



Understanding Memory and Attention in Dissociative Identity Disorder (DID)

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Increasing research has been conducted to examine the nature, diagnostic validity, symptomatology and phenomenology of Dissociative Identity Disorder (DID) in the past three decades, though little research were devoted on the understanding of its cognitive functioning. This pilot study aims at exploring a range of cognitive abilities in DID by using existing cognitive tests. Several surveys and tests were conducted in this study and it was discovered that many of the respondents could finish the 'divided attention tasks' and they were able to distinguish between the given older and newer version of the pictures in the cognitive memory tasks, and many could not. Overall, this study is based on the changed pictures, cognitive memory tasks and other data and information which might help explain lack of memory for the pictures or similar data or related identification tasks. Results of the study show less significant in high and low dissociators' familiarity with such information in the participants having DID.

Keywords: *Dissociative identity disorder (DID); memory; cognitive; decision making process.*

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1. INTRODUCTION

Small sample groups were utilized in study for intelligence of DID from 1981. According to Coons and Sterne, Walter measured 11 people with diagnosis of DID and found that their mean IQ score was 118, which suggested DID sample in that study have higher than average IQ. Given the very small sample size of Walter's study, Coons and Sterne conducted a research examining intelligence on DID and the outcome scores ranged from Borderline to Superior (score from 76 to 123) [1]. One of the limitations of Coons and Sterne's study was the inconsistency in the measurement tools for participants' intelligence. Some participants were assessed with the Shipley-Hartford Vocabulary Scale while others were assessed with the Wechsler's Adult Intelligent Scale, and the proportion of participants assessed with either test was not reported [2,3,4,5].

Armstrong and Loewenstein were the first to use the widely researched psychometric instrument, Wechsler Adult Intelligence Scale-Revised, to measure intelligence functioning for an entire group of research participants (N=14) [6]. They also creatively injected a component of process questioning when conducting the WAIS-R so as to examine the effect of different consciousness of identity states on the test result. The participants were informed that all aspects of self were allowed to participate in the testing. The participants were also asked with questions related to their approach to tasks, their decision making process, identified problems during the response, and identified aspect of self involved in the responding process [6]. The research result showed that the intelligence level of DID range from Average to Superior (score from 92 to 129), without particular pattern of intellectual strengths or weaknesses. There was however high intra-scale variability, and different response was noted to emotional laden items. For instance, the participants were perceived as retreating to more concrete mode of thinking when the test items were associated with traumatic experience in either verbal or performance modality. Although Armstrong & Loewenstein's approach was a non-standard approach to administer the WAIS-R, their approach allowed additional qualitative data to be gathered during the administration process. It also minimized the risk of underestimating the participants' intelligence due to potential switching or compartmentalization of information in DID participants during the administration

process. Interpretation of the qualitative data however would heavily rely on clinical judgment of the examiners.

In the largest study of cognition in subjects with dissociative disorders, Rossini, Schwartz and Braun recruited 150 people in which 50 were diagnosed with DID and 100 were diagnosed with Dissociative Disorders Not Otherwise Specified (DDNOS) [7]. The result showed no significant difference between groups on verbal, performance and global intelligence. No significant difference between estimated and actual intelligence was found either. The mean full-scaled IQ score for the whole sample group was approximately 99, with a wide range from 65-134, which is consistent with general populations norms. The DID group has significantly more abnormal scatter on the verbal subtests but not on performance or summed subtests when compared with the DDNOS group. Inconsistent with Armstrong's [6] findings, this study did not show the vulnerability of people with DID to affect-laden test material. Thus the question of whether DID people retreat to concrete cognitive mode when confronted with materials that potentially trigger their traumatic experience remained unresolved.

Rossini et al's study was the latest one to measure intelligence level of DID using the Wechsler Adult Intelligence Scale. Probably the lack of research on continuing the exploration work on this line was due to the long and structured nature of the test and the inconsistent or insignificant result found by past research [7]. Sternberg and Pardo suggested that the relation between intelligence and cognition is bidirectional [8]. That is, the construct of intelligence provides a way of conceptualizing cognition and vice versa. In psychology, cognition is commonly referred to the mental process of memory, attention, language, perception, reasoning, problem solving, planning and judgment. The older versions of WAIS undoubtedly helped to detect different domains of cognitive functioning, but from a neuropsychological perspective, they are not sensitive to some specific cognitive abilities especially those related to frontal lobe activities [9]. The latest version, WAIS-IV, encompasses a wider range of cognitive domains. Interestingly, no research has attempted to explore the full range of cognitive functioning of DID, and only a small number of studies have measured specific cognitive domains (memory and attention) apart from general intelligence of this population [3].

2. METHODOLOGY

Among all cognitive aspects of DID, inter-identity memory ability or amnesia has been the most researched area. The interest of researching memory ability in DID is most likely due to the diagnostic criteria of the disorder. In both DSM-IV and ICD-10, only memory ability among the whole range of cognitive functioning is stated as one of the diagnostic criteria for DID (Table 1).

The memory phenomenon of alternate identities in DID can be classified as three types: identities have full access to each other's memory; identities have zero access to each other's memory; identities have one-way access to other's memory. In a case series studied by Putnam et al., 72% of the cases had at least one identity who denied other identities (i.e. alters) existed while 86% of the cases had an identity who was aware of all other identities [10,11].

The possible difference of memory transfer between identities depends on types of memory. Semantic and episodic memory are under a category of memory called declarative memory or explicit memory, while another type of memory is procedural memory or implicit memory [12]. Episodic memory is memory for autobiographical events and experiences including times, places, associated emotions, and other conception-based knowledge, that can be explicitly stated. Semantic memory refers to the memory of theoretical knowledge independent of personal experience; it is the memory for factual information and general knowledge. Procedural memory is a type of implicit memory utilized on daily basis. It allows

ones to perform an action without conscious thinking. Episodic memory and procedural memory are the ones that have been researched most often in DID population. Single case studies were used from 1972 to understand the memory pattern of DID. Some of the results obtained from single case studies have showed evidence of information transferred across identity states and thus led to practice effect [13]. While others have showed transfer of information or priming effect across identity states on implicit tasks only, which means amnesia was evident across identity states on explicit memory tasks [14]. Nevertheless, not all, but only some, implicit tasks showed priming effect across states. Nissen et al. Thus proposed that priming effect should be minimal across states when implicit tasks require much semantic interpretation of the information, and that the priming effect may only be obvious on tasks that do not involve specific knowledge to identity state.

The first group study on memory ability of DID found no significant difference of memory ability between DID and control groups, and that DID do not have greater ability in compartmentalizing information even when they have learned information in different identity states [15]. This suggested possible transfer of learned information across identity states despite the DID participants' report of amnesia. Another study found DID perform less well on explicit memory across states without significant difference in performance on implicit tasks [9]. A longitudinal study conducted by Huntjens et al. [16] showed no difference between the

Table 1. Diagnostic criteria for DID in DSM-IV and ICD-10

The diagnostic criteria for DID in DSM-IV (300.14):
A) The presence of two or more distinct identities or personality states, each with its own relatively enduring pattern of perceiving, relating to, and thinking about the environment and self.
B) At least two of these identities or personality states recurrently take control of the person's behavior.
C) Inability to recall important personal information that is too extensive to be explained by ordinary forgetfulness.
D) The disturbance is not due to the direct physiological effects of a substance (e.g., blackouts or chaotic behavior during Alcohol Intoxication) or a general medical condition (e.g., complex partial seizures). In children, the symptoms are not attributable to imaginary playmates or other fantasy play (APA, 1994).
The diagnostic criteria for DID in ICD-10 (F44.81):
The essential feature is the apparent existence of two or more distinct personalities within an individual, with only one of them being evident at a time. Each personality is complete, with its own memories, behaviour, and preferences; these may be in marked contrast to the single premorbid personality (WHO, 1992).

remembering and knowing responses for information learned intra- or inter-identity states. Instead the participants could recognize half of the materials learned by another identity states, and they did not show better ability in discriminating between words seen by other identities and their own identities. In summary, these studies consistently showed that memory amnesia or compartmentalization of memory was not evident between identities on implicit tasks. Also, objective evidence on explicit memory amnesia is also lacking despite the subjective report by the patients. Reviewing the results of these research on DID memory, it appears that DID is state dependent only to some extent and that insufficient evidence was found to support the notion of inter-identity amnesia in DID using objective measures of memory [17].

The use of explicit and implicit memory was criticized as useful but not sufficient to help understanding the phenomenon of inter-identity amnesia in DID [18]. Rather, the identity specified encoding and retrieval processes are identified as factors that determine the extent of information shared among identities. Dorahy supported the notion that compartmentalization and information transfer across identities in DID is not explained by the differentiation between implicit and explicit memory [19]. Instead, it is the depth of information processing that attributes to the information transfer or amnesia across identities, at least on implicit tasks. Information in implicit memory may transfer across identity states if lower order mental functions such as categorization were the only requirement in the encoding process, while compartmentalization is resulted if higher order mental functions such as judgment and reasoning were required in the encoding process. It was argued that the failure in finding any significant memory difference between DID and average people in previous studies was probably due to the requirement of low level processing only on the test items. Though most memory tests used in clinical settings may not tap into the deep level processing at the encoding stage unless the tests are specially designed for particular purposes. The current study focuses on exploring a wider range of cognition in DID and examining its potential difference with schizophrenia. Therefore, more commonly used tests in clinical settings will be selected for the purpose of this research.

Working memory requires people to hold information in the head and manipulate the

information. There has been limited investigation of working memory in DID. Research using non-clinical sample, people with high dissociation tendency, have yielded inconsistent results. Some found non-significant relationship between dissociation and cognitive failures and interference from secondary working memory tasks [20]. Yet others found superior performance on working memory tasks, and higher activation on dorsolateral prefrontal cortex, ventrolateral prefrontal cortex, and parietal corte [21]. In clinical samples, test results have showed smaller declined performance when task load increased, and the interference effect was not significant compared to the control, depressed or PTSD group but significant when compared to the psychosis group [22,23].

2.1 Attention

Working memory represents one's capacity to perform complex tasks with the ability to retain and actively access relevant information over time. Attention is one's ability to selectively process information in the environment. Awh and colleagues have suggested that the interaction of attention and working memory depends on what stage of attention is engaged and what type of information is being maintained in working memory [24]. Working memory includes the processes of encoding, storing, and manipulating information. Attention was perceived as minimally involved in the storage stage, but important for the encoding and manipulation of information in working memory [25].

Attempts were made to measure the effect of dissociation on attention tasks. The effect of emotional laden materials on attentive ability has found to be mixed in non-clinical samples. Freyd et al. found that high dissociators' attentive ability was not affected significantly by the emotional laden words, and yet opposite results were found in a study where high dissociators showed better ability to remember the sexual words [22]. In DID sample, emotional content of the materials have found to have effect on the information processing. Neutral materials seem to lead to normal ability in cognitive inhibition, and emotionally negative materials lead to poor cognitive inhibition. Clinical sample thus seems to show a different result compared to the non-clinical high dissociators sample [26].

Also, complexity of tasks was found to affect non-clinical dissociative samples differently from

normal sample. In DePrince and Freyd's study, higher dissociators performed better on divided attention tasks than selective attention tasks, and divided attention was suggested as a cognitive strategy helping high dissociators to function effectively in their environment [27]. DePrince et al. (2008) conducted a research using children sample aged between 9 and 12, and similar result was yielded. The sample was divided into family trauma group, nonfamilial trauma group and no trauma group, based on both parent report and child report. Comparable to the outcomes in the previous research, performance on divided attention task is more superior than that in selective attention task in people with higher dissociation level, same result was evident in children sample.

Non-clinical samples were often utilized to investigate cognitive functioning on dissociation. Only a small number of studies on DID cognition used a sample of people who had received a formal diagnosis of DID. In most research, non-clinical samples were divided into high dissociators or low dissociators determined by the Dissociative Experience Scale (DES) scores. Results were mixed in terms of the link between executive functioning and dissociation, and between working memory and dissociation [28]. Although it was thought that the result obtained from non-clinical sample can be translated to clinical sample with caution, differences in findings between non-clinical and clinical samples were evident [29,22,23]. Caution required when over-generalizing the results from non-clinical to clinical population. Overall, the number of research on cognition using clinical DID sample is very small and the results have been inconsistent and inconclusive.

In summary, published research, while limited and subject to various methodological weaknesses, indicates it is likely that cognitive functioning of people with a diagnosis of DID will be in the normal range. Evidence from available studies so far indicated low possibilities of complete compartmentalization of information, and possibly better than average attention and smaller declined in working memory performance when task demand increased.

2.2 Participants

A pilot study was conducted on a group of 12 participants who were diagnosed with DID. All participants were over 18 years old outpatients with majority of the participants come from

private health settings. Participants were required to fulfill the relevant DSM-IV diagnostic criteria, diagnosed by treating psychiatrists, as one of the selection criteria. Participants with comorbidity diagnosis including bipolar disorder or current substance use disorders were excluded. Participants with epilepsy or history of brain injury were also excluded. As past researches have showed high prevalent rate of PTSD in DID population; (Middleton & Butler, 1998), it is not feasible to exclude DID sample with a co-morbid diagnosis of PTSD [30]. Only participants with a stable mental state are included to reduce the potentially confounding factor of chronic versus acute symptoms. Stable mental state is defined by absence of current hospital admission due to acuity or deterioration of symptoms.

Record forms were coded with a 6 digit number to keep the participants' identification anonymous. Participants were asked about their age and the highest education level obtained. The cognitive testings alone took the whole process including the interviewing, questionnaire and administration of cognitive tests. Ten minutes break were given after the first 60 minutes, or more frequent as required on individual basis. A \$20 gift voucher were rewarded at the end of testing to compensate the participants for their time.

2.3 Measures

One is aware that some Common information on DID is as follows:

- A highly stressful event during childhood may prevent some children from integrating their experiences into a unique identity.
- The person has two or more identities and has memory gaps for everyday events, important personal information, and traumatic or stressful events, as well as many other symptoms, such as depression and anxiety.
- Through a thorough psychiatric interview and special questionnaires, sometimes facilitated by hypnosis or sedatives, the doctor obtains the information necessary to establish a diagnosis of this disorder.
- Psychotherapy can promote the integration of identities or, at least, achieve the cooperation of existing identities. Dissociative identity disorder is rare and

the number of people who suffer from unknown.

Dissociative identity disorder may present in following forms:

- Possession
- No possession

In the possessive form, the different identities appear as if they were outside agents that have taken control of the person. This outside agent may be described as a supernatural being, spirit (often a demon or god, who may exact punishment for past actions) but sometimes another person (often someone who has died, sometimes dramatically). In all cases, people speak and act very differently from their normal behavior. Thus, the different identities are obvious to other people. In many cultures, similar possession states are a normal part of the local culture or religion and are not considered a disorder. In contrast, in dissociative identity disorder, the alternate identity is unwanted, causes significant distress, functional impairment, and appears at times and places that are not appropriate for the person's social situation, culture, and/or religion.

Dissociative identity disorder often occurs in people who experienced overwhelming emotional stress or trauma during childhood. In the United States, Canada, and Europe, about 90% of people with this disorder have a history of severe abuse (physical, sexual, or emotional) or neglect during childhood. Some people have not been abused but have experienced a significant early loss (such as the death of a parent), a serious illness, or other overwhelmingly stressful events.

As children develop, they must learn to integrate diverse and complicated types of information and experiences into a single, cohesive and complex personal identity. Sexual and physical abuse that occurs in childhood, when personal identity is developing, can have lasting effects on a person's ability to construct a unique identity, especially when the abusers are parents or caregivers.

Abused children may go through phases in which different perceptions, memories, and emotions about their life experiences are kept separate. Parents or other caregivers intensify this segregation of experiences by behaving inconsistently over time (for example, alternating

between loving and abusive behaviors), a behavior called traumatic betrayal. Over time, these children may develop an increasing ability to escape the abuse by "walking away," dissociating from their harsh physical environment or retreating into their own mind. Each traumatic phase or experience can be used to produce a different identity.

However, if these vulnerable children are sufficiently protected and psychologically supported by adults who truly care about them, they are less likely to develop dissociative identity disorder. Dissociative identity disorder has a chronic course and is potentially disabling, although many people achieve a good level of functioning and lead creative and productive lives. Dissociative identity disorder presents several characteristic symptoms.

Apart from the established clinical diagnosis, participants already have when initially referred to current study, standardized instruments including a screening tool for dissociative disorders (DES-II) and a diagnostic tool for DID (DDIS) were used to cross check diagnosis. Any discrepancies in the diagnosis given by treating psychiatrists and the diagnosis obtained from the instrument tools will be reported in the result section.

Dissociative Disorders Interview Schedule (DDIS): A 132 item structured diagnostic interview, administered by clinician, especially for detecting dissociative disorders. Related symptoms and diagnostic categories are also assessed, including those of Schneiderian symptoms, depression, borderline personality disorder, somatoform disorder and substance abuse. It takes about 30 minutes to complete [31].

Dissociative Experiences Scale-II (DES-II): DES is a self-rating questionnaire which takes about 5 minutes to complete. It contains 28 items with each item rating from 0-100%. The higher the score the more intense is the measured dissociative symptoms, with an average score of over 30 being highly associated with DID. DES is a screening tool, its use complements the diagnostic tool for DID.

Childhood Trauma Questionnaire: A 28 item self report questionnaire exploring presence of childhood abuse and neglect history. It covers five types of abuse including emotional abuse, physical abuse, sexual abuse, emotional neglect

and physical neglect. It does not cover other childhood traumatic events like death of loved ones or illnesses. It includes a three item minimization/ denial scale to detect false-negative responses. All questions are 5-point Likert scale ranging from Never True to Very Often. It takes about 5 minutes to complete the questionnaire. The questionnaire shows good test-retest reliability (.88) and internal consistency (.80 to .97) [32].

Cognitive Tests:

1. Performance tasks in WAIS-IV (Wechsler, 2008).

Wechsler Adult Intelligence Scale (WAIS) has published the forth version in 2008, WAIS-IV. The latest version comprises additional tests in performance tasks. The Perceptual Reasoning Index comprises five tests, including Block Design, Matrix Reasoning, Visual Puzzles, Picture Completion, and Figure Weights. The Processing Speed Index comprises three tests, including Symbol Search, Coding, and Cancellation [8].

2. Stroop Colour and Word Test (Golden and Freshwater, 2002).

The Stroop Colour and Word Test has been used in research for testing selective attention in dissociative samples (e.g. DePrince & Freyd., 1999; DePrince et al., 2008). The test is commonly used to measure attention vitality, flexibility and ability to inhibit automatic response. Subjects are required to inhibit an overlearned verbal response, which is to name the colour of the ink in which incongruent colour words are printed [33].

3. Rey Complex Figure Test.

A geometric figure is shown to the participants and participants are required to first copy the figure. Then the figure is removed and participants are required to recall them by drawing on the paper immediately. About 30 minutes later, participants are required to recall the figure again. The copy condition measures visuo-spatial construction ability whilst the immediate and delayed recall conditions measure incidental or implicit memory [34]. Accurate reproduction and placement of 18 specific design elements are scored for each recall and copy on the Test Booklet of Rey complex Figure Test [34].

Most tests measure multiple cognitive abilities and domains simultaneously. The underlying structures covered by these tests include visuo-spatial skills and construction (Block Design, Rey Figure), processing speed (symbol search, coding cancellation, Stroop Colour and Word Test), visual memory (Rey Figure), attention/concentration (symbol search, coding, cancellation, picture completion), motor coordination and speed (block design, symbol search, coding cancellation), non-verbal reasoning (Figure weight, visual puzzle, matrix reasoning), and switching/inhibition ability/impulsivity (Stroop Colour and Word Test). Thus, these selected tests cover almost all neurocognitive domains, at least at a screening level, except verbal ability. This selection of test battery therefore is seen to be the most reasonable choice for the purpose of this study.

In addition to the above cognitive tests, an adult reading test was also administered to measure estimated premorbid intellectual functioning. Although, the norm in NART-2 is relatively old, general reading test is commonly used as a measurement for premorbid functioning. Test of Premorbid Functioning in Advanced Clinical Solutions would be a more ideal measurement because it aligns with the latest version (fourth edition) of both intelligence and memory scale of the Wechsler tests [35].

National Adult Reading Test (NART-2): A reading test of irregular words to measure premorbid intellectual functioning, that is, predicted IQ is measured by the accuracy of pronunciation. This format of premorbid intellectual measurement is commonly used in both clinical and research settings given its high accuracy in predicting premorbid IQ [36].

The selected cognitive tests will be administered in the sequence listed below. The Rey Complex Figure Test- copy condition will be the first to administer, and its immediate recall condition and delayed recall condition will be administered after the NART-2 and the Picture Completion, respectively. The designed order aims at minimizing the interference effect of other performance tasks on the recall tasks on the Rey Complex Figure Test. Also, the Matrix Reasoning task will be tested at the last because it is an untimed task and can potentially take up more time than the other tasks.

1. Rey Complex Figure Test
2. NART-2

3. Stroop Colour and Word Test
4. Picture Completion
5. Cancellation
6. Visual Puzzles
7. Block Design
8. Symbol Search
9. Coding
10. Figure Weights
11. Matrix Reasoning

2.4 Data Analysis

Multivariate analysis of covariance (MANCOVAs) will be used to compare the cognitive test data for the two groups (DID and schizophrenia). MANCOVA protects against type 1 error by testing for group effects on the full set of variables prior to post-hoc analysis for specific variables (using Bonferroni corrections). It also corrects for covariates that are relevant to cognitive functioning and that are not equally distributed between groups. The first step of the analysis is to find out if there is any significant difference among the two groups in terms of gender, age, education, estimated premorbid intellectual functioning, childhood trauma history, and dissociative symptoms. These variables are entered simultaneously into the analysis as covariates to control for their influence. The scores obtained from the cognitive tests are entered as dependent variables, and the initial analysis tests for group membership effects on the full set, with post-hoc analysis used to identify specific cognitive measures that are more sensitive to group membership effects.

3. RESULTS AND DISCUSSION

Dissociative Identity Disorder has been studied as one of the most paradigmatic phenomena of dissociative disorders, as it involves the presence of more than one identity or personality state with its own characteristics. The literature agrees that one of the most important etiological factors is a childhood with severe and chronic traumatic experiences in which neglect by caregivers is often part of their development [37].

By the late 1990s, research on DID experienced a decline, calling into question its scientific acceptance as a diagnostic condition [38]. As a result, although a large consensus has been reached about its etiology, DID remains a controversial diagnosis. Diagnostic complexity has generated divisions among mental health professionals: there are those who consider that the symptoms could be malingering and those who recognize and accept this

psychopathological category [38]. The lack of knowledge among professionals about dissociation, dissociative disorders, and the psychological effects of trauma has contributed to the difficulty in making a clinical diagnosis [39]. In turn, many of the disabling symptoms experienced by patients (eg headaches, switching, intrusive memories) often do not have a clear observable manifestation, or are not communicated due to shame or lack of awareness of their behaviors, making diagnosis difficult [40]. In this sense, the most recent research is beginning to focus on defining strategies for the adequate diagnosis and clinical management of patients with DID [41].

The three models described address dissociation as a psychological response to traumatic events, which in principle would allow the negative impact of the overwhelming experience to be overcome, but in the long term it brings about more lasting and maladaptive consequences such as dissociative symptoms and/or disorders.

DID has been shown to be one of the most extreme cases of dissociation, affecting the uniqueness of the personality, in the service of survival in hostile environments (Nijenhuis & Van der Hart, 2011). It would allow to face a conflict between the need for attachment and care, on the one hand, and the need for self-preservation on the other [42]. In this way, the different states of the self or "alters" are the manifestation of the adaptation attempts of a vulnerable personality, which somehow tries to sustain itself by avoiding traumatic memories and experiences.

One of the difficulties raised by dissociation models is the persistence of the dissociative response beyond the traumatic situation. This implies that dissociation can be triggered by stimuli associated with the traumatic event or even by less threatening stressful situations [17]. An adequate therapeutic approach should take into account the individuality of the case presentation, focusing on the processing of the traumatic experience in autobiographical memory, the learning of more functional coping strategies, and then focusing on the integration of personality aspects. The importance of research into DID, but also into Dissociative Disorders. A greater delimitation and conceptual clarity of dissociative phenomena can be appropriate tools at a clinical and theoretical level, to improve understanding and management by mental health professionals, as

well as for the treatment of people who suffer from it.

The results indicate that the 'processing speed' seems to be faster in people with DID. Many of the respondents could finish the 'divided attention tasks' and they were able to distinguish between the given older and newer version in the cognitive memory tasks. It is although proposed that a simpler version be devised for lower age group respondents, as the analysis is to find out if there was any significant difference among the two groups in terms of gender, age, education, estimated premorbid intellectual functioning, childhood trauma history, and dissociative symptoms, though in some prospective research attempts may devise the test-procedure much easier for child respondent. These cognitive memory tasks produced the satisfactory memory score to enable the comparison amongst the groups. At the same time, the effect of stimulus order was found. Result of the present study where the respondent was subjected to abuse in childhood, along-with prior study of memory with dissociative Identity disorder (DID) adult, lends support to this hypothesis which states that the person which grew up at an abusive home also grew 'divided attention skills' that helped him or her to keep the related information threat away from awareness. Although 'Dissociation' scores itself predicts memory in adult, abuse history contributes to memory capability from the childhood. On giving the focus to the abused or high dissociative group in comparison to non abuse or low dissociative group, one can isolate that group which one could forecast having poor memory for picture changes under the 'divided attention tasks; this signifies respondents/ participants who possess memory to ignore (i.e., abuse) and the means to ignore them (i.e., dissociative abilities) (JOURNAL OF TRAUMA & DISSOCIATION).

It was stated earlier as one of the diagnostic criteria of DID, which means the presence of two or more distinct identities or personality states, each with its own relatively enduring pattern of perceiving, relating to, and thinking about the environment and self. The present research determines the kind of environment that is linked to the usage of 'divided attention tasks' and the deficiency in recalling the threat related information that would evince extent through which the trauma is associated with usage of 'divided attention tasks' and dissociations. It was stated earlier that the working memory

represents one's capacity to perform complex tasks with the ability to retain and actively access relevant information over time. Attention is one's ability to selectively process information in the environment. The common characteristics between trauma & dissociations amongst the group of children could require some more research, as this study could have important implications for appreciating the development of dissociation from the childhood stages. So, further research should use various measures of dissociation (for instance, the Child Dissociative Checklist; Putnam, Helmers, & Trickett, 1993) to ascertain relation amongst dissociation, attention and memories for threat related data. However the determination of environment is appropriate for the identified groups; these studies suggest that high dissociators might be at a cognitive advantage in tasks that require divided attention. Hence one can predict that the divided attention context should assist high dissociators to keep threat data or information away from awareness. In a prior study (DePrince & Freyd, 2001), it was tested high and low dissociators utilizing an item method directed forgetting tasks in selective and divided attention condition. Like McNally et al., it was determined that there were no differences in the free recall of trauma related items illustrated under selective attention conditions. But, within divided attention condition, high dissociators could recall only few trauma related items and were also additionally neutral 'to-be-remembered' expressions compared to the recall by the low dissociators [43].

It was indeed a challenge to include respondents who would have experienced ongoing family or external abuse, in this study of attention & memory. Though the study on the child-abuse would involve the identification, but the current study depends on the adults who would self-report their abuse as a retrospective occurrence. It is quite likely that some significant difference could arise from the two cases, which makes it more harder to accurately forecast the study. As for instance, the trauma theory forecasts that the respondents who hide their abusive past are the ones who also could forget to remember their past abuse. So this could affect the precision in the findings. Although the participants were required to fulfil the relevant DSM-IV diagnostic criteria, diagnosed by treating psychiatrists, as one of the selection criteria. Participants with comorbidity diagnosis including bipolar disorder or current substance use disorders were excluded. Participants with epilepsy or history of brain injury were also excluded. As past

researches have showed high prevalent rate of PTSD in DID population. Participants who had experienced excessive trauma of various kinds (physical abuse, neglect and sexual abuse) may have very different reactions to abuse; it was highlighted earlier that, for instance, the participants were perceived as retreating to more concrete mode of thinking when the test items were associated with traumatic experience in either verbal or performance modality. Although Armstrong & Loewenstein's approach was a non-standard approach to administer the WAIS-R, their approach allowed additional qualitative data to be gathered during the administration process. It also minimized the risk of underestimating the participants' intelligence due to potential switching or compartmentalization of information in DID participants during the administration process. Interpretation of the qualitative data however would heavily rely on clinical judgment of the examiners.

4. CONCLUSION

In conclusion, this study is based on the changed pictures, cognitive memory tasks and other data and information which might help explain lack of memory for the pictures or similar data or related identification tasks. Results of the study show less significant in high and low dissociators' familiarity with such information in the participants having DID. However there is a general inference that the 'processing speed' seems to be faster in people with DID. Many of the respondents could finish the 'divided attention tasks' and they were able to distinguish between the given older and newer version of the pictures in the cognitive memory tasks. Further, the respondents who had a past of living in abusive homes would have developed the 'divided attention skills' which would have facilitated them to keeping the threat information away from awareness. Appreciating this skill is the throughout process from childhood stages and it has a deep impact and implications for this attention and mental health and growth.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

I hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

A written description of the study were given to the participants and written informed consent is

sought before the commencement of cognitive testings.

COMPETING INTERESTS

Author has declared that no competing interests exist.

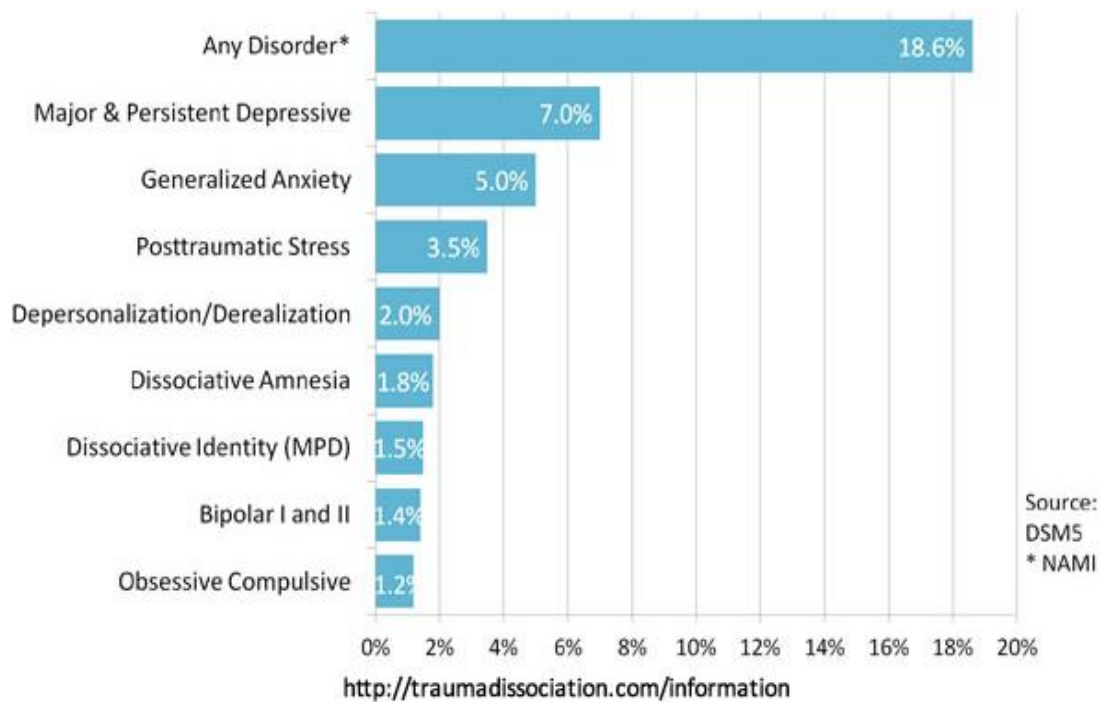
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APPENDIX



Graph 1. Annual prevalence of Trauma and dissociative disorders

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