POST-TRAUMATIC STRESS DISORDER AND OVER GENERAL AUTOBIOGRAPHICAL MEMORY: AN EXPERIMENTAL APPROACH

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ABSTRACT

Objectives: *The present study assesses over general autobiographical memories (OGMs) and specific autobiographical memories (SAMs) in PTSD patients and healthy controls by cueing through different words, images and odor cues.*

Design of study: *The between subject randomized post -test only experimental design was conducted in the study*

Place and Duration of the Study: *Fountain House, Lahore*

Subjects and Method: *Sample of the study (N=50) participants: PTSD Participants (M=15, F=10) and non- PTSD controls (M=20, F=05) participants. For assignment of participants to treatment and control groups, block randomization was done using MS Excel. The level of PTSD was assessed through the Post Traumatic Stress Disorder checklist. Manipulation was done through presenting participants with images, words and odor cues in response to which they were asked to produce specific memories using the Autobiographical Memory Test. Memories were rated as being specific or generalized by a panel of three psychologists. Reaction time estimates were also taken using DM DX Auto mode Software.*

Results and Conclusion: *Findings of the study show that is highly related with number of over-general autobiographical memories (r =.76, p < .01).Further analysis indicates negative correlation between PTSD and Specific Autobiographical memories (r =-.59, p < .01). Multiple regression analysis results show that PTSD (B=.053, p <.01) significantly predicted over general autobiographical memories. Thus, present research indicated that PTSD is a causal factor that leads to impairment in the retrieval of specific autobiographical memories. It was also found that individuals with PTSD tend to show longer reaction times.*

Keywords: *PTSD; over general autobiographical memory; words images and odor cues*

INTRODUCTION

Development of post-traumatic disorder after exposure to a traumatic event has been linked with increasing reliance on over general autobiographical memories (OGMs) (Contractor et al., 2021). OGM is a specific type of autobiographical memory in which individuals are unable to recall specific memories and are more oriented towards providing categorical and generic representations of their memories such as going to a restaurant instead of providing specific details of the memory such as going to the restaurant for a breakfast in the morning with one's family. Williams et al. (2007) has identified neurobiological underpinnings behind OGMs through analysis of studies done on humans and animals (Matsumoto et al., 2020; Schiller et al., 2010).

Meanwhile, the intrusive, disturbing and unintentional memories of any event of an individual's life are a hallmark symptom of developing Post Traumatic Stress Disorder (PTSD) (APA, 2013; Bernstein et al., 2020). A number of studies reported that deficits in autobiographical memory become the cause for the development of mental health problems especially depression and PTSD (Anderson et al., 2010; Bryant et al., 2007; Sumner et al., 2012; Moulds et al., 2020).

Different studies found PTSD to be associated with memory problems such as impairment in verbal memory (Scott et al., 2015). Researches on autobiographical memory were very limited (McKinnon et al. 2014). It has been revealed that for memories related to both trauma and non-trauma, individual with PTSD recalled more OGMs as compared to those individuals who has no history of PTSD, on the other hand, there were no significant differences were found in regards of richness or accuracy of non-trauma memories (Brown et al., 2014). According to the patients after PTSD they experienced themselves as entirely changed person and also expressed difficulty to remember their personality before PTSD (Ehlers, 2010; Erten& Brown, 2018). OGM has further been classified as a critical pathological orientation and mechanism showing the pathogenesis of PTSD and has been further been associated significant memory related impairments (Lapidow& Brown, 2015; Khan et al., 2021; Shi et al., 2020).

The techniques of retrospective questionnaires and interview assessment for the investigation of traumatic memories in PTSD have restricted the environmental validity of the results (Schomfeld & Ehlers, 2017). There is no any evidence of causal association of PTSD and OGM. Therefore this study will helps to bridge the gap in literature and employs an experimental method to discover a predictive

relationship between PTSD and OGM and to explore the influence of words, images and odor cues on the memory retrieval of the PTSD participants.

We predicted that patients with PTSD will retrieve more OGMs in comparison to healthy control (Non-PTSD individuals) who will retrieve more SAMs. Moreover, it was hypothesized that in response to the treatment intervention i.e. word, images and odor cue types, patients with PTSD will take a longer time with regard to the retrieval of memories in comparison to the healthy controls.

METHOD

Participants

This research was designed to explore the causal relationship between PTSD and OGM. Between subjects posttest research design was used to study OGM among PTSD and non-PTSD patients. For this purpose 50 participants were selected. The participants of PTSD (*N=25, Male=15& Female: 10*) were approached from Fountain House, Lahore. The control group i.e.; participants who were not having any traumatic event and healthy (*N=25; Male 20 & Female 05*) were university students. The age ranges of participants were between 15 – 35 years. Potential participants who were not included in the study were those who were diagnosed as having suicidal tendencies and the ones with psychotic symptomatology.

Block randomization was used to assign the experimental and control group participants to different treatment blocks (block 1: words depicting trauma, block 2: images depicting trauma and block 3: odor cues associated with trauma). Specifically, first the researcher had divided the subjects into two gender blocks and had then focused on assigning them to the three cued treatment conditions which included word, picture and odor cues.

Measures

Posttraumatic Stress Disorder Checklist (Weathers et al., 1993):

The PCL Civilian Version is an easy to administer and reliable self-report measure for assessing PTSD. It comprises a total of 17 items with response options varying from 1 to 5 on a Likert type response format. Research suggests that the test has excellent test-retest reliability over a period of 3 days to one week.

A) Autobiographical Memory Test (AMT) (Williams &Broadbent,1986)

OGM was evaluated by using the measure designed to test autobiographical memory. This test comprises of three types i.e; word cues, image cues and odor cues.

To evaluate word cues, six words cues in which 3 positive and 3 negative cue words were presented. The word cues i.e.; happy, successful and surprised were used for positive while angry, lonely and sorry were used for negative cue words. For the image cues, 6 pictures all related to the words in AMT were used (3 happy and 3 sad). The odor cues used for the experiment were: tobacco, soap, camphor, roses, jasmine and lavender which have been associated with traumatic and depressive symptoms.

B) Reaction Time Estimates

For the purpose of measuring reaction time of participants in all the three experiments, DMDX AUTOMODE software was used. It is a widely used tool for the purpose of obtaining accurate and highly precise (milliseconds) reaction time of participants (Forster & Forster, 2003; Garaizar&Reips, 2015).

Procedure

The study was conducted after approval of the Ethical Review Board of G.C University, Lahore. Concerning authors of the measures were then contacted to take permission to use the study measures and permission to collect data was also taken Fountain House, Lahore. PTSD and non-PTSD sample was identified by using the Post traumatic stress disorder checklist. Consent from individuals who were fulfilling the inclusion criteria of the study was taken. The standardized instructions as recommended by Williams and Broadbent (1986) were given to the experimental and control group. The experimenter read aloud the following instructions, "I am interested in knowing your memory of events that have happened during the different phases of your life. I am going to present you with some words (condition 1), pictures (condition 2) and odors (condition 3). In response to each cue, you will be expected to think of a memory. This memory can be recent such as a memory from last week or an older memory such as a memory from last year. One more thing-you are requested to recall the memory of a specific event and try not to provide general information about the memory. An example of this is if you see the word "good" you will be required to link this cue with a specific memory. It is also important for you to try to retrieve a different memory in response to each cue i.e. words, images and odors.

The participants were informed and brief about the purpose of the present experiment. The word and image cues were display through a projector by using computer. For the odor cues, the participants were simply asked to take a sniff of the smells and then try to identify memories evoked by these smells. The same procedures were used for all the three treatment conditions. For the purpose of recording response time, the DMDX auto mode software was activated as soon as the cue was presented and the time lapse between presentation of the cue and the time when the participant started reporting his or her memory was also measured.

Here is an example of one statement reported by a participant from the experimental group in response to a word cue "surprise". He reported, "I am never surprised with anything in life" compared to the statement given by a control group participant, "I was surprised when I had attained the highest CGPA among all my class members in semester 2)".

RESULTS

Table 1

Demographic characteristic of the experimental and control group (N=50)

Variable	*F*	%
Diagnostic Status		
Participants with PTSD	25	50 %
Non-PTSD Participants	25	50 %
Gender		
Male	35	70 %
Female	15	30 %

Note: f= frequency, % = percentage

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Table 2

Inter-Correlation among PTSD scores, Cue Types, Over general Autobiographical Memories, Specific AMs and Reaction Time (N=50)

Variable	1	2	3	4	5
1.PTSD Scores	—	-.11	.76**	-.59**	.62**
2.cuetype		—	.03	.054	.14
3.Overgeneral AMs			—	-.52**	.17
4.Specific AMs				—	-.46**
5. Reaction Time					—

*Note. **p < .01, *p < .05, AMs=Autobiographical Memories*

Pearson Product Moment Correlation indicated significant relationship between PTSD and over general autobiographical memories ($r =.76$, $p < .01$). Further analysis indicates a negative association between PTSD and Specific AMs ($r =-.59$, $p < .01$). Results also show an insignificant relationship between cue types and over general autobiographical memories. However, significant negative association between specific AMs and over general autobiographical memories ($r =-.52**$, $p < .01$). The analysis further indicates a significant positive association between reaction time and PTSD scores ($r =.62**$, $p < .01$). The differences in reaction time for cues (panel a for all cues, panel b for words, panel c for pictures and panel d for odors) in relevance to OGMs and SAMs have been presented below.

Table 3

PTSD Scores and Cue Types as a Predictor of Over General Autobiographical Memories (N=50)

		95 % *CI* Over-general Autobiographical Memories	
Predictor	*B*	*LL*	*UL*
Constant	1.16	.42	1.91
PTSD Scores	.053**	.04	.06
Cue Types	-.08	-.40	.23
R	.76		
R^2	.58		
F	33.3*		

*Note. **p <.01. B=coefficient of regression, LL=Lower Limit, UL=Upper limit, Over-general Autobiographical Memories were taken in numbers*

Multiple regressions were used. The results shows that PTSD (*B=.053, p <.01)* significantly predicted over general autobiographical memories. R^2 of 0.58 PTSD explained 58 % variance in the general autobiographical memories. The positive *B* value indicated that an increase in predictor results one standard deviation change in over general autobiographical memories. Moreover, cue types did not significantly predict over general autobiographical memories.

Table 4

Mean Differences on Over general Autobiographical Memories, Specific Autobiographical Memories, Pre-Test PTSD Scores and Post Test-PTSD scores and Reaction Time (N=50)

Variable	Experimental (N=25)		Control Group (N=25)				95 % CI		
	M	*SD*	*M*	*SD*	*t*(48)	*p*	*LL*	*UL*	Cohen's *d*
PTSD Scores	46.36	13.71	12.28	6.77	11.14	.000	27.93	40.22	3.21
Over general Autobiographical Memories	3.72	.89	1.36	.48	11.60	.000	1.95	2.76	3.34
Specific Autobiographical Memories	2.36	1.18	4.12	.88	-5.95	.000	-2.35	-1.16	-1.71
Reaction Time	12.94	4.45	3.76	1.83	9.05	.000	6.78	10.65	2.61

Note. *CI*=confidence interval, *LL*=lower limit, *UL*=upper limit, Reaction Time is in seconds.

Table shows that there was significant mean difference between experimental and control group sample on post test results only on the construct (*t* =11.14, *p* <.01), over general autobiographical memories (*t* =11.60, *p*<.01), specific autobiographical memories (*t* = -5.95, *p*<.01) and reaction time (*t* = 9.05, *p*<.01). Also, it was shows that individuals of experimental group (*M* =46.36, *SD* =13.71) recorded high scores on PTSD Scale as compared to the control group individuals (*M* =12.28, *SD* =6.77). It further shows that experimental group participants retrieved high number of over general autobiographical memories (*M* =3.72, *SD* =.89) as compared to the control group (*M* =1.36, *SD* =.48). Further results shows that sample of control group retrieved more specific autobiographical memories (*M* =4.12, *SD* =.88) and also had faster reaction time

(M =3.76, SD =1.83) in comparison to experimental group participants with regard to specific autobiographical memories (M =2.36, SD =1.18) and reaction time (M =12.94, SD =4.45).

DISCUSSION

The present study aimed to find the predictive association between Post-traumatic stress disorder (PTSD) and over general autobiographical memories (OGM) through experimental manipulation of words, images and odor cues on the memory retrieval of the individuals with PTSD. The results of the study indicated relationship between PTSD, cue types, overgeneral OGMs, specific AMs and reaction time estimates. The results had also shown that PTSD scores of participants significantly predicted OGMs. These results are in accordance or consistent with the existing researches. Harvey, Bryant and Dang (1998) had examined the effects of PTSD on AM retrieval of car crash survivors. Moore, et al. (2007) conducted a meta-analysis exploring the role of trauma exposure in PTSD in predicting over general autobiographical memories. The results had shown that participants with acute stress disorder do report more over general autobiographical memories. There are many other research findings that have provided support to the results in the present investigation (McNally et al., 2008; Wittekind et al., 2016). Sutherland and Braynt (2008) had reported that individuals with PTSD tend to have problems in AM retrieval. This is potentially due to the existence of trauma due to which the cognitive resources of participants are impaired. The lack of such resources results in impairments in memory retrieval processes. It was also found that even participants with PTSD were able to retrieve older memories in response to olfactory activation of the sensory systems. This shows that odor based memory activation is a neural correlate of autobiographical memories. Also, odor cues in comparison to words and visual information helped in overcoming avoidance mechanisms that did not allow the participants exposed to the latter cues to retrieve older memories. There is also supporting evidence in terms of this finding (Koppel & Rubin, 2016).

From results of the experimental manipulation and comparison with the control group, evident that PTSD is the main aspect that defines over generality in people experiencing this disorder. Moreover odor cues were found to be associated with the retrieval of a high number of overgeneral autobiographical memories. The findings are highly consistent with existing researches on this specific area (Glachet, & El Haj, 2019 ;Masaoka et al., 2012; Moore & Zoellner, 2007).

Conclusion

The study indicated that PTSD does result in impairment in the retrieval of specific autobiographical memories. Hence, it can be conclude that presence of psychological disorder is a significant factor behind the deficits in the autobiographical memories of individuals who participated in research. It was also found that individuals with PTSD tend to show longer reaction times to respond to the stimuli than non-PTSD. There is also evidence to show that impairments in autobiographical memories might be a coping mechanism.

Limitations and Recommendations

- The internal validity of the study is high due to the higher level of control and standardization that was used in the experiment. This is indicative of a direct causal association between PTSD and over general autobiographical memories.
- The experimental settings were not as natural conditions. FMRI scans would be suggested in future research as it give more information for the finding of the research i.e. odor cues can trigger long term memory centers as compared to image and word cues. Block Randomization did support for balancing the differences among individuals who were participated in the research. Although, there would be remain major differences that could not be evaluated.

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