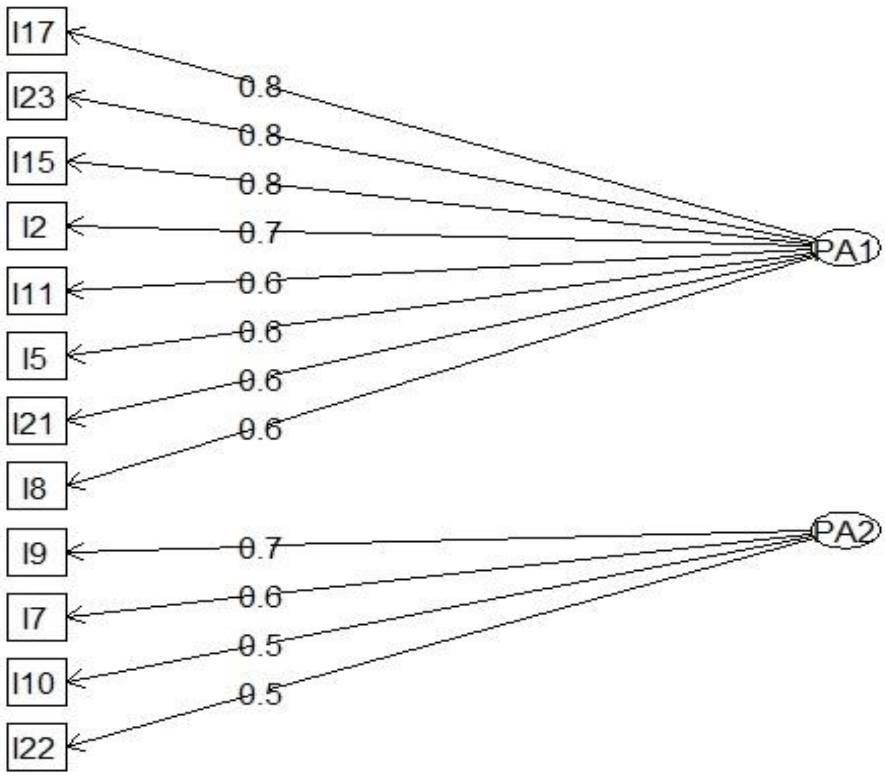

Fig. 4: Two factor solution for the 12 item MRS

We propose to label the two-factor solution as affect and attention. Under affect, both emotion and interest, which are the factors of our theoretical framework is assimilated. The four-factor solution had the factors: emotion, interest, attention, and hurdle, as expected from our theoretical framework. The lyrical appraisal factor however, did not clearly emerge.

6.4 Reliability of the Music Receptivity Scale

6.4.1 Internal consistency

The overall internal consistency measured using Cronbach's alpha was 0.89. For the 20-items four-factor solution, the alpha was: 0.81 (emotion), 0.84 (interest), 0.68 (attention), and 0.59 (hurdle). For the 20-items two-factor solution, the alpha were: 0.87 (affect), and 0.75 (attention).

6.4.2 Test-retest reliability

Test-retest was conducted on two different occasions, after 15 days and after 30 days. The test retest reliability was found to be very high, r (45) = .87, p < .001 for 15 days interval, and r (49) = .91, p < .001 for a 30 days interval. This suggests high temporal stability of the tool.

6.5 Validation of the first item

The first item in the Music Receptivity Scale attempts to capture the type of emotion captured after listening to the given piece of music. The validity of this first item would differ from context to context. In our study, we played a musical piece that was traditionally known to evoke predominantly positive emotions, especially sublime devotion, surrender, reflections, love, happiness, etc. In order to validate this, we used the principal component analysis to check if the responses get reduced to represent the main theme of the played song. The parallel analysis suggested three components. We observed that the first component had distinctively higher loadings in the pattern matrix compared to all other components, the first component's eigen value was 9. The items of this component converged to the theme of sublime devotion, surrender, love, acceptance, etc., unambiguously capturing the theme of the played song. Hence the first item also had good validity.

6.6 Factor analysis of the musicians data (n=44)

This sample consisted of music college students (males =40, females =4) and we antic ipated that this group will show higher scores on music receptivity. Following the pre vious analyses of the main study, two factors (affect and attention) were extracted, wh ich reproduced the results of the main study. The mean MRS score of musician group was significantly higher than the main study group, t (69.17) = 5.515, p < .001, d = 0. 46. Also, the variance of the musician group was significantly lower than the main stu

dy group, F (1,355) = 4.89, p = .028. This suggests likely discriminant validity of the MRS tool in this analysis between musicians and general population.

Considering the factor analysis results of the three subsets of data, we propose a two-factor solution for the music receptivity scale to be used for all general purposes, and for clinical purposes, a four-factor solution would be recommended.

6.7 Influence of social desirability

In any self-report measures, an element of social desirability may be there in responses. Hence to assess that, social desirability scale was used. The correlation between the total music receptivity score and total social desirability score was not statistically significant, $r(310) = .01$, $p = .834$, indicating that in this study sample, social desirability did not influence the music receptivity and suggest that this construct is not socially sensitive. However, this particular result needs to be reproduced across study setups before it can be generalized.

6.8 Result of validation of MRS among yoga population

This study mainly focused on evaluating the convergent and divergent validity of the Music Receptivity Scale. Towards this, d2 test of attention, Music Receptivity Scale (MRS), Interest in Music (IiM), Positive and Negative Affect Schedule (PANAS-SF), and Mind Wandering Scale (MWS) were employed.

Data Extraction

From the raw data, we extracted only TN (Total number of items processed), E1 (Error of omission), E2 (Error of commission), E (Total errors), E% (Error percentage), TN-E (Total number of items processed – Total errors), CP (Concentration performance), FR (Fluctuation rate). Similarly, data was extracted from other questionnaires on to an excel sheet for performing further analyses.

Reliability of scales

IIM (Interest in Music Scale)

Coefficient alpha for the Interest in Music Scale is 0.73 which shows acceptable reliab ility.

MWS (Mind Wandering Scale)

Alpha for the Mind Wandering scale is 0.7 indicating good internal consistency reliability.

panas_neg (Positive and Negative Affect Schedule)

Alpha for panas neg is 0.75, which shows acceptable reliability.

panas_pos (Positive and Negative Affect Schedule)

Panas pos gives the coefficient alpha value of 0.84, which denotes good reliability.

MRS_Tot (Music Receptivity Scale)

MRS Tot scores shows alpha = 0.88 which indicates high reliability

In Table 4, given on the next page, Pearson's correlation (r) value between Interest in Music Total (IiMTot) vs. Mind Wandering Total (MWTot) is 0.18 which indicates low correlation. For Mind wandering total score (MWTot) vs. Positive and Negative Affect Schedule Negative (PANASNeg), the r is 0.49 which means it is highly correlated. In Positive and Negative Affect Schedule Positive (PANASPos) vs. PANASNeg the r is -0.02 which means it is not correlated at all. In PANASPos vs. MRS_Emo (Emotion domain of the Music Receptivity Scale) the r is -0.36 which is negatively correlated. In MRS_Emo vs. MRS_Atten (Attention domain of the Music Receptivity Scale) the r is 0.21 which again is low correlation. In MRS_Atten vs. MRS_Int (Interest domain of the MRS) the r is 0.3 which suggests moderate correlation. In MRS_Int vs. MRS, the r is 0.65, which is high correlation, whereas in MRS_LA (Lyrical appraisal domain of the MRS) vs. MRS_Hrdl (Hurdle domain of the MRS) the r is 0.36, which again shows moderate correlation. In MRS Hrdl vs. d2 (E) test (errors) the r is 0.07 which is very low correlation. In E (errors) vs. d2 (CP – Concentration Performance) r is -0.38 which is negatively correlated. In CP vs. d2 (FR – Fluctuation Rate) the r is -0.37 which is also negatively correlated.

In table 5, given on page 84, corresponding p values associated with the correlation values are presented. MWTot was significantly correlated with PANASNeg, MRS_Atten, MRS_LA, MRS_Hrdl. PANASNeg was significantly correlated with MRS_Atten and MRS_Hrdl. PANASPos was significantly correlated with MRS_EMO, MRS_Int, MRS_LA, and MRS_Hrdl. MRS_Emo was significantly correlated with MRS_Int, MRS_Semant, and MRS_Hrdl. MRS_Atten was significantly correlated with MRS_Int, MRS_LA, and MRS_Hrdl. MRS_Int was significantly correlated with MRS_LA, and MRS_Hrdl. MRS_LA is significantly correlated with MRS_Hrdl.

Table 4: Pearson's correlation values of Music Receptivity Scale and other Scales (n=72)												
	IiMTot	MWTot	PANASNeg	PANASPos	MRS_Emo	MRS_Atten	MRS_Int	MRS_LA	MRS_Hrdl	E	CP	FR
IiMTot	1											
MWTot	0.18	1										
PANASNeg	0.03	0.49	1									
PANASPos	0.06	-0.19	-0.02	1								
MRS_Emo	-0.11	0.13	0.18	-0.36	1							
MRS_Atten	0.04	0.34	0.29	-0.3	0.21	1						
MRS_Int	-0.02	0.16	0.07	-0.48	0.57	0.3	1					
MRS_LA	-0.07	0.29	0.14	-0.47	0.61	0.28	0.65	1				
MRS_Hrdl	-0.07	0.32	0.33	-0.51	0.37	0.61	0.51	0.36	1			
D2 Test (E)	0.03	-0.02	0.1	0.07	-0.06	0.04	-0.06	-0.07	0.07	1		
D2 Test (CP)	0.03	0.07	0.03	-0.16	0.13	-0.14	0.05	0.11	0.05	-0.38	1	
D2 Test (FR)	-0.02	-0.17	-0.21	0.2	-0.17	-0.17	-0.09	-0.08	-0.17	0.27	-0.37	1

[IiM Tot – Interest in Music total value, MWTot- Mind Wandering Scale total value, PANAS – Positive and Negative Affect Schedule; Pos- positive, Neg- negative, MRS- Music Receptivity Scale; MRS_Emo- Emotion, MRS_Atten- Attention, MRS_Int- Interest, MRS_LA- Lyrical Appraisal, MRS_Hrdl- Hurdle, E- Errors, CP- Concentration Performance, FR- Fluctuation Rate]

Table 5: p values of correlation test: Music Receptivity Scale and other Scales (df=70)												
	IiMTot	MWTot	PANASNeg	PANASPos	MRS_Emo	MRS_Atten	MRS_Int	MRS_LA	MRS_Hrdl	E	CP	FR
IiMTot												
MWTot	0.14											
PANASNeg	0.78	<0.001***										
PANASPos	0.61	0.11	0.86									
MRS_Emo	0.37	0.29	0.13	<0.001***								
MRS_Atten	0.72	<0.001***	0.01**	0.01*	0.08							
MRS_Int	0.84	0.17	0.54	<0.001***	<0.001***	0.01**						
MRS_LA	0.59	0.01**	0.24	<0.001***	<0.001***	0.02*	<0.001***					
MRS_Hrdl	0.57	0.01**	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***	<0.001***				
E	0.81	0.88	0.43	0.56	0.61	0.74	0.61	0.54	0.55			
CP	0.78	0.56	0.81	0.18	0.28	0.24	0.66	0.35	0.66	<0.001***		
FR	0.89	0.15	0.07	0.10	0.16	0.15	0.47	0.52	0.15	0.02*	<0.001***	

[IiM Tot – Interest in Music total value, MWTot- Mind Wandering Scale total value, PANAS – Positive and Negative Affect Schedule; Pos- positive, Neg- negative, MRS- Music Receptivity Scale; MRS_Emo- Emotion, MRS_Atten- Attention, MRS_Int- Interest, MRS_LA- Lyrical Appraisal, MRS_Hrdl- Hurdle, E- Errors, CP- Concentration Performance, FR- Fluctuation Rate]