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Efficacy of Simulative Activities for Autistic Children with Hypersensitivity to Sensory Inputs

Abstract

The motive of the current study was to discern whether the sensations of children with autism spectrum disorder who inheritably acquired neurophysiologic abnormal conditions as well as experienced peri-natal complications received sensational simulation through activities based on the theorem of normalizing the disruption in everyday life enough to perceive or respond to extremes. The subjects taken from 17 special education schools (10 private schools and 7 government schools) of Faisalabad city were 57 boys and 59 girls = 116 autistic children with hypersensitiveness to sensory inputs with mean value of (1.9189), median value of (2.00), mode value of (2.00), standard deviation of (.7128) and variance of (.508) . From which 20 subjects were diagnosed with visual, 15 with auditory, 13 with tactile, 14 olfactory, 17 with gustatory, 18 with vestibular, 16 with proprioceptive and 4 with interoceptive defensiveness to sensory integration apparatus. Three age groups were formulated aged from 6 to 8 years with (frequency = 132 and percentage = 29.7), from 9 t0 11 with (frequency = 216 and percentage = 48.6) and from 12 t0 16 with (frequency = 96 and percentage = 21.6). The researchers chose 3, 2, 3, 2, 3, 4, and 3 activities for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive defensiveness respectively. Stratified sampling technique was used to assign the homogeneous participants into two groups. The subjects got specified simulative treatment daily for 40 minutes with appropriate apertures. A structured questionnaire on 5 point likert scale was used to collect data filled by the teachers selected through stratified sampling techniques. There were three follow-up assessments: 1, 2 and 3 months after the pre-test conducting by the teachers. The subjects improved after receiving simulative treatment with an emphasis on normalizing the impaired sensations applied to children within three months duration of experiment.

Key Words: Autism, Auditory, Gustatory, Interoceptive, Olfactory, Proprioceptive, Tactile, Visual.

Introduction

At least 1 out of 20 children's life is affected by (SPD) sensory processing disorder (Ahn, R. R., Miller, L. J., Milberger, S., & Mclntosh, D. N., 2004). 1 out of 6 children experience sensory experiences enough to devastate their academic and social functioning (Ben-Sasson, A., Carter, S. A., & Briggs-Gowan, J. M., 2009). Diminished social skills, fine and gross motor skills and daily life skills are the most commonly functional impairments associated with SPD (Kientz, M. A., & Dunn, W., 1997). Probably copying strategies such as mental preparation, avoidance, talking through counteracting, predictability and confrontation are time and energy consuming but have enthusiastic impacts on the functioning state of (SPD) sensory processing disorder (Kinnealey, M., Oliver, B., & Wilbarger, P., 1995). Fear, tension, depression, anxiety and stress significantly disrupt routine tasks performed by autistics (Bar-Shalita,T., Vatine, J-J., & Parush S., 2008). Treatments for sensory integration are thus important for diagnostic, intervene and rehabilitative point of view (Vargas S., & Camilli G., 1999). Restorative procedures with hyperactive children in behavioral, social and emotional areas have more worth over hypoactive as they respond to auditory, visual, gustatory, vestibular, proprioceptive, tactile and olfactory sensations in a better way. Tactile and vestibular sensations have credible effects

on processing of commands as compare to other sensations (Ayres, J. A., & Tickle, S. L., 1980). Sensory integration models serve well in stimulating as well as regulating behaviors by indulging the autistics into utilitarian activities (Smith, A. S., Press, B., Koenig, P. K., & Kinnealey, M., 2005). Undoubtedly the effects of therapeutic models of sensory integrations have empirical support either applied on population diagnosed with psychiatric, emotional or physical disorders. And in spite of wide spread application of therapeutic models, no criteria is found that can evaluate the developmental gains such as academic performance, language improvement or improvement in gross/fine motor (Kenneth Ottenbacher, 1982). Sensory integration developmental procedures have ultimate positive effects on academic achievement and gross/fine motor abilities of children identified as learning disabled (Polatajko, J. H., Law, M., Miller, J., Schaffer, R., & Macnab, J., 1991). Sensory integration interventions manifest decrease in autistic mannerism (Pfeiffer, A. B., Koenig, K., Kinnealey, M., Sheppard, M., & Henderson, L., 2011).

1. Research Gap and Rationale of the Study

Although a lot of researches have been conducted in past to investigate the effects of impaired sensations on developmental procedures of children with autism spectrum disorder but most of them were done in western developed countries. However, in Pakistani society this issue does not take keen and thorough interest of researchers. There was a great deal to explore the effects of simulative activities by covering the perception of teachers in the context of Pakistani society. Therefore, a few studies have been conducted so far by considering the practical aspects of Pakistani disabled population especially the impaired sensations under the abnormal conditions of neurophysiology. The study was mainly aimed at investigating the effects of simulative activities on children with autism spectrum disorder in their multi-dimensional procedures of development. Findings of the study will definitely help the parents, siblings, relatives, teachers, trainers as well as professionals to formulate and implement such effective aids that will minimize the effects of impaired sensations. It will hopefully open new horizons for new researchers in this field.

2. Statement of the Problem

The problem to be investigated was how simulative activities taken as determinant contribute to improve visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensational integration of the children with autism spectrum disorder.

3. Objective of the Study

- To investigate the efficacy of simulative activities in improving visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensational integration of the children with autism spectrum disorder.

4. Research Questions

Following questions were raised to address the research problem:

- What is the influence of independent variable (simulative activities) on dependent variables (visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations)?
- What is the significant contribution of independent variable (simulative activities) on dependent variables (visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations)?

5. Research Hypothesis

Keeping in view the above mentioned objectives, following hypotheses were formulated:

H_0: There would be significant effect of simulative activity 1 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_A: There would be insignificant effect of simulative activity 1 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_0: There would be significant effect of simulative activity 2 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_A: There would be insignificant effect of simulative activity 2 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_0: There would be significant effect of simulative activity 3 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_A: There would be insignificant effect of simulative activity 3 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_0: There would be significant effect of simulative activity 4 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.
H_A: There would be insignificant effect of simulative activity 4 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.

6. Research Methodology and Methods

In the current study, stratified sampling technique was used since the participants involved were the autistic children with impaired sensations (visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations). The intention of the research was to investigate the efficacy of simulative activities in improving visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensational integration of the children with autism spectrum disorder and, if there is significant or insignificant efficacy of simulative activities for impaired sensations.

7.1. Research Design

The method chosen for this research was descriptive as well as quantitative in its nature. Descriptive research was used by the researchers in the current study as it fundamentally describes characteristics of a population or phenomenon being tested. It does not typically answer such questions show/when/why the characteristics appeared, prevailed or happened in a distinctive population. It purely makes a speech to the question of "what" (what are the characteristics of the distinct population or phenomenon being tested?). Additionally, theorem of descriptive research antedates the hypotheses of explanatory research (Shields, Patricia and Hassan Tajalli., 2006). In a scientific method, an experiment is conducted; implemented and accomplished that adjudicates between observed models and expected models (Cooperstock, Fred I. 2009). Researchers also used experimentation to test existing theories or new hypotheses to support or disprove them (*Griffith, W. Thomas., 2001).* Quantitative method was chosen for its ability to enable the study's findings to be generalized over the population. This methodology enabled the researchers to endeavor the efficacy of simulative activities in improving visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensational integration of the children with autism spectrum disorder. In natural sciences and social sciences, quantitative research is the coherent and meticulous factual based investigation of discernible phenomena via mathematical, graphical, statistical or computational techniques. Such a procedure of measurement is central to quantitative research because it provides the core connection between real observation and statistical analyzed expression of quantitative relationships needed for accepting/not accepting the formulated hypotheses of the particular study. (Given, Lisa M., 2008). Measurement of observed and expected values is often considered a vital force by which collected surveillances are exhibited numerically in order to explore causal relations

or amalgamations. However, it has been expostulated that measurement often plays a vital role in quantitative research as done by the researchers in the current study (Moballeghi, M., & Moghaddam, G.G., 2008).

7.2. Target Population

The present study was included sample comprised of (n=116) autistic children with impaired sensations chosen by using stratified sampling technique. This technique was chosen by the researchers in the current study because stratified sampling technique could produce weighted arithmetic mean values with less variability than the arithmetic mean values of a simple random sample of a population.

7.3. Sampling Technique

Stratified sampling technique was used to choose the sample (n=116). It enabled the researchers to have reduction in variance when applied statistical methods in order to estimate population statistics from a known population.

7.4. Data Collection Method

A structured questionnaire on 5 point likert scale was provided to teachers for collecting as well as measuring the scores. When responding to a Likert questionnaire item, respondents specify their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements. Thus, the range captures the intensity of their feelings for a given item (Burns, Alvin; Burns, C. A., & Bush, F, R., 2008). A scale can be created as the simple sum of questionnaire responses over the full range of the scale. In so doing, Likert scaling assumes distances between each item are equal. Importantly, "All items are assumed to be replications of each other or in other words items are considered to be parallel instruments" (Alphen, van A., Halfens, R., Hasman, A., & Imbos, T., 1994). Likert scaling is a bipolar scaling method, measuring either positive or negative response to a statement. Sometimes an even-point scale is used, where the middle option of "Neither agree nor disagree" is not available. This is sometimes called a "forced choice" method, since the neutral option is removed (Allen, Seaman, E. I., & Christopher. 2007). Five response categories are often believed to represent an Interval level of measurement. But this can only be the case if the intervals between the scale points correspond to empirical observations in a metric sense (Reips, Funke, D. U., & Frederik., 2008).

7.5. Questionnaire Design

7.5. (a) Formulation of Questionnaire

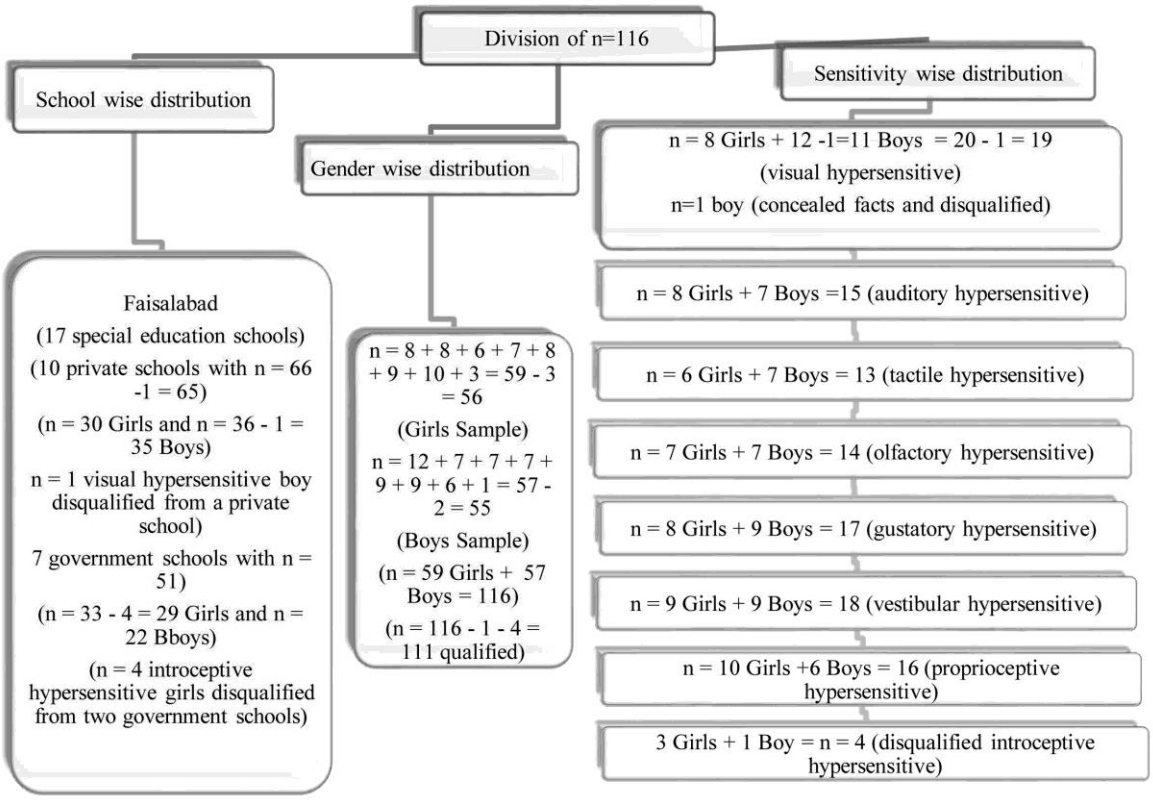
A structured questionnaire was formulated on a five point likert scale to investigate the efficacy of simulative activities for children with impaired sensations where 5 was considered for “excellent”, 4 for “very much”, 3 for “somewhat”, 2 for “slight” and 1 for “rare”. The questionnaire had 47 questions for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations. Collected data from the questionnaire was coded and analyzed by using Statistical Package for the Social Sciences (SPSS) that is a widely used for statistical analysis in social science. It enables the researchers to have descriptive statistics in the form of cross tabulation, frequencies, and ratios; bivariate statistics in the form of mean values, t-test, analysis of variance and correlation; and prediction for identifying groups in the form of factor analysis and cluster analysis (*Alan, B., & Duncan, C., 2011).*

Table 1:

Questionnaire Distribution					
Demographical Questions		Questions For Independent Variables		Questions For Dependent Variables	
Category	No. of Qs	Category	No. of Qs	Category	No. of Qs
Name	01	Simulative activities for visual hypersensitivity	03	Visual hypersensitivity to sensory input	10
Age	01	Simulative activities for auditory hypersensitivity	02	Auditory hypersensitivity to sensory input	06
Gender	01	Simulative activities for Tactile hypersensitivity	03	Tactile hypersensitivity to sensory input	10
Class	01	Simulative activities for olfactory hypersensitivity	02	Olfactory hypersensitivity to sensory input	04
School	01	Simulative activities for gustatory hypersensitivity	03	Gustatory hypersensitivity to sensory input	06
		Simulative activities for vestibular hypersensitivity	04	Vestibular hypersensitivity to sensory input	07
		Simulative activities for proprioceptive Hypersensitivity	03	Proprioceptive hypersensitivity to sensory input	04
Total	05	Total	20	Total	47

7.1. (b) Circulation of Questionnaire

Figure 1:



7.5. (c) Activity Supported Program

The researchers designed activity supported program that was easily implemented by the teachers working in special education schools. All the chosen activities were related to impaired sensations which were applied and executed for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive hypersensitive subjects. Each convenient activity designed for supporting sensational defensiveness was performed by each child with autism spectrum disorder during their school time with appropriate apertures under the supervision of skilled teachers. All the qualified subjects took the planned activities into account and performed well with their full devotion. Follow up sessions were performed at the end of 1st month, 2nd month and 3rd month after conducting the pre-test session.

Table 2:

Formulation of Focused Activities for Each Category of Hypersensitivity	
Category	Focused Activities
Simulative activities for visual hypersensitivity	Drawing and coloring, watching video game, picking, carrying and putting bright colored objects into their relevant colored bins.
Simulative activities for auditory hypersensitivity	Listening to natural sound recordings, encourage creating pleasant sounds with musical instruments.
Simulative activities for tactile hypersensitivity	Messy playing with textures, filling a bin with pencils, dressing up with unfamiliar clothes.
Simulative activities for olfactory hypersensitivity	Smell stuff activities with roze flowers and lemons, exploring scents.
Simulative activities for gustatory hypersensitivity	Activities with different flavored candies, slices of different fruits, slices of different vegetables.
Simulative activities for vestibular hypersensitivity	Picking up….and up….and up, swinging, sliding, “heads, shoulders, knees and toes” singing.
Simulative activities for proprioceptive Hypersensitivity	Sweeping the class room, digging in the school garden, jumping on a trampoline.

7.6. Research Instruments

In the current study, paired t-test and analysis of variance used to quantify the amount of interrelationship, variation or dispersion of the given set of variables. The researchers developed a structured questionnaire on five point likert scale for the teachers to measure the variables taken as determinants and their effects on the impaired sensations of the children with autism spectrum disorder.

7.7. Procedure of the Study

The current study was conducted in Faisalabad city in order to accomplish the requirement of the study. In the light of the objective, a questionnaire on 5 point likert scale was developed for the current study. The questionnaire was circulated to the sample chosen by using stratified sampling technique and filled by them within the given time period allocated for conducting the pre-test and post-tests. After that, the researchers determined statistical significance of the data by using statistical description through the Statistical Package for the Social Sciences (SPSS). At the end, hypotheses were tested and results were expounded.

7.8. Data Analysis

The researchers used Cronbach α (alpha) to find out the inter item consistency reliability of the collected data. In statistics, Cronbach's α (alpha) is used as a lower bound estimate of the reliability of a psychometric test (Cronbach L. J., 1951). It has been proposed that α can be viewed as the expected correlation of two tests that measure the same construct. By using this definition, it can be absolutely assumed that the average correlation of a set of items is an accurate estimate of the average correlation of all items that have relevance to a certain construct (Nunnally, J. C., 1978).The researchers used one-way analysis of variance for comparing and testing mean values of visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive hypersensitivity of the autistic children for statistical significance. Analysis of variance also helped the researchers to determine the significance level of each independent variable on each dependent variable which is probably the most helpful technique in the field of statistics for inferences about the probability distribution of the responses (Anderson, R. D., Sweeney, J. D., & Williams, A. T., 1996). Paired t-test was also used by the researchers to compare mean values in order to determine efficacy of activity 1, activity 2 and activity 3 based on the values obtained from the pre-test sessions and the follow-up assessment sessions that were performed at the end of 1st month's simulative treatment, 2nd month's simulative treatment and 3rd month's simulative treatment to all the subjects for all the hypersensitive dimensions through Statistical Package for the Social Sciences (SPSS).

8. Results

Table 3:

Categorical Description of Analysis (Evidence from the Analyzed Values Determined by Cronbach Alpha Interprets Satisfactory Internal Reliability of Item Consistency)									
Categories	Mean	Min	Max	Range	Max/Min	Variance	No. of Items	Cronbach Alpha	Grand Mean
Means of visual defensive subjects	3.269	3.243	3.315	.072	1.022	.001	10		3.2690
Variances of visual defensive subjects	1.539	1.470	1.589	.118	1.081	.002	10	.994	
Inter-item correlations of visual defensive subjects	.944	.920	.963	.043	1.047	.000	10		
							*Cum=10		
Means of auditory defensive subjects	3.281	3.259	3.304	.045	1.014	.000	06		3.2808
Variances of auditory defensive subjects	1.548	1.510	1.580	.070	1.046	.001	06	.993	
Inter-item correlations of auditory defensive subjects	.959	.944	.974	.030	1.031	.000	06		
							*Cum=16		
Means of tactile defensive subjects	3.261	3.234	3.282	.047	1.015	.000	10		3.2606
Variances of tactile defensive subjects	1.515	1.465	1.548	.083	1.057	.001	10	.996	
Inter-item correlations of tactile defensive subjects	.964	.919	.993	.073	1.080	.000	10		
							*Cum=26		
Means of olfactory defensive subjects	3.261	3.241	3.273	.032	1.010	.000	04		3.2607
Variances of olfactory defensive subjects	1.492	1.470	1.510	.040	1.027	.000	04	.992	
Inter-item correlations of olfactory defensive subjects	.968	.955	.974	.019	1.020	.000	04		
							*Cum=30		
Means of gustatory defensive subjects	3.238	3.191	3.273	.081	1.025	.001	06		3.2384
Variances of gustatory defensive subjects	1.487	1.472	1.499	.027	1.019	.000	06	.992	
Inter-item correlations of gustatory defensive subjects	.954	.930	.979	.049	1.053	.000	06		
							*Cum=36		
Means of vestibular defensive subjects	3.223	3.196	3.259	.063	1.020	.001	07		3.2230
Variances of vestibular defensive subjects	1.480	1.439	1.517	.078	1.054	.001	07	.992	
Inter-item correlations of vestibular defensive subjects	.948	.907	.996	.089	1.098	.001	07		
							*Cum=43		
Means of proprioceptive defensive subjects	3.225	3.214	3.236	.023	1.007	.000	04		3.2252
Variances of proprioceptive defensive subjects	1.450	1.447	1.454	.007	1.005	.000	04	.991	
Inter-item correlations of proprioceptive defensive subjects	.966	.950	.981	.031	1.033	.000	04	*Overall CA=.999	*Overall GM=22.76
							*Cum=47		

***Cum stands for cumulative items, *Overall CA stands for overall value of cronbach alpha,*Overall GM stands for overall value of grand mean**

Table 4:

Categorical Description of Analysis (Evidence from the Analyzed Values Determined by Analysis of Variance)						
Visual Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		6474.832	443	14.616	3.409	.000
Within People	Between Items	2.652	9	.295		
	Residual	344.572	3987	.086		
	Total	347.224	3996	.087		
Total		6822.056	439	1.537		
Auditory Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		3973.309	443	8.969	2.216	.050
Within People	Between Items	.710	5	.142		
	Residual	141.956	2215	.064		
	Total	142.667	2220	.064		
Total		4115.976	2663	1.546		

Tactile Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		6492.802	443	14.656	1.621	.103
Within People	Between Items	.798	9	.089		
	Residual	217.902	3987	.055		
	Total	218.700	3996	.055		
Total		6711.502	4439	1.512		
Olfactory Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		2579.547	443	5.823	1.775	.150
Within People	Between Items	.258	3	.086		
	Residual	64.492	1329	.049		
	Total	64.750	1332	.049		
Total		2644.297	1775	1.490		
Gustatory Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		3802.139	443	8.583	6.589	.000
Within People	Between Items	2.250	5	.295.450		
	Residual	151.250	2215	.068		
	Total	153.500	2220	.069		
Total		3955.639	2663	1.485		

Vestibular Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		4385.623	443	9.900	3.226	.004
Within People	Between Items	1.495	6	.249		
	Residual	205.362	2658	.077		
	Total	206.857	2664	.078		
Total		4592.480	3107	1.478		
Proprioceptive Hypersensitive Subjects		Sum of Squares	Df	Mean Square	F	Sig
Between People		2503.910	443	5.652	1.030	.378
Within People	Between Items	.153	3	.051		
	Residual	65.847	1329	.050		
	Total	66.000	1332	.050		
Total		2569.910	1775	1.448		

Table 5:

Pivot Table Description of Visual Hypersensitivity										
Categorical Questions	Particular Activities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Between Component Variance
						Lower Bound	Upper Bound			
Bright lights	Activity 1	32	4.3438	.78738	.13919	4.0599	4.6276	3.00	5.00	
	Activity 2	50	4.2200	.64807	.09165	4.0358	4.4042	3.00	5.00	
	Activity 3	29	4.4483	.82748	.15366	4.1335	4.7630	3.00	5.00	
Total	3	111	4.3153	.73833	.07008	4.1764	4.4542	3.00	5.00	
Model	Fixed Effects			.73894	.07014	4.1763	4.4543			
	Random Effects				.07014[a]	4.0135[a]	4.6171[a]			-.00138
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.049		.002		-.007		.741			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (16.2% with N=18) for "somewhat", (36.0% with N=40) for "very much", and (47.7% with N=53) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for bright lights" among visual defensive population on five point likert scale.									
Moving lights	Activity 1	32	4.4375	.71561	.12650	4.1795	4.6955	3.00	5.00	
	Activity 2	50	4.2200	.67883	.09600	4.0271	4.4129	3.00	5.00	
	Activity 3	29	4.3103	.84951	.15775	3.9872	4.6335	3.00	5.00	
Total	3	111	4.3063	.73599	.06986	4.1679	4.4447	3.00	5.00	
Model	Fixed Effects			.73700	.06995	4.1676	4.4450			
	Random Effects				.06995[a]	4.0053[a]	4.6073[a]			-.00227
Curve Fit	R		R Square		Adjusted R Square		Standard Error of Estimate			
	.068		.005		-.005		.738			

Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (16.2% with N=18) for "somewhat", (36.9% with N=41) for "very much", and (46.8% with N=52) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for moving lights" among visual defensive population on five point likert scale.									
Changes in lights	Activity 1	32	4.2188	.83219	.14711	3.9187	4.5188	3.00	5.00	
	Activity 2	50	4.2600	.75078	.10618	4.0466	4.4734	3.00	5.00	
	Activity 3	29	4.4828	.63362	.11766	4.2417	4.7238	3.00	5.00	
Total	3	111	4.3063	.74824	.07102	4.1656	4.4471	3.00	5.00	
Model	Fixed Effects			.74740	.07094	4.1657	4.4469			
	Random Effects				.07560	3.9810	4.6316			-.00193
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.129		.017		.008		.745			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (17.1% with N=19) for "somewhat", (35.1% with N=39) for "very much", and (47.7% with N=53) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for changes in lights" among visual defensive population on five point likert scale.									
Eye-rubbing	Activity 1	32	4.3750	.79312	.14020	4.0891	4.6609	3.00	5.00	
	Activity 2	50	4.2800	.70102	.09914	4.0808	4.4792	3.00	5.00	
	Activity 3	29	4.5172	.78471	.14572	4.2188	4.8157	3.00	5.00	
Total	3	111	4.3694	.74988	.07118	4.2283	4.5104	3.00	5.00	
Model	Fixed Effects			.75044	.07123	4.2282	4.5106			
	Random Effects				.07123[a]	4.0629[a]	4.6758[a]			-.00128
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.067		.004		-.005		.752			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (16.2% with N=18) for "somewhat", (30.6% with N=34) for "very much", and (53.2% with N=59) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "eye-rubbing" among visual defensive population on five point likert scale.									
Eye-hand-coordination	Activity 1	32	4.4688	.71772	.12688	4.2100	4.7175	3.00	5.00	
	Activity 2	50	4.3000	.64681	.09147	4.1162	4.4838	3.00	5.00	
	Activity 3	29	4.5172	.78471	.14572	4.2188	4.8157	3.00	5.00	
Total	3	111	4.4054	.70554	.06697	4.2727	4.5381	3.00	5.00	
Model	Fixed Effects			.70521	.06694	4.2727	4.5381			
	Random Effects				.06883[a]	4.1093	4.7015			-.00073
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			

	.021		.000		-.009		.709			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (12.6% with N=14) for "somewhat", (34.2% with N=38) for "very much", and (53.2% with N=59) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "eye-hand-coordination" among visual defensive population on five point likert scale.									
Attention span	Activity 1	32	4.3750	.75134	.13282	4.1041	4.6459	3.00	5.00	
	Activity 2	50	4.4000	.69985	.09897	4.2011	4.5989	3.00	5.00	
	Activity 3	29	4.7241	.59140	.10982	4.4992	4.9491	3.00	5.00	
Total	3	111	4.4775	.69866	.06631	4.3461	4.6089	3.00	5.00	
Model	Fixed Effects			.68916	.06541	4.3478	4.6071			
	Random Effects				.10700	4.0171	4.9379			-.02024
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.182		.033		.024		.690			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (11.7% with N=13) for "somewhat", (28.8% with N=32) for "very much", and (59.5% with N=66) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "attention span" among visual defensive population on five point likert scale.									
Eye contact	Activity 1	32	4.4688	.76134	.13459	4.1943	4.7432	3.00	5.00	
	Activity 2	50	4.3800	.63535	.08985	4.1994	4.5606	3.00	5.00	
	Activity 3	29	4.5517	.78314	.14542	4.2538	4.8496	3.00	5.00	
Total	3	111	4.4505	.71017	.06741	4.3169	4.5840	3.00	5.00	
Model	Fixed Effects			.71311	.06769	4.3163	4.5846			
	Random Effects				.06769[a]	4.1592[a]	4.7417[a]			-.00643
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.040		.002		-.008		.713			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (12.6% with N=14) for "somewhat", (29.7% with N=33) for "very much", and (57.7% with N=64) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "eye contact" among visual defensive population on five point likert scale.									
Eye blinking	Activity 1	32	4.3438	.78738	.13919	4.0599	4.6276	3.00	5.00	
	Activity 2	50	4.3200	.68333	.09664	4.1258	4.5142	3.00	5.00	
	Activity 3	29	4.5862	.73277	.13607	4.3075	4.8649	3.00	5.00	
Total	3	111	4.3964	.72962	.06925	4.2592	4.5336	3.00	5.00	
Model	Fixed Effects			.72733	.06904	4.2596	4.5332			
	Random Effects				.08113	4.0473	4.7455			-.00512
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			

	.120		.014		.005		.728			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (14.4% with N=16) for "somewhat", (31.5% with N=40) for "very much", and (54.1% with N=60) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "eye blinking" among visual defensive population on five point likert scale.									
Looking/thinking intently	Activity 1	32	4.4063	.79755	.14099	4.1187	4.6938	3.00	5.00	
	Activity 2	50	4.3600	.66271	.09372	4.1717	4.5483	3.00	5.00	
	Activity 3	29	4.5172	.78471	.14572	4.2188	4.8157	3.00	5.00	
Total	3	111	4.4144	.73198	.06948	4.2767	4.5521	3.00	5.00	
Model	Fixed Effects			.73586	.06984	4.2760	4.5529			
	Random Effects				.06984[a]	4.1139[a]	4.7149[a]			-.00874
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.054		.003		-.006		.734			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (14.4% with N=16) for "somewhat", (29.7% with N=33) for "very much", and (55.9% with N=62) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "looking/thinking intently" among visual defensive population on five point likert scale.									
Fingers flicking	Activity 1	32	4.5000	.71842	.12700	4.2410	4.7590	3.00	5.00	
	Activity 2	50	4.3600	.63116	.08926	4.1806	4.5394	3.00	5.00	
	Activity 3	29	4.5862	.77998	.14484	4.2895	4.8829	3.00	5.00	
Total	3	111	4.4595	.69784	.06624	4.3282	4.5907	3.00	5.00	
Model	Fixed Effects			.69758	.06621	4.3282	4.5907			
	Random Effects				.06768	4.1682	4.7507			-.00056
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.042		.002		-.007		.700			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (11.7% with N=13) for "somewhat", (30.6% with N=34) for "very much", and (57.7% with N=64) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "fingers flicking" among visual defensive population on five point likert scale.									

Table 6:

Pivot Table Description of Auditory Hypersensitivity

Categorical Questions	Particular Activities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Between Component Variance
						Lower Bound	Upper Bound			
Atmospheric noises	Activity 1	56	4.5000	.68755	.09188	4.3159	4.6841	3.00	5.00	
	Activity 2	55	4.3818	.75745	.10214	4.1770	4.5866	3.00	5.00	
Total	2	111	4.4414	.72218	.06855	4.3056	4.5773	3.00	5.00	
Model	Fixed Effects			.72303	.06863	4.3054	4.5775			
	Random Effects				.06863[a]	3.5695[a]	5.3134[a]			-.00244
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.082		.007		-.002		.723			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (13.5% with N=15) for "somewhat", (28.8% with N=32) for "very much", and (57.7% with N=64) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for atmospheric noises" among auditory defensive population on five point likert scale.									
Man-made noises	Activity 1	56	4.4286	.70986	.09486	4.2385	4.6187	3.00	5.00	
	Activity 2	55	4.0000	.73535	.09915	4.2012	4.5988	3.00	5.00	
Total	2	111	4.4144	.71945	.06829	4.2791	4.5497	3.00	5.00	
Model	Fixed Effects			.72260	.06859	4.2785	4.5503			
	Random Effects				.06859[a]	3.5429[a]	5.2859[a]			-.00900
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.020		.000		-.009		.723			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (13.5% with N=15) for "somewhat", (31.5% with N=35) for "very much", and (55.0% with N=61) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for man-made noises" among auditory defensive population on five point likert scale.									
Appliance noises	Activity 1	56	4.4107	.70780	.09458	4.2212	4.6003	3.00	5.00	
	Activity 2	55	4.3455	.77503	.10451	4.1359	4.5550	3.00	5.00	
Total	2	111	4.3784	.73921	.07016	4.2393	4.5174	3.00	5.00	
Model	Fixed Effects			.74187	.07041	4.2388	4.5179			
	Random Effects				.07041[a]	3.4837[a]	5.2731[a]			-.00779
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.004		.002		-.007		.742			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (31.5% with N=35) for "very much", and (53.2% with N=59) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "tolerance for appliance noises" among auditory defensive population on five point likert scale.									

Transition from quiet to loud	Activity 1	56	4.4464	.71146	.09507	4.2559	4.6370	3.00	5.00	
	Activity 2	55	4.3455	.72567	.09785	4.1493	4.5416	3.00	5.00	
Total	2	111	4.3964	.71706	.06806	4.2615	4.5313	3.00	5.00	
Model	Fixed Effects			.71853	.06820	4.2612	4.5316			
	Random Effects				.06820[a]	3.5298[a]	5.2630[a]			-.00421
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.071		.005		-.004		.719			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (13.5% with N=15) for "somewhat", (33.3% with N=40) for "very much", and (53.2% with N=59) for "excellent" evinced divisional contribution of determinants taken as independent variables in developing "transition from quiet to loud " among auditory defensive population on five point likert scale.									
Covering ears	Activity 1	56	4.5179	.66033	.08824	4.3410	4.6947	3.00	5.00	
	Activity 2	55	4.4182	.78625	.10602	4.2056	4.6307	3.00	5.00	
Total	2	111	4.4685	.72388	.06871	4.3323	4.6046	3.00	5.00	
Model	Fixed Effects			.72545	.06886	4.3320	4.6049			
	Random Effects				.06886[a]	3.5936[a]	5.3434[a]			-.00452
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.069		.005		-.004		.725			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (13.5% with N=15) for "somewhat", (26.1% with N=29) for "very much", and (60.4% with N=67) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "covering ears" among auditory defensive population on five point likert scale.									
Startle by whisper	Activity 1	56	4.4286	.70986	.09486	4.2385	4.6187	3.00	5.00	
	Activity 2	55	4.3818	.75745	.10214	4.1770	4.5866	3.00	5.00	
Total	2	111	4.4054	.73086	.06937	4.2679	4.5459	3.00	5.00	
Model	Fixed Effects			.73382	.06965	4.2674	4.5435			
	Random Effects				.06965[a]	3.5204[a]	5.2904[a]			-.00861
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.032		.001		-.008		.720			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (14.4% with N=16) for "somewhat", (30.6% with N=34) for "very much", and (55.0% with N=61) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "startle by whisper" among auditory defensive population on five point likert scale.									

Table 7:

Pivot Table Description of Tactile Hypersensitivity										
Categorical Questions	Particular Activities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Between Component Variance
						Lower Bound	Upper Bound			
Distress by light touch	Activity 1	33	4.3030	.68396	.11906	4.0605	4.5456	3.00	5.00	
	Activity 2	50	4.3400	.79821	.11288	4.1132	4.5668	3.00	5.00	
	Activity 3	28	4.5714	.69007	.13041	4.3038	4.8390	3.00	5.00	
Total	3	111	4.3874	.74065	.07030	4.2481	4.5267	3.00	5.00	
Model	Fixed Effects			.73941	.07018	4.2483	4.5265			
	Random Effects				.07699	4.0561	4.7186			-.00282
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.049		.002		-.007		.741			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (30.6% with N=34) for "very much", and (54.1% with N=60) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "distress by light touch" among tactile defensive population on five point likert scale.									
Tip-toe walking	Activity 1	33	4.2727	.67420	.11736	4.0337	4.5118	3.00	5.00	
	Activity 2	50	4.3400	.82338	.11644	4.1060	4.5740	3.00	5.00	
	Activity 3	28	4.5357	.63725	.12043	4.2886	4.7828	3.00	5.00	
Total	3	111	4.3694	.73766	.07002	4.2306	4.5081	3.00	5.00	
Model	Fixed Effects			.73742	.06999	4.2306	4.5081			
	Random Effects				.07134	4.0624	4.6763			-.00054
Curve Fit	R		R Square		Adjusted R Square		Standard Error of Estimate			
	.068		.005		-.005		.738			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (32.4% with N=36) for "very much", and (52.3% with N=58) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "tip-toe walking" among tactile defensive population on five point likert scale.									
Ticklish behavior	Activity 1	33	4.1627	.68410	.13336	4.1227	4.4318	3.00	5.00	
	Activity 2	50	4.3201	.81815	.11545	4.1772	4.4928	3.00	5.00	
	Activity 3	28	4.5005	.62928	.11962	4.2331	4.7569	3.00	5.00	
Total	3	111	4.3514	.73421	.06969	4.2132	4.4895	3.00	5.00	
Model	Fixed Effects			.73551	.06981	4.2130	4.4897			
	Random Effects				.06981[a]	4.0510[a]	4.6517[a]			-.00293

Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.129		.017		.008		.745			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (34.2% with N=38) for "very much", and (50.5% with N=56) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "ticklish behavior" among tactile defensive population on five point likert scale.									
Difficulty with being touched	Activity 1	33	4.1777	.68420	.12736	4.0317	4.5289	3.00	5.00	
	Activity 2	50	4.3851	.87334	.12489	4.1517	4.6189	3.00	5.00	
	Activity 3	28	4.5220	.63728	.12542	4.2435	4.6175	3.00	5.00	
Total	3	111	4.3784	.72681	.06899	4.2417	4.5151	3.00	5.00	
Model	Fixed Effects			.72855	.06915	4.2413	4.5154			
	Random Effects				.06915[a]	4.0808[a]	4.6759[a]			-.00390
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.067		.004		-.005		.752			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (14.4% with N=16) for "somewhat", (33.3% with N=37) for "very much", and (52.3% with N=58) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "difficulty with being touched " among visually defensive population on five point likert scale.									
Skin rubbing	Activity 1	33	4.2719	.67423	.11696	4.0327	4.5308	3.00	5.00	
	Activity 2	50	4.3408	.82341	.12534	4.1162	4.5840	3.00	5.00	
	Activity 3	28	4.5557	.63725	.12043	4.2886	4.7828	3.00	5.00	
Total	3	111	4.3694	.73766	.07002	4.2306	4.5081	3.00	5.00	
Model	Fixed Effects			.73742	.06999	4.2306	4.5081			
	Random Effects				.07134	4.0624	4.6763			-.00054
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.021		.000		-.009		.709			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (32.4% with N=36) for "very much", and (52.3% with N=58) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "skin rubbing" among tactile defensive population on five point likert scale.									
Extreme react when	Activity 1	33	4.3127	.65420	.12336	4.0347	4.5128	3.00	5.00	
	Activity 2	50	4.3410	.82338	.11644	4.1060	4.5740	3.00	5.00	

being touched	Activity 3	28	4.5000	.63828	.12062	4.2525	4.7475	3.00	5.00	
Total	3	111	4.3604	.73599	.06986	4.2219	4.4988	3.00	5.00	
Model	Fixed Effects			.73765	.07001	4.2216	4.4991			
	Random Effects				.07001[a]	4.0591[a]	4.6616[a]			-.00374
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.182		.033		.024		.690			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (33.3% with N=37) for "very much", and (51.4% with N=57) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "extreme react when being touched " among tactile defensive population on five point likert scale.									
Difficulty with washing	Activity 1	33	4.3333	.69222	.12050	4.0879	4.5788	3.00	5.00	
	Activity 2	50	4.3803	.83029	.11742	4.1440	4.6160	3.00	5.00	
	Activity 3	28	4.5357	.63725	.12043	4.2886	4.7828	3.00	5.00	
Total	3	111	4.4054	.74319	.07054	4.2656	4.5452	3.00	5.00	
Model	Fixed Effects			.74584	.07079	4.2651	4.5457			
	Random Effects				.07079[a]	4.1008[a]	4.7100[a]			-.00605
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.040		.002		-.008		.713			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (15.3% with N=17) for "somewhat", (28.8% with N=32) for "very much", and (55.9% with N=62) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "difficulty with washing" among tactile defensive population on five point likert scale.									
Difficulty with outside temperature	Activity 1	33	4.3939	.65857	.11464	4.1604	4.6275	3.00	5.00	
	Activity 2	50	4.3400	.82338	.11644	4.1060	4.5740	3.00	5.00	
	Activity 3	28	4.5000	.63828	.12062	4.2525	4.7475	3.00	5.00	
Total	3	111	4.3964	.72962	.06925	4.2592	4.5336	3.00	5.00	
Model	Fixed Effects			.73345	.06962	4.2584	4.5344			
	Random Effects				.06962[a]	4.0969[a]	4.6959[a]			-.00860
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.120		.014		.005		.728			

Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (14.4% with N=16) for "somewhat", (31.5% with N=35) for "very much", and (54.1% with N=60) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "difficulty with outside temperature " among tactile defensive population on five point likert scale.									
Difficulty with haircuts	Activity 1	33	4.2771	.67121	.11716	4.0317	4.5717	3.00	5.00	
	Activity 2	50	4.3345	.81934	.11376	4.0372	4.5327	3.00	5.00	
	Activity 3	28	4.4246	.62463	.12075	4.1296	4.7230	3.00	5.00	
Total	3	111	4.3423	.74462	.07378	4.2223	4.4624	3.00	5.00	
Model	Fixed Effects			.74777	.07098	4.2017	4.4830			
	Random Effects				.07098[a]	4.0370[a]	4.6477[a]			-.00722
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.054		.003		-.006		.734			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (16.2% with N=18) for "somewhat", (33.3% with N=37) for "very much", and (50.5% with N=56) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "difficulty with haircuts" among tactile defensive population on five point likert scale.									
Feelings of being dirty	Activity 1	33	4.2827	.68420	.12736	4.0338	4.5118	3.00	5.00	
	Activity 2	50	4.3436	.82342	.11664	4.1080	4.5746	3.00	5.00	
	Activity 3	28	4.4648	.69298	.13098	4.1958	4.7338	3.00	5.00	
Total	3	111	4.3514	.74649	.07085	4.2109	4.4918	3.00	5.00	
Model	Fixed Effects			.74987	.07117	4.2103	4.4924			
	Random Effects				.07117[a]	4.0451[a]	4.6576[a]			-.00778
Curve Fit	R		R Square		Adjusted R Square		Standard Error of the Estimate			
	.042		.002		-.007		.700			
Inference	With test of homogeneity of variances for "tolerance for bright lights" with Levene Statistic of (3.391) exhibited significance of (.037) on df1 (2) and df2 (108), overall effect of above formulated activities secured marginal percentage of (16.2% with N=18) for "somewhat", (32.4% with N=36) for "very much", and (51.4% with N=57) for "excellent" evinced divisional contribution of determinants taken as independent variables in repressing "feelings of being dirty " among tactile defensive population on five point likert scale.									

Table 8:

Pivot Table Description of Olfactory Hypersensitivity										
Categorical Questions	Particular Activities	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	Between Component Variance
						Lower Bound	Upper Bound			
Noticing	Activity 1	54	4.3398	.77738	.13889	4.0619	4.5976	3.00	5.00	

8. Discussion

The purpose of the study was to investigate the effects of simulative activities for hypersensitive sensations in children with autism spectrum disorder. Undoubtedly, much work has been done in this field; however, in review of literature, a few studies were found related to the efficacy of the simulative activities. In past, significance of indoor as well as outdoor activities was not considered as an advantageous instrument in bringing the autistic children up to surface with composed sensations, but now a days, increased awareness has markedly acknowledge the existence of simulative ways in attaining more and more satisfactory and independent living. From the obtained results, the researchers can say:

- Pre-test score and post-test scores for activity 1 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are weakly but positively correlated such as $r = 0.234$, $p < 0.001$.
- There was a significant average difference between pre-test score and post-test scores for activity 1 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations such as $t_{114} = 16.211$, $p < 0.001$.
- On average, post-test scores for activity 1 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are 18 points higher than pre-test score such as 95% Confidence Interval [13.34, 19.26].
- Pre-test score and post-test scores for activity 2 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are weakly but positively correlated such as $r = 0.238$, $p < 0.001$.
- There was a significant average difference between pre-test score and post-test scores for activity 2 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations such as $t_{114} = 18.231$, $p < 0.001$.
- On average, post-test scores for activity 2 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are 21 points higher than pre-test score such as 95% Confidence Interval [14.36, 18.27].
- Pre-test score and post-test scores for activity 3 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are weakly but positively correlated such as $r = 0.240$, $p < 0.001$.
- There was a significant average difference between pre-test score and post-test scores for activity 3 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations such as $t_{114} = 16.301$, $p < 0.001$.
- On average, post-test scores for activity 3 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are 19 points higher than pre-test score such as 95% Confidence Interval [14.38, 19.19].
- Pre-test score and post-test scores for activity 4 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are weakly but positively correlated such as $r = 0.312$, $p < 0.001$.
- There was a significant average difference between pre-test score and post-test scores for activity 4 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations such as $t_{114} = 17.276$, $p < 0.001$.
- On average, post-test scores for activity 4 for visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations are 24 points higher than pre-test score such as 95% Confidence Interval [13.39, 19.08].

In this way, null hypotheses for the formulated activities are strongly supported by results in favor of alternative hypotheses and are significant at 0.05 levels (2-tailed). It is obvious from

tables 5 to 11 that there is a positive correlation between simulative activities and hypersensitive responses to sensory inputs observed by Pearson's correlation. On other hand, the researchers can say on behalf of obtained results that alternative hypotheses are not supported in favor of null hypotheses which ultimately determine the efficacy of all the formulated simulative activities for all the hypersensitive senses regarding to reduce impaired sensational effect among the autistic children. Tables from 5 to 11 also manifest that simulative activities play pivotal role in reducing the effect of impaired senses.

Table 12:

Acceptance/Not Acceptance of the Formulated Hypothesis of the Study on the Basis of the Above Analyzed Results	
Formulated Hypotheses	Remarks
H_0: There would be significant effect of simulative activity 1 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Accepted
H_A: There would be insignificant effect of simulative activity 1 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Not Accepted
H_0: There would be significant effect of simulative activity 2 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Accepted
H_A: There would be insignificant effect of simulative activity 2 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Not Accepted
H_0: There would be significant effect of simulative activity 3 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Accepted
H_A: There would be insignificant effect of simulative activity 3 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Not Accepted
H_0: There would be significant effect of simulative activity 4 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Accepted
H_A: There would be insignificant effect of simulative activity 4 on visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive sensations.	Not Accepted

9. Findings

Effectiveness of simulative activities for visual hypersensitivity was found 28.8%, 45.0% and 26.1% respectively for each designed activity with value of chi-square (67.022); for auditory hypersensitivity, it was found 50.5% and 49.5% respectively for each designed activity with value of chi-square (17.322); for tactile hypersensitivity, it was found 29.7%, 45.0% and 25.2% respectively for each designed activity with value of chi-square (33.910); for olfactory hypersensitivity, it was found 48.6% and 51.4% respectively for each designed activity with value of chi-square (6.149); for gustatory hypersensitivity, it was found 27.0%, 42.3% and 30.6% respectively for each designed activity with value of chi-square (34.533); for vestibular hypersensitivity, it was found 17.1%, 30.6%, 27.0 and 25.2% respectively for each designed activity with value of chi-square (58.300); and for proprioceptive hypersensitivity, it was found 33.3%, 41.4% and 25.2% respectively for each designed activity with value of chi-square (18.967).

10. Conclusions

The aim of current study was to investigate the effects of simulative activities on hypersensitive sensations for children with autism spectrum disorder. This research ended on the statement that simulative activities reserve substantial effects in diminishing the hypersensitivity to sensory inputs among children with autistic spectrum disorder. The current study comprised a sample of (n= 116) with visual, auditory, tactile, olfactory, gustatory, vestibular and proprioceptive hypersensitivity selected from seventeen schools of special education situated in Faisalabad city with age range of 6 to 8 years, 9 to 11 years and 12 to 16 years. Pearson's correlation, One-way analysis of variance and Paired t-test were used for statistical analysis through Statistical Package for the Social Sciences (SPSS). Findings of the research strongly support null hypothesis with significant percentage of excellent results in favor of simulative activities in all the hypersensitive dimensions else interoceptive hypersensitivity to sensory inputs. Findings of the research may also be helpful for parents, teachers as well as caregivers to put worthwhile simulative activities in an application for the betterment of the hypersensitive segment of population.

11. Limitations and Future Scope

The current study was limited to explore the efficacy of certain simulative activities for autistic children with hypersensitive to visual, auditory, tactile, olfactory, gustatory, and vestibular and propriocetive sensory inputs. Similarly, the efficacy of simulative activities can also be explored for autistic children with hyposensitive to visual, auditory, tactile, olfactory, gustatory, and vestibular and propriocetive sensory inputs which was not contemplated in the current research. Effects of certain simulative activities were observed by the researchers while the effects of many more supplementary activities might be traversed. Effects of simulative activities were explored for the autistic children aged from 6 to 8 years, 9 to 11 years and 12 to 16 years. Undoubtedly, these years have great importance in the developmental procedures of children, collaterally the prenatal process until birth and above 16 years are also crucial stages on which the effects of simulative activities must be investigated in ongoing researches. The researcher's study was limited to Faisalabad city only. Cultural differences might provide different results to the researchers. Therefore, it can be said that the scope of the study was limited in its nature. Further scope and opportunities in this field are lying ahead in future for new researchers. Hopefully, the current study would be of great help for further researchers.

12. Recommendations

Following recommendations were made by the researchers:

1. Simulative activities should be promoted in schools by the teachers and in homes by the parents in order to minimize the effect of impaired sensations.

2. Adaptations should be considered to address the access and learning needs of autistic children with hypersensitive to sensory inputs.

3. Counseling, family support and financial assistance should also be granted.

References

1. Ahn, R. R., Miller, L. J., Milberger, S., & Mclntosh, D. N. (2004). Prevalence of Parent's Perceptions of Sensory Processing Disorders among Kindergarten Children. *American Journal of Occupational Therapy,* 58, 287-293.

21. *Alan, B., & Duncan, C. (2011). Quantitative Data Analysis with IBM SPSS 17, 18 and 19: A Guide for Social Scientists. New York: Routledge.*
22. Cronbach, L. J. (1951). "Coefficient Alpha and the Internal Structure of Tests".*Psychometrika* 16, 3, 297–334.
23. Nunnally, J. C. (1978). Assessment of Reliability. In Psychometric Theory (2nd Ed.). New York: McGraw-Hill.
24. *Anderson, R. D., Sweeney, J. D., & Williams, A. T. (1996). Statistics for Business and Economics (6th Ed.). Minneapolis/St. Paul: West Pub. Co. pp. 452–453.*