

Comparison of Verbal and Practical Intelligence in Normal Individuals and Individuals with Generalized Anxiety Disorder (GAD) by Focusing on Worry, Rumination, and Post-event Processing

Maryam Moghadasin* and Bita Khodaverdizadeh

Department of Clinical Psychology, Kharazmi University, Tehran, Iran.

Abstract

Previous researches have shown that anxiety symptoms are negatively associated with measures of intelligence. However, recent findings indicate possible positive relationships between generalized anxiety disorders, worry, rumination, post event processing and intelligence. The present study examined the relationships between GAD, as well as their underlying cognitive processes including worry, rumination, and post-event processing, with verbal and non-verbal intelligence. The study was performed on two groups of subjects including those with GAD and Healthy Volunteer group. The number of 40 healthy volunteers as a control group and 41 patients with GAD as case group were selected (N=81). Verbal and non-verbal intelligence were measured with WAIS-III. Rumination and post-event processing were measured by PSWQ, RRS-BR and PEPQ, respectively. The results indicated the significant difference in the intelligence between GAD and normal groups. In other words, high degree of worry, rumination and post event processing in patients with GAD correlated positively with general and verbal intelligence. However, verbal and non-verbal intelligence had negative correlation with worry, rumination and post event processing in healthy volunteers. Investigation of the possible connections between intelligence and the cognitive processes underlying emotional disorders can provide therapeutic strategies for smart individuals who are exposure to GAD disorder.

Keywords: Verbal intelligence; Non-verbal intelligence; Generalized anxiety disorder; Worry; Rumination; Post event processing

Introduction

Intelligence has been defined in terms of different abilities, including abstract thinking, understanding, communication, planning, learning, reasoning, and most importantly problem solving. In fact, intelligence refers to a set of mental processes involving cognition [1].

Researchers showed that high intelligence is related to frequent vulnerabilities including anxiety and obsessive behaviors disorders. In their opinion, high intelligence was related to psychological fragility. Also, they believed that the gifted children were at high risk of being psychopathology disorder [2]. Several researchers believe that some unique characteristics like unhealthy perfectionism and experiences such as suicide of gifted individuals exposes them at a higher risk of being mood disorders [3]. Perfectionism, asynchronous development, over excitabilities, and high cognitive functioning are known as risk factors among gifted individuals [4]. For example, anxiety can result from asynchronous development when a child identifies a problem in the environment, but he/she is not able to solve it [5]. The desire to complete projects flawlessly may be a reaction to other's high expectations that may make the gifted individual vulnerable to anxiety when performance is not certain. On the other hand, gifted individual who are highly attuned to their environment may experience intense anxiety due to the situations/accidents; while their peers may not be aware of it. In fact, these people may be unable to ignore threats, even remote ones [3].

Studies on the relationship between intelligence and anxiety have led to inconsistent results. In spite of considerable researches on this relationship, it is not still clear whether high intelligence is a risk factor for anxiety or a protective factor against it [6]. Several studies have shown that high intelligence is a risk factor for different disorders, such as anxiety, depression, and self-harm; while according to other research findings, high intelligence can be a protective factor [7]. However, negative relationships between IQ and emotional disorders

in different samples was found in the various researches [8,9]. Although there is research evidence that the four elements of psychopathology (unhealthy perfectionism, anxiety, depression, and social ideation) may not be more prevalent among gifted individuals in comparison to ordinary ones; but, they have unique experiences that exposed them to the special risk; so that it leads to increase the psychology disorder 3.

From another point of view, adaptive emotional regulation is also considered to be critically important for survival and reproduction [10]. Some theorists have extrapolated the evolutionary framework to encompass the maladaptive extremes of emotions – the emotional disorders. These theorists maintain that experiencing the 'right' emotion (e.g. anxiety, sadness, and/or happiness), with the optimal intensity and duration, in the correct context or situation, would clearly enhance an organism's fitness [11,12].

Aligning with this, researchers found that individuals with GAD had higher intelligence. Also, there is positive correlation between worry and intelligence among patients with GAD, and a negative correlation between score of anxiety and intelligence among healthy subjects [13,14]. Also, others researchers found a positive relationship between verbal intelligence with worry and rumination in subjects with GAD symptoms. They found a negative correlation between non-verbal intelligence and Post-Event Processing (PEP). They showed a negative

***Corresponding author:** Maryam Moghadasin, Department of Clinical Psychology, Kharazmi University, Tehran, Iran, Tel: +98-913-1942296 Email: <mailto:mmoghadasin@yahoo.com>

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relationship between higher intelligence and less worry among healthy subjects [15].

The discrepancy of aforementioned results poses important questions regarding the methodological differences of previous studies about the relationship between intelligence and anxiety. A key point is that studies to date have mainly focused on the relationship between general intelligence and general anxiety. The reason of its importance is that the associations may be found in specific domains of intelligence and anxiety [6]. Penny also pointed out that high intelligence may be related to cognitive processes underlying anxiety disorders, such as worry, rumination and post-event processing [15].

Since worry is the suggested essential cognitive process underlying GAD. In the other words, worry may be considered as the diagnostic characteristic of GAD [16]. It is a form of repeated thoughts that has mainly been examined in terms of anxiety [17]. Many studies have examined worry and rumination in terms of GAD and depression, respectively [18]. Although several studies have considered the rumination specific to depression and worry to anxiety, but these two variables overlap in the anxiety and depression [19,20]. First of all, there is a difference between worry and rumination from the perspective of the occurrence time. In other words, worry and rumination are future-oriented and past-oriented, respectively [21]. However, there are research evidences that indicates the these two types of repeated thinking have a common underlying process [22]. Several studies have shown that ruminators are more uncertain about their invented solutions for complex situations than non-ruminators [23]. This uncertainty forces them to analyze past events and other's speech ruminatively [24]. On the other hand, several researchers believe that uncertainty about ability to control environment is the key factor underlying anxiety [25,26]. Post-event processing is a model of rumination in dealing with social interactions that comes from social phobia literature [18]. Regarding the relationship between PEP and social anxiety, some studies concluded that PEP was not significantly correlated with level of performance/anxiety in social interactions. Based on these studies, there is a strong and significant correlation between the PEP and state anxiety [27].

The first purpose of the present study is to compare healthy volunteer and those with generalized anxiety disorder on verbal and non-verbal intelligence. The second purpose is to investigate the relationship between intelligence and worry, rumination, PEP in adults with GAD, and comparing them with healthy volunteer. As mentioned earlier, Coplan investigated the relationship between the general intelligence and worry [13,14]. Also, Penney examined relation of general intelligence, rumination, and worry in a sample who had not undergone clinical and diagnostic interviews. Their anxiety had been assessed using questionnaires [15]. It should be noted that we could not find any study examining the common cognitive underpinnings of anxiety and intelligence in clinical samples with anxiety diagnosis.

In comparison to previous studies, we expect that the following innovation could be obtained from the present study:

- All components of cognitive intelligence are investigated,
- All samples undergone clinical and diagnostic interviews,
- Large sample size in GAD group in comparison to previous studies is considered,

Methods

Participants and design

In the present paper, the study was performed on two groups of

subjects including those with GAD and Healthy Volunteer (HV) group consisting of individual without GAD based on the structural clinical interview for DSM-V (SCID-5-CV). The number of 40 healthy volunteers (19 males and 21 females) as a control group and 41 patients with GAD (18 males and 23 females) as case group were selected (N=81). The advantage of the present study in comparison to similar studies is that GAD patients with comorbidity psychiatric disorder were excluded from the study. In healthy volunteers, non-psychiatrically ill controls were required to have a negative family history in first-degree relatives. In the preliminary study, comorbid psychiatric disorders in the GAD group were OCD (n=10), MDD (n=15) and PTSD (n=1) that was determined by structured clinical interview based on DSM-V. However, these subjects (subjects with comorbidity psychiatric disorders in the GAD group) were excluded from the study. In this study, exclusion criteria were a major depressive episode, substance abuse within 24 months of study entry; a life time history of psychotic, bipolar, obsessive-compulsive, post-traumatic stress, eating disorder; substance dependence (other than nicotine); mental retardation or learning disability; autism; significant medical and neurological conditions. Also, GAD patients (41 subjects) were medication-naive, and no subject had psychotropic exposure at least 6 months before study. GAD subjects diagnosed by psychiatrists or clinical psychologists in two private psychiatric clinics located in Tehran city. They were in the age range of 20-50 years, who were selected using a judgmental sampling method. The healthy volunteers in both studies were matched with the case groups using the "exact control matching" method in terms of demographic variables including age, gender, level of education, college/university, socioeconomic status, marriage status, and career. Participants in the GAD group were matched one by one with the control group participants in terms of all above mentioned demographic variables, so that there was a matched individual in the control group for each participant in the case group. In this matching method, each participant in the case group is matched with an individual in the control group based on variables correlated with the dependent variable [28]. Using this method, we could control all the confounding variables for intelligence that led to reduce the likelihood of unsystematic variance. As mentioned above, individuals with comorbid disorders, drug intoxication and people who did not want to participate in the study, were not included in the case groups. Also, individuals with history of clinical disorders, family history of clinical disorder in first-degree relatives and those did not want to participate in the study, were not included in the control group. Participants of control group were selected based on random sampling method. The present study was cross-sectional and the research was performed based on causal-comparative method.

Verbal and non-verbal intelligence in the present study, was measured with Wechsler Adult Intelligence Scale-3rd edition (WAIS-III) [29]. Participants were assessed within eleven month in two clinics. After administering the subscales of the WAIS-III on each subject, the responses were examined by two skilled examiners in the scoring of the WAIS-III. It took 1.5 to 2 hours to administer the WAIS-III to each participant. Most of the participants (70%) were examined in one day, and the remaining (30 %) were examined in two consecutive days (for those who were tired in the first day of examination). Also, the exclusion criterion was IQ<70 for participants in the studies. The next day the administering the WAIS-III, influential components of anxiety including worry, rumination and post-event processing were measured by PSWQ, RRS-BR and PEPQ, respectively. In order to evaluate the negative emotional states, the DASS were completed by the participants. All subjects gave written consent before participating in the study.

Instruments

The Wechsler Adult Intelligence Scale-III (WAIS-3): Third version of the Wechsler Adult Intelligence Scale [29], generates three scores including Verbal Intelligence (VIQ), Performance intelligence (PIQ) and Full Scale Intelligence (FSIQ). Also, it generates four index scores including Perceptual Organization Index (POI), Processing Speed Index (PSI), Working Memory Index (WMI) and Verbal Comprehension Index (VCI). Among the 14 subsets of the WAIS-III, Object Assembly is optional because it is not used in calculation of any index or summary scores. Two other subsets, Symbol Search and Letter Number Sequencing are considered in the index scores, but these subsets are not calculated in the FSIQ scores.

The Depression Anxiety Stress Scales (DASS-21): This self-report scale assesses depression, anxiety and stress. In the present study, a short version of the scale consists of seven items on each subscale was used [30]. The DASS-21 has good psychometric properties among the Iranian population. This scale has also good-to-excellent internal consistency, stability, convergent validity, discriminate validity and a three factor structure.

The Penn State Worry Questionnaire (PSWQ): This self-report scale assesses normal and excessive worry and it contains 16 items [31]. The items are rated on a five Likert-point scale ranging from 1 (Not at all) to 5 (Totally true). Total scores range from 16 to 80. The PSWQ has good psychometric properties among the Iranian population [32].

Post Event Processing Questionnaire-Revised (PEPQ-R): This questionnaire contains 14 items [33]. Its items are rated on a scale ranging from 0 (Never) to 100 (Totally agree). The higher scores indicate the higher PEPQ-R. The PEPQ-R has good psychometric properties among the Iranian population [34].

The Ruminative Response Scale-Brooding and Reflection (RRS-BR): This self-report questionnaire assesses tendency to ruminate in response to experiencing negative mood [35]. The RRS-BR has 22 items rated on a four Likert-point scale, ranging from 1 (Almost never) to 4 (Almost always). Higher scores indicate more tendency to ruminate [36]. In Iran, the RRS-BR has good psychometric properties [37].

The Structured Clinical Interview for DSM-5 (SCID-5): This is a comprehensive and standard interview developed by First and his/her colleagues [38]. It is used for clinical purposes in order to assess psychiatric disorders based on the diagnostic criteria in the DSM-5.

Statistical analysis

In this study, independent *t*-test compared GAD patients against healthy subjects for mean values of IQ, DASS, PSWQ, PEPQ-R, RRS-BR and age. Distribution of sex and level of education were examined for group differences and, where appropriate, were controlled. Pearson correlation matrices examined the relationship between IQ, PSWQ, RRS-BR and PEPQ-R in two groups, separately. Also, Pearson partial correlation examined the relationship between FSIQ, VIQ, PIQ and PSWQ in all subjects with controlling group variable. To examine the differences between two groups, a Linear Discriminant Function (LDF) analysis was employed. LDF analysis is a multivariate test for determination of the function of difference between groups. In other words, FSIQ, VCI, PIQ, VCI, WMI, POI, PSI, PSWQ, RRS-BR and PEPQ-R are considered as continuous predictor variables and group as a categorical variable.

Results

Analysis of independent variables in GAD patients and HV subjects

No significant different was observed for age in two groups [GAD group mean=29.20 ± 7.58 years (SD); HV group mean=28.85 ± 8.08 years (SD), *t*=0.14, *df*=79, *P*=0.89]. Also, the comparison distributions between sexes [GAD group: male, 19 and female, 23; HV group: male, 18 and female, 21], ($\chi^2=0.201$, *P*= 0.654) and level of education ($\chi^2=0.783$, *P*= 0.854) showed no-significant difference (Table 1). Analysis of independent *t*-test reported that patients with GAD significantly exhibited higher mean scores for FSIQ, VIQ, VCI, rumination, worry and PEP, depression, anxiety and stress. Also, they significantly exhibited lower mean scores for WMI and POI than HV group (Table 2) (Table 3).

Correlations among IQ, worry, rumination and post-event processing

To calculate the correlation matrix of variables, the data of each group was investigated separately to identify the pattern of relations. Scatter-plots showed that the direction and intensity of the relationships are different in the two groups (Figures 1-4).

In the GAD group, VIQ and VCI were positively related to

Variable	participants			
	HV	GAD	sum	
Sex	Male	18	19	37
	Female	21	23	44
	Sum	20	21	81
Statistical index	Chi-squared ¹	0.201		
	Df	1		
	p-value	0.654		
Level of education	High school	4	4	8
	Diploma	6	5	11
	Bachelor	17	21	38
	Master	13	10	24
	Sum	40	41	81
Statistical index	Chi-squared	0.783		
	Df	3		
	p-value	0.854		

Chi-squared: comparing distribution of variables in groups (HV, GAD); df: degrees of freedom ;GAD: generalized anxiety disorder patients; HV: healthy volunteer

Table 1: Comparison of sex and level of education distributions for diagnostic groups

Variables	HV (N=20)	GAD (N=20)	t-value	df	p-value	f-value	p-value
Age (year)	29.20±7.58	28.85±8.07	0.14	79	0.89	0.071	0.79
IQ (FSIQ)	105.90±9.41	115.05±9.36	-3.08	79	0.004	0.46	0.50
Verbal IQ	102.20±8.88	117.45±8.69	-5.48	79	0.0001	0.07	0.79
Performance IQ	108.00±12.06	107.33±10.95	0.13	79	0.89	1.18	0.28
Verbal Comprehension Index	90.47±13.41	118.11±12.71	-5.24	79	0.0001	0.32	0.57
Working Memory Index	108.64±11.99	98.68±13.22	2.30	79	0.027	0.28	0.60
Perceptual Organization Index	109.13±8.24	94.64±10.32	4.37	79	0.0001	1.81	0.13
Processing Speed Index	100.89±9.59	98.72±15.40	0.53	79	0.59	1.06	0.32
DASS-stress	5.85±4.76	12.70±4.41	-4.74	79	0.0001	0.003	0.95
DASS-anxiety	2.85±2.39	10.20±4.08	-6.94	79	0.0001	1.27	0.27
DASS-depression	4.10±3.46	10.00±4.54	-4.04	79	0.0001	1.65	0.14
RRS_BR	44.00±9.06	62.35±12.34	-5.36	79	0.0001	2.06	0.16
PEPQ_R	57.80±20.79	76.75±17.76	-3.10	79	0.004	0.60	0.44
PSWQ	41.05±10.72	59.65±9.94	-5.69	79	0.0001	0.017	0.89

IQ: intelligence quotient; FSIQ: total intelligence quotient; PSWQ: Penn State Worry Questionnaire; PEPQ-R: Post Event Processing Questionnaire-Revised; RRS-BR: Ruminative Response Scale-Brooding and Reflection. df: degrees of freedom; f-value: equal variances assumed

Table 2: Comparison of means and SDs of dependent variables for patients with generalized anxiety disorder versus healthy volunteers.

Variables	HV (N=40) against GAD (N=41)		df	p-value
	t-value			
Information subtest	-6.59		79	0.0001
Similarities subtest	-4.18		79	0.0001
Comprehension subtest	-3.79		79	0.0001
Arithmetic subtest	-2.11		79	0.02
Digit Span subtest	1.99		79	0.035
Picture Completion subtest	4.58		79	0.0001
Block Design subtest	2.85		79	0.015

Table 3: Comparison of means and SDs of sub-scales IQ for patients with generalized anxiety disorder versus healthy volunteers.

rumination, worry and PEP. Also, FSIQ was positively related to rumination and worry, while there was a negative relationship between POI with worry and PEP (Table 4).

In the control group, VIQ, WCI and WMI were negatively related to worry and FSIQ was negatively related to rumination and worry, in a way that the scatter-plots of these groups were counteractive. Also, there was a negative relationship between PIQ with rumination, worry and PEP. Finally, POI and PSI were negatively related to rumination and worry (Table 5).

Pearson partial correlation displayed the linear relationship between FSIQ and worry ($r=-0.27$, $sig=0.015$), VIQ and worry ($r=-0.175$, $sig=0.126$) and PIQ and worry ($r=-0.312$, $sig=0.005$) in all subjects with controlling the group variable.

Discriminant function analysis

One of the assumptions for the application of discriminant analysis refers to the existence of multi-collinearity between independent variables. Prior to conducting the discriminant analysis, correlation between independent variables had been obtained. Calculating the matrix of average correlations within groups did not indicate the existence of multi-collinearity (i.e., all the correlation coefficients are less than 0.6).

In the first stage of the discriminant analysis, the extent to which independent variables were capable of discriminating between groups was established. To this end, a forward stepwise method was used, in which variables are gradually added to the model until the satisfactory criteria have been met. At each particular step, variables with the highest F value are selected (higher than the specified F to enter value) for inclusion in the model [39]. The procedure ends when they enter value of F for the variable is not higher than the enter value of specified

F. In the present analysis, enter value of F is 3.84 and F-remove value equals to 2.71.

The discriminant function was significant (Wilks'lambda= 0.756, $df=8$, $p-value <0.0001$). Wilks'lambda value (0.756) indicates the existence of differences between the groups. The model is constituted of eight variables that have a significant effect upon discrimination between groups. On the basis of the values of Wilks'lambda for particular variables, the degree to which each individual variable contributes to discrimination between groups was determined [40]. This discrimination is accounted by the following variables: first worry, VIQ, rumination, VCI, POI, PEP, FSIQ, and WMI. The remaining variables (PIQ and PSI) were not included in the model. Since it was considered two groups in the present study, one discriminant function was established. Given this function, discrimination between GAD group and control group becomes possible. The evaluation of the function based on the means of canonical variables gives the canonical variables equal to 0.68 and -0.71 for GAD and control groups, respectively. It is evident that GAD group contribute to the canonical function to a higher degree than control group. Discriminant function eigenvalue equal to 0.897 shows the significance of dimensions in independent variable classification. Based on the canonical correlation equals 0.906, it can be concluded that there is a correlation between the discriminant function and the two groups. Chi-square value obtained from the evaluation of canonical function equals 56.51 that it is indicative of its significance ($p<0.05$).

Structure coefficients show a relative strength of discriminant variables, and their values are shown in the third column of the (Table 6); where, the independent variables were sorted based on the structure coefficients from the largest to the smallest value. The (Table 6) also shows the values of standardized coefficients. Standardized coefficients

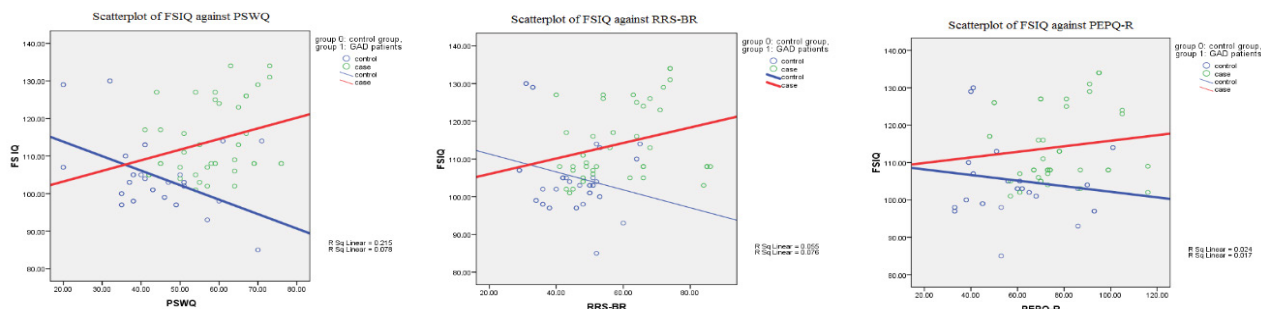


Figure 1: Scatter-plot of FSIQ versus worry, rumination and post event processing in patients with GAD and healthy volunteers (Group 0= healthy volunteers, Group 1= GAD patients) (N=81).

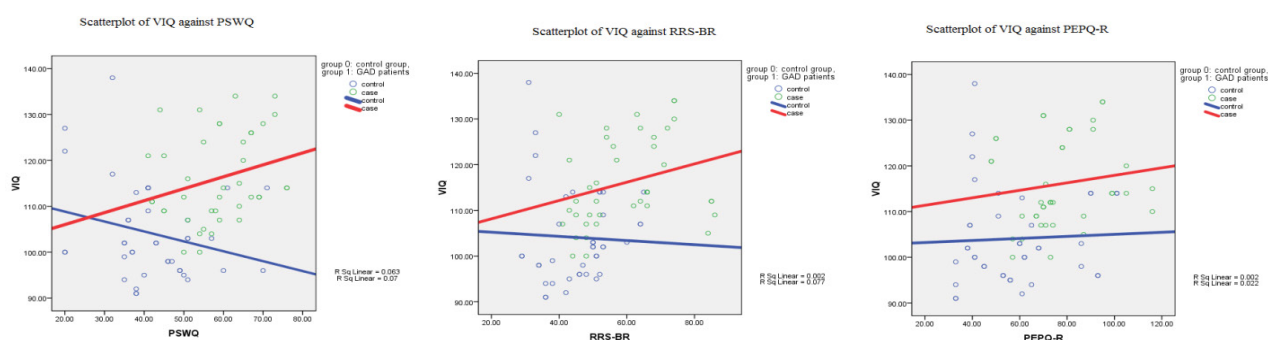


Figure 2: Scatter- plot of VIQ versus worry, rumination and post event processing in patients with GAD and healthy volunteers (Group 0= healthy volunteers, Group 1= GAD patients) (N=81).

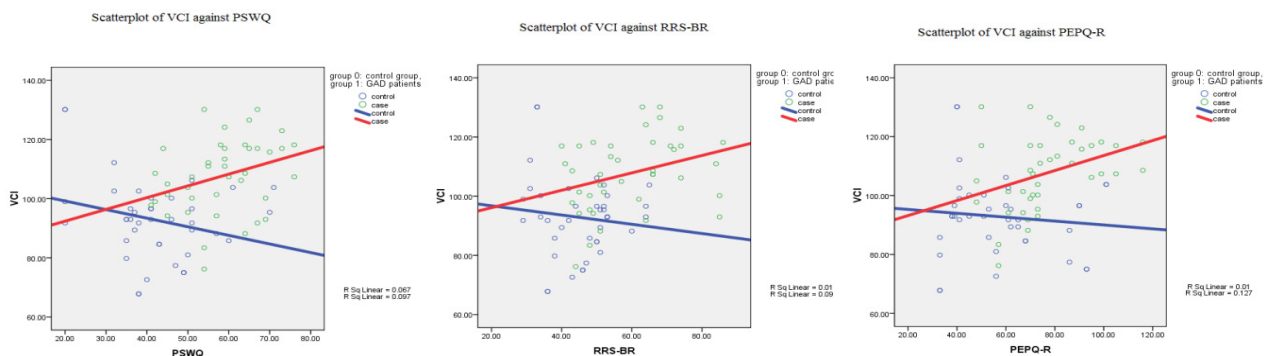


Figure 3: Scatter-plot of VCI versus worry, rumination and post event processing in patients with GAD and healthy volunteers (Group 0= healthy volunteers, Group 1= GAD patients) (N=81).

are used for evaluating the unique contribution of the independent variable to the discriminant function [40].

The classification matrix shows that how participants constituting the sample are distributed across groups. Here 87.50% participants from the control group are well distributed, whereas 92% of GAD group are distributed in line with expectations. 90% of the participants were distributed in line with the expected classification.

Discussion

An investigation of difference of the total intelligence scores between the GAD and control groups indicated that the GAD group had a significantly higher mean score than the control one. This finding

has a good agreement with the results published by [13,14]. In addition, the results of present study confirms the findings of other researchers who found that high intelligence may lead to anxiety disorders [2]. Given the adaptive value of an emotion such as anxiety, which would permit and individual to anticipate and plan for potential threats, it reveals that anxiety might have co-evolved with increased intelligence [15].

According to the results of present study, mean scores of VIQ and VCI in the GAD group were significantly higher than the control group. This finding is in line with those reported by Coplan et al, 2006 and 2012 [13,14].

As one of the innovations of the present study, the mean scores of subtests in each index were evaluated. The outcome of the evaluation

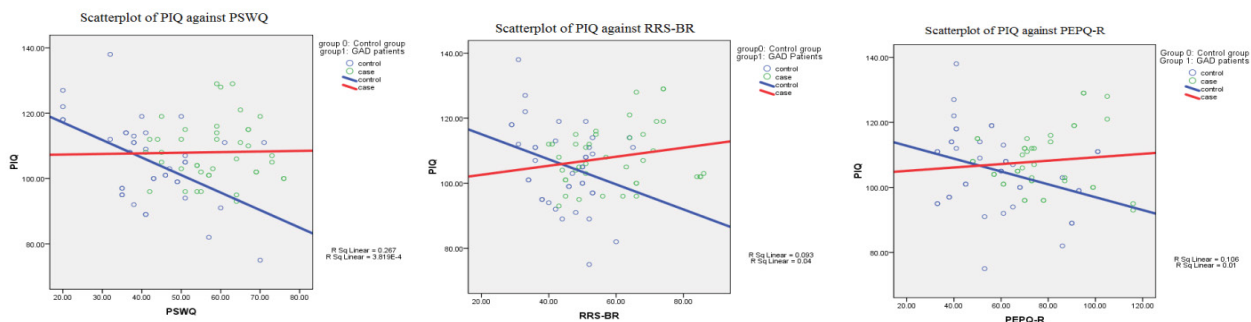


Figure 4: Scatter-plot of PIQ versus worry, rumination and post event processing in patients with GAD and healthy volunteers (Group 0= healthy volunteers, Group 1= GAD patients) (N=81).

	GAD group (N = 41)									
	FSIQ	VIQ	PIQ	VCI	WMI	POI	PSI	RRS_BR	PSWQ	PEPQ_R
FSIQ	1.00									
VIQ	0.88**	1.00								
PIQ	0.75**	0.37**	1.00							
VCI	0.71**	0.81**	0.28*	1.00						
WMI	0.51**	0.55**	0.34**	0.32**	1.00					
POI	0.45**	0.15	0.50**	0.02	0.48**	1.00				
PSI	0.39**	0.19	0.46**	0.31*	0.34**	0.40**	1.00			
RRS_BR	0.23*	0.32**	-0.02	0.36**	-0.01	-0.18	-0.08	1.00		
PSWQ	0.35**	0.40**	-0.17	0.22*	-0.11	-0.32**	-0.09	0.62**	1.00	
PEPQ_R	0.16	0.30**	-0.09	0.35**	-0.16	-0.26*	-0.11	0.49**	0.63**	1.00

* P value < 0.05
** P value < 0.01

Table 4: Pearson correlation matrix for relationship between IQ, rumination, worry and post event processing in GAD group.

	healthy volunteers (N = 40)									
	FSIQ	VIQ	PIQ	VCI	WMI	POI	PSI	RRS_BR	PSWQ	PEPQ_R
FSIQ	1.00									
VIQ	0.87**	1.00								
PIQ	0.74**	0.43**	1.00							
VCI	0.70**	0.88**	0.35**	1.00						
WMI	0.57**	0.58**	0.42**	0.48**	1.00					
POI	0.52**	0.25*	0.53**	0.13	0.52**	1.00				
PSI	0.51**	0.29*	0.56**	0.39**	0.43**	0.52**	1.00			
RRS_BR	-0.24*	-0.04	-0.31**	-0.11	-0.18	-0.30**	-0.26*	1.00		
PSWQ	-0.46**	-0.25*	-0.52**	-0.26*	-0.28*	-0.41**	-0.32**	0.53**	1.00	
PEPQ_R	-0.15	-0.04	-0.33**	-0.10	-0.17	-0.20	-0.04	0.42**	0.60**	1.00

* P value < 0.05
** P value < 0.01

Table 5: Pearson correlation matrix for relationship between IQ, rumination, worry and post event processing in healthy volunteers.

variables	Standardized coefficients	Structure coefficients
Worry	0.728	0.633
Verbal IQ	0.718	0.518
Rumination	0.416	0.508
Verbal Comprehension Index	0.307	0.411
Perceptual Organization Index	-0.608	-0.393
Post event processing	0.324	0.336
IQ (total)	0.241	0.335
Working Memory Index	-0.835	-0.275

Table 6: Standardized and structure coefficients.

was that the GAD group significantly scored higher than the control group in the Information and Similarities subtests. This finding can be explained by [41]. According to this research, the performance in

tasks that are based on retrieving knowledge from long-term memory, pattern matching, and perceptual speed was not associated with state anxiety.

There was no significant difference between the two groups in the Vocabulary subtest. Since the education and age have an important role in the word definitional skill and the vocabulary expands with age [42,43], there was no significant difference in performance of the two groups due to control of age and education.

The mean scores of WMI and its subtests in the GAD group were significantly lower than the control group. Regarding this finding, it was concluded that individuals with a lot of worries have verbal thoughts which may lead to less use of working memory capacity [44]. The control group had a better performance than the GAD group for the Digit Span subtest of the WMI. Several researchers found that state anxiety had a negative effect performance on Digit Span task [45,46]. Also, some other researchers maintain that state anxiety leads to poorer performance on the tasks that are strongly dependent on working memory capacity (e.g. Digit Span and particularly Digits Backward) [41]. The performed studies on the verbal working memory [47], sequence of numbers in short-term memory [48,49] and final evaluation of the progression of education [50] showed that high anxiety increases the required response time for doing the tasks. However, some other studies indicated that individuals with higher and lower levels of anxiety have the same level of performance, but for individuals with higher level of anxiety is increased response time length [49,51,52].

The GAD group had a significantly higher mean score on the Arithmetic subtest than the control group. Possible explanation for this finding is that higher perfectionism in the GAD group may lead to this result. The reason of this statement is that there is a significant relationship between socially prescribed perfectionism and GAD [53]. The relation between anxiety and socially prescribed perfectionism can be explained as following: individuals with high socially prescribed perfectionism experience higher levels of external pressure when trying to complete the tasks. Thus, it can be argued that the anxiety symptoms experienced by these individuals are due to a perceived need to prevent guilt or shame and a fear of failure [11]. The perfectionism people would like to do all tasks completely; the motive force in these people is anxiety that it includes the fear of failure, the sense of never being good enough and being somehow flawed [3,54].

Examination of PIQ score indicated no significant difference between the two groups. However, the control group had better performance than GAD one in POI and some of the subtests in which agility and response time were important factors. The control group had better performance than GAD one in the Blocks Design subtest of the POI. This finding is also confirmed through comparison with the results reported by [41]. These researchers maintained that individuals with higher state anxiety have poorer performance on the skills related to the central executive region (e.g. Blocks Design). These results are consistent with the Processing Efficiency Theory that emphasizes on the interference of verbal processes, such as worry with cognitive performance. This theory explains that although individuals with higher anxiety can be successful in performing the tasks, but, they may need more time and energy to complete the tasks compared to those with lower anxiety [55]. In addition, present results show that POI is negatively related to worry and processing of social events in GAD group. In other word, VIQ is a positive predictor of the intensity of worry, rumination and PEP, while PIQ is a negative predictor of worry and PEP. This finding is in line with those of reported by [15].

The results indicated that FSIQ, VIQ and VCI were positively related to worry, rumination and PEP in the GAD group. This result has an open access journal ISSN: 2161-0681 [14]. It is

possible that those with higher verbal intelligence can process past and future events with more details, and this can lead to severe rumination about the past events and worry about the future ones [15]. Also, high intelligence along with neuroticism can lead to anxiety disorders and compulsive behaviors. In the other words, the individuals with high IQ, experience more psychological fragility [2]. Higher intelligence has the relationship with the cognitive processes underlying anxiety disorders [15].

All aforementioned findings may be validated against the results of researches performed by [56-58], in which worry was considered as a verbal behavior. Other researchers has suggested that more tendency to worry is mostly consisted of verbal thoughts [59, 60]. Also, it was concluded that individuals with pathological worries experience more tendency to verbal worry than nonclinical subjects [58, 61].

Conclusion

We have observed that individuals with Generalization Anxiety Disorder have a lot of attention to the around possible dangers during their life. Such extreme attention or concern may be due to the abnormal growth of cognitive abilities. Particularly, these people have more attention to verbal signals, minute details and similarities. As a positive aspect of the abnormal growth of cognitive abilities, it may lead to gradual increase in verbal intelligence in these individuals. Although we cannot claim with certainty that higher verbal intelligence is accompanied with GAD disorder, but, as a preventive suggestion, it may be stated that if evidence of unhealthy perfection in children with high verbal intelligence is observed, it could be symptoms of pathological worry in these children. If the extreme pathological worry is not controlled and treated at an early age, it could lead to the prevalence of disorders such as GAD in adulthood.

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