

A Comparative Study of Brain Systems Behavior in Students with Behavioral Disorders and Normal Students

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Abstract

A comparative study of brain systems between the behavior of students with behavioral disorders (ADHD, ODD and CD) and also the students without a diagnosis of behavioral disorder (normal students) who were matched for variables, as age and sex were selected as a comparison group. The study groups consisted of all the boys and girls with behavioral disorders in exceptional schools in Alborz province, Iran. Totally, the group size was 340 for all three disorders, and normal students were 113. For the measurement of the data and information, BIS-BAS questionnaire and Rutter behavioral questionnaire were used. The results of the questionnaires were analyzed by SPSS and ANOVA method. Furthermore, the results showed that the normal students in regular normal schools were reported to function better in behavioral brain than other students with behavioral disorders. This item was considered to determine the behavior of brain systems in test scores and scores on the scale indicated a positive correlation was in Rutter behavior disorders.

Keywords: Behavioral inhibition system; Behavioral activation system; Behavioral disorders; Normal students

Introduction

Childhood as the most sensitive period of life is highly important in formation of mental health. Some recent studies have indicated that specific types of behavioral disorders, among other emotional disorders are in high rate during school years, like conduct disorder (CD) and oppositional defiant disorder (ODD) [1]. Also, the *attention-deficit/hyperactivity disorder (ADHD)* as the other type of behavioral disorder is studied in the current research. However, the accurate recognition of prevention and treatment concerning the brain systems is a worthy step. The mood and a behavioral approach system (BAS) or a behavioral inhibition system (BIS) is normally observable from early childhood. So, the initial identification, prevention or treatment of the problems can contribute to the individual's anxiety.

Gray presented an alternative personality theory which was turned to Eysenck's model [2], this theory with psychobiological perspective was indicated in three factors: "EPS"; Extraversion "E"; Neuroticism "N"; and Psychoticism "P" [2]. Gray also proposed a neurological anchored emotion system which was included the behavioral approach system (BAS), the fight/flight system (FFS), and the behavioral inhibition system (BIS). Gray reported BAS hyper-activation was related to sense of reward signals in children and hyper activation of BIS was related to sensitivity to punishment signals [3,4]. In summary, BAS activation (addictive behaviors) was included the response to conditioned rewards, non-punishment or novelty [5]. And the response of BIS was punishment conditioned signals and non-reward signals [6].

BAS was responsible for the positive feelings or experiences, like: hope and happiness or component of mania [7], and also BIS were responsible for emotional disorders, experience and negative feelings, like: fear, anxiety, frustration, depression, obsessive-compulsive disorder, delinquency and hyperactivity (ADHD) [4,8]. The children with the greatest BIS sensitivity have more reflected to anxiety [9-11]. Also, the greater BAS sensitivity has more reflected to the engage in goal-directed efforts and the person is exposed to the cues of impending reward [12]. In addition, FFS was sensitive to unconditioned aversive stimuli, (the emotion mediates of rage and panic) and also, the behavior effects on unconditioned aversive events [10,11]. Some studies suggest both BIS and BAS systems were mediated peripheral by the autonomic nervous system. This led us to expect that

the high BIS and high BAS sensitivity were associated with increased sympathetic activity [6]. Thus, BIS/BAS systems were related to slightly moderate, but not the point of redundancy [12,13].

Methods

Participants

Participants were children in primary school in all three disorders (N=340), these volumes were considered among the group of students with behavioral disorders, each disorders volume was ADHD: 113, ODD: 113 and CD: 114. And the volume in the normal students or without a diagnosis of behavioral disorders students was 113 (half girls/half boys in each condition "ADHD, ODD, CD and normal individuals"), that were chosen with the random method in exceptional primary schools, and normal primary schools in Alborz province, Iran. The normal students were matched in some variables, like age and sex. The participants for all three disorders recognized by doctors and psychologists in the different places like clinics or hospital, and for assessing children for ODD and ADHD used various tools were applied for the assessment of the children, included of: the Anxiety disorder interview schedule (ADIS-C), the child behavior checklist (CBCL) and the SDQ questionnaire that administered to parents and teachers which this algorithm makes separate predication for CD and HDHD. After identifying the children with behavioral disorders from their record files, tests were taken to assess them. The current study was done through cross-sectional method with using MANOVA, and SPSS to analyze the hypotheses in the present research. This study was based on, an ex post facto design (scientific-comparative).

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Instruments

Carver’s and white’s behavioral activation system/behavioral inhibition system scale (BIS/BAS) scales: There were few instruments of BAS and BIS for assessment of children. The review of the measurements presents an instrument of children’s BIS and BAS scale [14], which were self-reported and used for assessing the sensitivity of BIS/BAS (extend by Gray’s theory). These measures have two main controlling behavior systems. The scales were included of comprises of 20 scored items and four filler items. BAS have three Subscales: 1) BAS drive (BAS-Drv) contained 4 items indicative of persistence in obtaining desired goals, 2) BAS fun-seeking (BAS-FS) contained: willingness to seek out and spontaneously approach potentially rewarding experiences, and 3) BAS reward responsiveness (BAS-RR) contained anticipation and positive response towards rewards. Also, BIS a four-point Likert-type scales was used (1=strongly disagree, 4=strongly agree). The subscale has five items which were designed to assess positive response to reward stimuli. BIS/BAS scales were associated with prefrontal cortical activity, affect, personality traits, and performance on reaction-time and learning tasks [12,15].

The Rutter children’s behavior questionnaire

The Rutter Children’s Behaviour Questionnaire [16] for completion by teachers is a 26-item survey designed to evaluate children’s behavior at school. Answers are rated on a scale of 0 to 2, with higher ratings indicating more severe presence of the symptoms. Possible ratings on the scale range from 0 to 52. The Portuguese version of Azevedo, Barreto, Faria and Robalo (1986) was used. The Rutter Children’s Behaviour Questionnaire [16] for completion by teachers is a 26-item survey designed to evaluate children’s behavior at school. Answers are rated on a scale of 0 to 2, with higher ratings indicating more severe presence of the symptoms. Possible ratings on the scale range from 0 to 52. The Portuguese version of Azevedo, Barreto, Faria and Robalo (1986) was used.

The Rutter Children’s Behavior questionnaire was a survey designed, and was based on the children’s behavior at school. The questionnaire consisted of 26 items and an answer was from 0 to 2, and achieved by teacher’s answers. But the more severe presence of the symptoms was indicated higher rate and the possible rates, the scale range from 0 to 52 [16].

Analyses

The tables show the results of the frequency distribution of age, sex and education (Tables 1-6).

Group	Behavioral disorder		Normal	
	Percent	Frequency	Percent	Frequency
Illiterate	32	16	1.9	1
Reading and writing	34	17	17.3	9
High school	20	10	17.3	9
Examen	6	3	32.7	17
License	4	2	25	13
Post-graduate	2	1	5.8	3
Non- answer	2	1	0	0
Total	100	50	100	52

Frequency distribution of father’s education in sample group

Table 1: The most frequency was related to the father’s education (reading and writing level) in the children with behavioral disorders group (34%) and this frequently in the normal group had been (examen level) around (32.7%). Also, the least frequency (illiterate level) in the normal group was (1.9%), the post-graduate with 2% was in the group of children with behavioral disorders.

Group	Behavioral disorder		Normal	
	Percent	Frequency	Percent	Frequency
Illiterate	23.5	12	5.8	3
Reading and writing	29.4	15	28.8	15
High school	19.6	10	26.9	14
Examen	11.8	6	23.1	12
License	7.8	4	13.5	7
Post-graduate	3.9	2	1.9	1
Non- answer	3.9	2	0	0
Total	100	51	100	52

Frequency distribution of mother’s education in sample group

Table 2: The most frequency in mother’s education had been in the children with behavioral disorder groups in the reading and writing level (29.4%) and the normal student was (28.8%). However, the least frequencies were in “the over the license degree level” in the normal group (1.9%).

Group	Behavior disorders		Normal	
	Percent	Frequency	Percent	Frequency
Weak	34.7	17	15.7	8
Average	36.7	18	29.4	15
Well	26.5	13	37.3	19
Very well	2	1	17.6	9
Total	100	49	100	51

Table 3: The most frequencies were related to good economy (well) in the normal children (37.3%) and the least frequencies was for great economy (very well) in the individuals with behavioral disorders (2%).

Scale	Subscales	Standard deviation	Mean
Normal children	BAS behavioral	3.08	16.4
	BIS behavioral	3.1	16.1
Children with behavioral disorder	BAS behavioral	4.9	23.07
	BIS behavioral	4.3	23.3

Table 4: The least scores of BIS/BAS were 16.4 and 16.1 and the standard deviation were 3.08 and 3.1 in normal group. Also, the mean scores of BIS/BAS in the individuals with behavioral disorders were 23.7 and 23.3 and the standard deviation for them were 4.9 and 4.3 in BIS/BAS. Thus, the subscale scores in the normal individuals were less than individuals with behavioral disorders in BAS/ BIS scores.

	Test Name	Eta Square	Significance level	Degree of freedom	Fisher score	Quantity
Model	Pylayy effect	0.98	0.000	2	2593.9	0.98
	Wilks Lambda	0.98	0.000	2	2593.9	0.019
	Hotelling effect	0.98	0.000	2	2593.9	51.8
	Most Error Root	0.98	0.000	2	2593.9	51.8
Group	Pylayy effect	0.61	0.000	2	80.5	0.61
	Wilks Lambda	0.61	0.000	2	80.5	0.38
	Hotelling effect	0.61	0.000	2	80.5	1.6
	Most Error Root	0.61	0.000	2	80.5	1.6

Table 5: The results of multivariate analysis of variance (MANOVA) in both groups (individuals with behavioral disorders and normal individuals) in terms of the BIS/ BAS were presented in this table. The individuals with behavioral disorders and normal individuals have a significant difference in terms of various variables. Also, around 61 percent of difference of variance between two groups was related to the interaction of dependent variables.

Results, Discussion and Conclusion

The most frequencies were for father’s education (reading and writing), and the last was for mother’s education of primary (higher license degrees and post-graduate degree) level, respectively. Also, the most distribution frequency was about the average economy and the least was for the great economy in normal individuals.

	The dependent variable	Eta coefficient	P	F	MS	DF	SS
Model	BAS behavioral	0.39	0.000	66.6	1143.8	1	1143.8
	BIS behavioral	.048	0.000	94.1	1337.7	1	1337.7
Group	BAS behavioral	0.39	0.000	66.6	1143.8	1	1143.8
	BIS behavioral	0.48	0.000	94.1	1337.7	1	1337.7
Error	BAS behavioral				17.1	101	1732.04
	BIS behavioral				14.2	101	1435.7

Table 6: The comparison of normal individuals with individuals with behavioral disorders reported the least points in behavioral disorders ($p < 0.005$) and the children with behavioral disorder groups show significant difference in terms of BAS/BIS.

According to BAS/BIS scales, the individuals with behavioral disorder indicated the significant difference compared to normal individuals in behavioral disorders, and the lowest scores of BAS/BIS were related to normal students. So, the normal group had the better function of the brain-behavior system compared to the children with behavioral disorders.

There was a relationship and positive significant correlation between the activities of behavioral inhibition (BIS) factor with anxiety and emotional disorders in boys. But with conduct disorder (CD), attention deficit hyperactivity disorder (ADHD), and specific social behaviors have a negative relationship [4,8,17]. The individuals with greater bilateral frontal cortical activity showed higher behavioral activation scores. So, the behavioral activation was related to approach and withdrawal motivation [18]. The children with behavioral inhibition were in the high performance levels and in behavioral activation have less sensitivity and attention [19].

In addition, Gary's theory has a special stance in the scope of psychology with biological personality structure. This theory opens up a new perspective into the other realms of psychology, including mental and physical pathology. Neurology science is highly significant in psychology fields, which helps to find an explanation for the function of behavioral systems/brain. According to the neural stimulation and brain lesion studies, there are different stances in the neurological studies in BIS and FFS, that the psychologists have identified a special structure for these systems. These structures are the amygdala and the medial hypothalamus. Regarding the various achievements about effective factors in BAS and BIS still more investigation is needed to clarify findings and results.

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