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RESEARCH ARTICLE

Autobiographical memories and emotions: an investigation from the perspective of the schema model

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ABSTRACT

Objective: The aim of this study was to examine the relationships between early maladaptive schemas, schema coping skills, and autobiographical memories in university students.

Method: The sample of the study consisted of 162 undergraduate students studying at Hacettepe and Ankara Universities. Data were collected using the Young Schema Questionnaire–Short Form 3 (YSQ-SF3), Young-Rygh Avoidance Inventory (YRAI), Young Compensation Inventory (YCI), and the Autobiographical Memories Questionnaire (AMQ).

Results: The relationships between schema domains, schema coping styles, emotional intensity of autobiographical memory, and autobiographical memory characteristics were examined through path analysis and the mediation in the path model was examined with mediation path analysis conducting Bootstrap correction. Model testing revealed that the model fit the data. The model indicated that the disconnection schema domain predicted avoidance, avoidance predicted emotional intensity of autobiographical memory, which in turn predicted autobiographical memory characteristics. Disconnection, impaired limits and unrelenting standards schema domains predicted overcompensation, which predicted autobiographical memory characteristics. Overcompensation mediated the relationships between impaired limits and autobiographical memory characteristics and between unrelenting standards and autobiographical memory characteristics.

Conclusion: This study revealed that schema coping styles and emotional intensity played a critical role in the relationships between schema domains and autobiographical memory characteristics.

Keywords: Autobiographical memories, early maladaptive schemas, schema coping styles

INTRODUCTION

In the last few years, the schema therapy model (STM) and autobiographical memories have been studied with increasing interest as two unrelated topics of psychology. The lack of connection might be explained when we consider that memory models emphasize cognitive structures, while clinical approaches tend to ignore memory processes (1). At the same time, the STM studies autobiographical memories of early negative experiences by establishing a link between past and present. One of the most important characteristics separating STM from cognitive therapy is the method of imagination used in working with memories (2). Thus, autobiographical memories are used in the subfields of cognitive as well as clinical psychology, but from different perspectives.

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Early maladaptive schemas, which are central to STM, are common themes or patterns consisting of memory, emotion, cognition, and physical sensation, regarding the individual and relations with others, developing in childhood or adolescence, that become more complex during the person's lifetime and are to a great extent dysfunctional (2). According to Young, schemas are cognitive structures that include a person's self as well as their beliefs about others and about the future (3). Early maladaptive schemas originating during childhood or youth can develop in children repeatedly experiencing neglect, abuse, and criticism or growing up in an environment that does not satisfy basic emotional needs (2). When a person is exposed to traumatic experiences early in life, these experiences may negatively affect the cognitive representation of the self and of others, or in other words, the development of schemas, via autobiographical memories (4).

Basically, it has been suggested that there are mutual relations between schemas and autobiographical memories (5,6). While people's memories of the past affect the self-related schemas, their current schemas impact the ways in which early experiences are remembered. For example, a child struggling to survive physically and emotionally after a trauma develops schemas based on the autobiographical memories of these traumatic experiences, while using certain protective mechanisms in processing and recalling these autobiographical memories that may impair memory processes (7). This study investigates the relation between early maladaptive schemas and negative autobiographical memories of experiences with caregivers in the early period of life.

Autobiographical memories have been defined as the mental representations of a person's experiences (8-11). According to Conway and Pleydell-Pearce (5), at the basis of autobiographical memories there is a hierarchical structure running from experiences, which are arranged from the specific to the general, to life history schemas. Using all the information contained in this structure, the individual develops a structure (schemas) containing representations of the self, of others, and of interactions with the world (12). Autobiographical memories are used to create mental representation of the self, while the resulting self-related schemas shape the encoding, storage, and retrieval of these memories (6,12). It is also assumed that early maladaptive schemas, as they contain general information about a person, others, and relations with others, may affect the retrospective memory of this information (6). On this basis, in our study we expect that early maladaptive schemas predict the characteristics of early autobiographical memories.

In the literature, autobiographical memory characteristics are studied in the context of how autobiographical memories are recalled. The concept of autobiographical memory characteristics considers the relevance of memory, its relation with the self, time and place, being relived and revived in the mind, and the effect/results of these processes (13-15). As memory characteristics increase, the memory is recalled more vividly and in more detail (12). Rather than recording events identically, autobiographical memories are structures shaped as a result of experiences (5). Thus, in studies examining the characteristics of autobiographical memory, an important topic is memory bias. For example, studies of memory performance found that participants were more inclined to remember items that were in line with their mood, indicating a mood-congruent memory bias (8). Especially in clinical groups of patients with a psychiatric diagnosis, it is interesting to see that autobiographical memory characteristics are modified and memory processes show certain biases (16). Thus it has been seen that individuals with a diagnosis of depression remember negative memories related to a negative mood more than positive memories (17). In addition to this memory bias, these individuals showed a tendency towards a more general recall of autobiographical memories (11). Studies in the literature show characteristics such as the content of the event (e.g., a trauma), its duration, and its emotional intensity to be important factors for a more detailed or a more general recall of autobiographical memories (18-20). In our study, the variable called autobiographical memory characteristics indicates a vividly and detailed recall of the memory.

The emotions that constitute a context for the recall of autobiographical memories play an important role in the autobiographical memory characteristics (21). Emotions occuring during experiences affect how that experience is encoded into memory, how it is stored and how it is recalled under what conditions (1). From this perspective, autobiographical memories are closely related to emotions (5,15,22). The correlation between emotion and autobiographic memory has been studied from the perspective of emotional stimulation (19). Studies in the literature have shown that with increasing emotional arousal, recall also increases (23-25). Therefore, in our study we expected emotions related to autobiographical memory to be another variable predicting autobiographical memory characteristics.

Considering early maladaptive schemas, they grouped into 5 schema domains in a study conducted in Turkey: disconnection/rejection (emotional deprivation, emotional inhibition, social isolation/alienation, defectiveness), impaired autonomy and performance (dependency, abandonment, failure, negativity, vulnerability to harm or illness), impaired limits (entitlement/insufficient self-control), other-directedness (self-sacrifice, subjugation), overvigilance, and inhibition (unrelenting standards, approval-seeking) (26). The disconnection/rejection domain includes the belief that basic needs not met in childhood, such as security, care, love, belonging, acceptance, or expression of emotions, will not be satisfied in adulthood either. The domain impaired autonomy and performance relates to a perception of deficiency in the ability to live independently and succeed in doing certain things. The domain impaired limits is related to problems with drawing lines, fulfilling responsibilities, and realize long-term goals. Other-directedness involves the individual focusing more on others' will, feelings, and reactions than on their own capacities when it comes to avoiding harm or finding love and confirmation. Finally, the last domain overvigilance and inhibition has to do with suppressing selfhood or following strict internalized rules (2). According to STM, early maladaptive schemas represent one's experiences at an early age and lead to a revival of past experiences triggered by new events (2).

From the viewpoint of STM, early maladaptive schemas persist through 3 coping styles: surrender, avoidance, and overcompensation. The surrender coping style entail behaving in a way that perpetuates the schema without being aware of being caught in it. As there is no valid and reliable instrument available to measure schema surrender, this study addresses avoidance and overcompensation coping styles. Schema avoidance means to avoid confronting problems and feelings related to the respective schemas. An example for a coping style of avoidance is staying away from topics perceived to be sensitive and avoid expressing one's feelings (2). The coping style of overcompensation includes battling the schema, thinking, feeling, and acting as if the opposite of the schema were true (2). While generally functional during childhood, the use of schema coping skills in adulthood, when the conditions change and the individual has more options, turns into a dysfunctional state (27). At the same time, schema coping skills are also related with one's emotions and their intensity (2). The use of coping strategies may serve to negate the intensity of feelings provoked by life events. A number of studies demonstrates the relation between schema coping skills and schema domains (28,29). Studies carried out in Turkey show that avoidance coping style is predicted by the disconnection/rejection schema domain and overcompensation coping style by the schema domain impaired limits (30,31) and by the schema domain overvigilance and inhibition (32). Consistent with these findings, in our study we expect that schema domains predict schema coping skills, while at the same time schema coping skills should mediate the relation between early maladaptive schemas and autobiographical memory characteristics.

When the literature is investigated, the relationship between early maladaptive schemas and autobiographical memory characteristics has not been studied sufficiently, even though there are a few studies (33,34). However, as there is information about self-related schemas, we may assume that a link can be established between autobiographical memories and early maladaptive schemas. In this sense, a study on autobiographical memories looking at the nature of negative childhood experiences in the framework of STM might offer an integrative view. Thus, this study has basically been designed to answer four questions: (1) Is there a relation between early maladaptive schemas and schema coping skills? (2) Is there a relation between schema coping skills and emotional intensity of autobiographical memory? (3) Is there a relationship between emotional intensity of autobiographical memory and autobiographical memory characteristics? (4) Do schema coping skills play a mediating role in the relationship between early maladaptive schemas and autobiographical memory characteristics?

Autobiographical memories and early maladaptive schemas provide information about the self, others, interaction with others, and about the world. In this study, the authors propose a model to examine the relations between schema coping skills, emotional intensity of autobiographical memory and autobiographical memory characteristics with the application of path analysis. From the relation between early maladaptive schemas and autobiographical memories proposed in the literature, we expect that schema domains predict schema coping skills (Hypothesis 1), schema coping skills predict emotional intensity of autobiographical memory (Hypothesis 2), emotional intensity of autobiographical memory predict memory characteristics (Hypothesis 3), and schema coping skills play a mediating role between schema domains and autobiographical memory characteristics (Hypothesis 4).

METHOD

The study included 176 participants selected from among the students of the Faculty of Language and History-Geography, the Faculty of Economics and Administration Sciences, and the Faculty of Agriculture at Ankara University and from the Faculty of Humanities at Hacettepe University. The study sample was recruited using the convenience sampling technique (35). Students answering in the affirmative the question "During the past six months, did you receive any psychiatric/psychological/neurological diagnosis?" on the demographic information form were not enrolled in the study. Thus, 5 potential participants were not included because of the exclusion criteria (absence of any psychiatric/psychological/neurological diagnosis). Two participants were not included because they did not meet the necessary statistical measures at the stage of data cleansing. Another 7 participants were not included because they remembered memories that did not fit the instructions or could not remember the required negative autobiographical memories. In the end, a total of 162 individuals participants with an age range of 17-27 years (M=20.59) were enrolled in the study, 148 of whom (91.4%) were female and 14 (8.6%) male. Data analysis was performed for these 162 participants.

Measures

Demographic Information Form: In addition to the measuring instruments, the researcher prepared a demographic information form to obtain various sociodemographic data of the participants, including their age, sex, faculty of study, department, educational status of their parents, and information about income.

Autobiographical Memories Questionnaire (AMQ): This is a self-report measure as part of a comprehensive interview form developed by Er and Ucar (22) to assess the characteristics of memories recalled by individuals, consisting of 25 items scored on a 7-point Likert-type scale (1=not at all, 7=very much). It includes the subdimensions memory details, flashbulb memory, importance and effect of the memory, repetitive memory, and coherent memory. Some examples of these items are: "How frequently do you recall this memory?" "Generally, how well, vividly, in detail, and clearly can you recall this memory?" "When thinking of this memory, to what degree to you feel like reliving the event you remember?" High scores on this scale show that a memory is lively, clear, and detailed. In this study, we used the total score of the scale. The instrument instructed the participants to evaluate each item in the most appropriate way, based on their memories. At the same time, we used the dimension emotional intensity on the relevant form for our study. For this dimension, participants had to specify their feelings relating to the memory (sadness, shame, fear, love, surprise, hate, happiness) and evaluate the intensity of their feelings (1=not at all, 7=very much). The internal consistency coefficient α was 0.94 for the total scale and 0.84-0.96 for the subscales (36).

Young Schema Questionnaire–Short Form 3 (YSQ-SF3): The original form developed by Young (2) suggests 18 subdimensions under 5 schema domains. A validity and reliability study in Turkey identified a 14-factor structure of a shorter form with 5 schema domains disconnection/rejection, impaired autonomy and performance, impaired limits, other-directedness, and overvigilance and inhibition. These factors are emotional deprivation, emotional inhibition, social isolation/alienation, defectiveness, dependency, abandonment, failure, negativity, vulnerability to harm (or illness), entitlement/insufficient self-control, self-sacrifice, subjugation, unrelenting standards, and approval-seeking. The internal consistency coefficient α was 0.95 for the entire scale and between 0.54 and 0.85 for the subscales (26). In this study, we used the 5 schema domains.

Young-Rygh Avoidance Inventory (YRAI): Developed by Young and Rygh (37), the scale includes the various avoidance strategies used to cope with early maladaptive schemas. Cakir (38) identified the subdimensions psychosomatic symptoms, ignoring the problem, emotion control, withdrawal, distracting the mind through activities, and indifference/emotional inhibition for the Turkish form. The scale adapted to Turkish consists of 40 items scored on a Likert-type scale between 1 and 6 points. High scores indicate the intensity of the respective avoidance strategy. Statistically significant correlations have been found between this scale and the YSQ-SF3 (r=0.51), Young Compensation Inventory (YCI) (r=0.37), Young Parenting Inventory-Mother Form (r=0.28), Young Parenting Inventory-Father Form (r=0.22) and Symptom Checklist (SCL)-90-R (r=0.37). The internal consistency coefficient α was 0.77 for the total scale and varied between 0.45 and 0.76 for the subdimensions. The unequal-length Spearman-Brown split-half reliability coefficient was 0.67 (38). In our study, we used the total score of the scale.

Young Compensation Inventory (YCI): The scale was developed by Young (39), and a validity and reliability study for the Turkish adaptation was carried out in a university sample by Karaosmanoglu et al. (27). This self-report instrument consists of 48 items scored on a Likert-type scale from 1 to 6 and has an 8-factor structure. According to the results of principal component analysis, the subdimensions are status fixation, rebelliousness, excessive independence, control mania, self-directedness, manipulativeness, distance, and intolerance towards criticism. The score of the instrument is arrived at by summing up the points given for the items related to the compensation dimensions. The increase of the score in any compensation dimension also increases the score for the scale as a whole. According to the results of higher-order factor analysis, all subdimensions are united under a single dimension. The split-half reliability coefficient for the scale was 0.88, while for the subdimensions α ranged between 0.60 and 0.81. In our study, the score from this scale corresponds to the overcompensation variable.

Procedure

The study was started after receiving approval of the ethics committee of Ankara University. It consisted of a single administration containing two separate sections. Participation was voluntary and participants received information about the research before being included in the study in groups of ten. At the beginning of the research, participants were administered the YRAI and YCI and then the YSQ-SF3. Subsequently, the participants' memories were elicited, in conformity with the group imagination instructions, using the following trigger text: "Close your eyes. Can you hear me clearly? Imagine that you are in a safe place. What is there around you? Try to remember the details. How do you feel? … Let it come as it is. Keep your eyes closed. Erase the image. Now imagine yourself to be in your childhood, in a sad situation that you went through with your parents or caregivers… Now continue to feel that emotion from your childhood, now leave the environment where you are and erase the image. When you are ready, slowly open your eyes." This instruction was developed by Young (2) and adapted by Soygut Pekak (personal communication, 2014) and, with Soygut Pekak's permission, has been modified by the authors to fit the purpose of this study. In order to prepare the participants for the administration and to make sure that they could identify a space where they could feel safe in case they felt bad during the imagination, they were asked to imagine a "safe space" before the negative autobiographical memory (40). For procedural control, the same revised standard instruction was administered to each group. Based on the recalled memory, each participant answered the AMQ. At the end of the session, the researchers removed participants reporting memories that did not conform with the instructions from the study. The schema scales had been administered before the imagination exercise in order to ensure the triggering of the requested memories and to prevent the responses to the instruments from being affected by the recalled memories. The participants completed this process on average in 45 minutes. At the end of the administration, participants feeling any kind of discomfort were assured that they could reach the researchers and were given their contact details.

Statistical Analysis

In accordance with the aims of this study, correlations of early maladaptive schemas and schema coping skills with autobiographical memory characteristics and emotions related to autobiographical memories were analyzed using SPSS 21 and AMOS 21 software. Correlations between variables were analyzed with Pearson correlation analysis; relations between schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics were tested with a path analysis model developed by the authors. To examine mediated relations in the path analysis model, we used the bootstrap correction developed by Shrout and Bolger (41), with a bootstrap sample of 2000 and a 95% bias-corrected confidence interval (BC CI).

Before starting path analyses to test the relations between schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics, data were tested for normality, linearity, and variance homogeneity and for the presence of outliers. As a result of the analyses, multivariate outliers were evaluated according to the Mahalanobis distance ($p<0.01$) and univariate outliers according to the z distribution ($|z|\geq 3.29$) (42) and two participants with extreme scores removed from the data set. Furthermore, for path analysis, the multivariate normal distribution assumption was assessed through Mardia's coefficient, and this value (3.57) was lower than the value calculated with the formula [p (p+2)=63] (43). It was thus

confirmed that the multivariate normal distribution assumption was fulfilled.

In this study, given that it was not appropriate to subsume schema domains with different theoretical characteristics, such as disconnection and impaired limits, under a single higher-order structure like "schemas" and make them implicit, path analysis was applied rather than the structural equation modeling. It was also found useful to be able to make other variables contained in the model beyond the schema domains observable. Thus, the subdimensions psychosomatic symptoms, ignoring the problem, emotion control, withdrawal, distracting the mind through activities, and indifference/emotional inhibition constituted the variable avoidance, status fixation, rebelliousness, excessive independence, control mania, self-directedness, manipulativeness, distance, and intolerance towards criticism the variable compensation, the score for emotional intensity of memory the variable emotion related to autobiographical memory, and the subdimensions memory details, flashbulb memory, importance and effect of the memory, repetitive memory, and coherent memory the variable autobiographical memory characteristics.

Various fit indices were used to establish how far the models proposed as a result of the path analyses fitted the data. In this study, we mainly used χ^2 (chi-square test), χ^2/df, GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index), and RMSEA (Root Mean Square Error of Approximation). As good fit index values, for CFI, GFI, and AGFI figures of 0.90 and above, for RMSEA 0.80 and below, and for χ^2/df values below 5 were established (44,45).

RESULTS

The hypotheses proposed in accordance with the aim of this study have been partly supported. According to our findings, the schema domain disconnection/rejection predicts the coping strategies avoidance and overcompensation, while the schema domains impaired limits and overvigilance/inhibition only predict the coping strategy overcompensation (Hypothesis 1). The coping strategy avoidance predicts emotional intensity of autobiographical memory (Hypothesis 2). The coping strategies emotional intensity of autobiographical memory and overcompensation predict autobiographical memory characteristics (Hypothesis 3). The relation between the schema domains impaired limits and overvigilance/inhibition and autobiographical memory characteristics is mediated by the coping strategy overcompensation (Hypothesis 4); however, the coping strategy avoidance mediates no relation.

Correlations between schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics have been established using Pearson correlation analysis (see Table 1), and a model has been created specifying all the variables that correlation analysis had found significantly correlated and the paths between these values. Correlations in the model that were not significant were removed and then the model tested again. The definitive model with only significant correlations is shown in Figure 1.

This study has used path analyses to test hypothesis developed by the authors to identify correlations and mediating roles between schema domains, schema coping skills, emotional intensity of autobiographical

Table 1: Coefficients for the correlations between early maladaptive schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics

	1	2	3	4	5	6	7	8	9
1. Disconnection/Rejection	1								
2. Impaired autonomy and Performance	0.65**	1							
3. Impaired limits	0.35**	0.28*	1						
4. Other-directedness	0.33**	0.48**	0.20**	1					
5. Overvigilance and Inhibition	0.29**	0.40**	0.32**	0.40**	1				
6. Avoidance	0.41**	0.19*	0.26**	0.16*	0.21**	1			
7. Compensation	0.42**	0.35**	0.51**	0.25**	0.65**	0.33**	1		
8. Emotional intensity of autobiographical memory	0.06	-0.09	-0.01	-0.16*	-0.06	-0.15	0.02	1	
9. Autobiographical memory characteristics	0.09	-0.01	0.02	0.14	0.06	0.02	0.17*	0.20*	1

*p<0.05, **p<0.01

memory, and autobiographical memory characteristics. The path analysis results for the model, together with χ^2, degrees of freedom (df) χ^2/df, GFI, AGFI, CFI, and RMSEA values are shown in Table 2. For the model, the result for χ^2 (11, n=162) is 12.42, p>0.05. Looking at the chi-square values, we find that they are not statistically significant in the model and the model fits the data. As for the other fit indices, the GFI value (0.98) and the RMSEA value (0.03) show a good fit for the model. A χ^2/df value of 1.13 shows that the model fits the data. AGFI and CFI (0.95 and 0.99, respectively) correspond to a good fit (0.90 and above). The modification indices show that the model does not require any error association.

The results of the model establishing correlations between the variables by path analysis show that the schema domain disconnection/rejection positively predicts avoidance (β=0.41, p<0.001); avoidance negatively predicts emotional intensity (β=-0.15, p<0.05); emotional intensity predicts autobiographical memory characteristics positively (β=0.20, p<0.01); these values are significant. Again, the schema domain disconnection/rejection significantly predicts overcompensation (β=0.17, p<0.01) and overcompensation predicts autobiographical memory characteristics positively (β=0.17, p<0.05). The schema domains impaired limits and overvigilance/inhibition only predict the scoping skill overcompensation positively and at a level of statistical significance (β=0.29, p<0.001; β=0.50, p<0.001, respectively).

Path Analysis Mediation Model Results

In order to test indirect correlations, mediation path analysis with bootstrap correction was used. The significance of the mediation effect is determined by calculating the confidence interval and establishing if zero falls into this confidence interval (41). It was seen that overcompensation mediated significantly the correlation between impaired limits and autobiographical memory characteristics (B=0.24, GA: 0.02, 0.54, p<0.05). The findings also showed that overcompensation significantly mediated the correlation between the schema domain overvigilance/inhibition and autobiographical memory characteristics (B=0.37, GA: 0.03, 0.76, p<0.05). In addition, the coping strategy overcompensation mediated the correlation between the schema domain disconnection/rejection and autobiographical memory characteristics, the avoidance coping strategy in the relation between the schema domain disconnection/rejection and emotional intensity of memory, and emotional intensity of autobiographical memory mediated the correlation

Table 2: Fit index values for the tested model

Model	χ^2	df	χ^2/df	GFI	AGFI	CFI	RMSEA
	12.42	11	1.13	0.98	0.95	0.99	0.03

GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index, CFI: Comparative fit index, RMSEA: Root mean square error of approximation

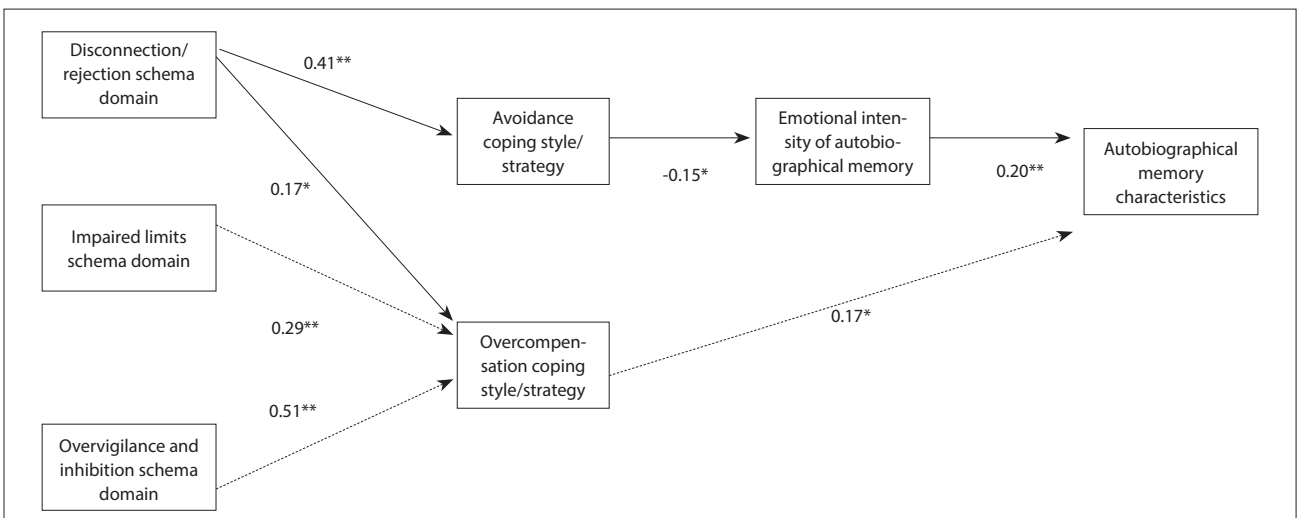

Figure 1: Results of path analysis model tests and regression coefficients for the correlations between schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics. Solid lines represent direct correlations, dashed lines indirect relations. *p<0.05 **p<0.01.

between the avoidance coping strategy and autobiographical memory characteristics.

DISCUSSION

On the basis of suggestions in the literature that autobiographical memories and schema domains are mutually related (5,6), this study expected that an individual's schema domains and schema coping skills affect the way in which childhood autobiographical memories are recalled. Thus, we triggered a negative childhood autobiographical memory in the framework of STM through imagination and examined the correlations between schema domains, schema coping skills, emotional intensity of autobiographical memory, and autobiographical memory characteristics through path analysis. According to the test results (see Figure 2), the schema domain disconnection/rejection predicts the coping strategies avoidance and overcompensation, while the schema domains impaired limits and overvigilance/inhibition only predict the coping strategy overcompensation. Other studies in Turkey have also shown that that the coping strategy avoidance is predicted by the schema domain disconnection/rejection (30,31). While overcompensation coping strategy is predicted by the schema domain impaired limits (30,31), it is also predicted by the schema domain overvigilance and inhibition (32).

According to the results of the model, an increase in the score for avoidance coping strategy predicts a decrease in the score for emotional intensity of autobiographical memory. Considering at the subscales of the avoidance coping strategy (psychosomatic symptoms, ignoring the problem, emotion control, withdrawal, distracting the mind through activities, and indifference/emotional inhibition), individuals using this coping strategy are prone to suppressing their feelings; in other words, they may not feel the intensity of their emotions. In addition, it can also be said that participants using the avoidance coping strategy were reluctant to communicate the emotion felt during the imagination of a sad memory of a childhood event experienced in the company of their parents. Another explanation might be the insight that particular strategies used to regulate their feelings might lead to memory biases (46). It can also be said that individuals using the coping strategy of avoidance recall autobiographical memories at a general level, which means that the emotional intensity may be variable. It appears thus that avoidance coping strategy protects the individual from the emotional burden of negative autobiographical memories. In line with these findings, studies in the literature point out that various avoidance strategies (inhibition, cognitive/behavioral avoidance, etc.) are correlated with a general level of recall reducing the emotional intensity (47-49). Remembering at a general level involves less negative feelings related to the memory (5,50). Considering that avoidance coping strategy limits the emotional response to life events, this result becomes more understandable. However, though avoidance may reduce the negative burden especially of traumatic or sad memories in the short term, in the long run, if it becomes a general coping strategy, it may divert the individual from a functional approach and lead to a clinical picture (51).

According to the results of the model we tested, autobiographical memory characteristics are predicted by the coping strategies emotional intensity of autobiographical memory and overcompensation. In other words, an increase in overcompensation and emotional intensity of memory leads to a more detailed recall of negative childhood autobiographical memories. As the number of studies on overcompensation coping strategy is limited and none of them addresses the correlation with autobiographical memory characteristics, the evaluation of our results may be possible with a definition of overcompensation coping strategy. As mentioned before, overcompensation indicates a tendency to battle with the schema by thinking, feeling, and behaving contrary to it (2). It can be said that individuals who cope by trying to differentiate negative early-life experiences like neglect, abuse, or criticism are quite taken up these memories. Studies in the literature of autobiographical memories suggest that the mental repetition of past events facilitates a more detailed recall (22). Therefore, people using a coping strategy of overcompensation may be able to recall memories of negative early life events that are occupying their mind in more detail. Having pointed out this correlation may be counted as an important contribution of our study to the literature.

Another finding of this model is the prediction of autobiographical memory characteristics by the emotional intensity of autobiographical memory. In other words, our hypothesis that an increase in the emotional intensity of a memory leads to a more vivid and detailed recall has been supported. This is consistent with research results indicating that the emotional burden of a memory being recalled increases the recall (23-25). Similarly, another study showed that an autobiographical memory with a negative emotional content is recalled more vividly with more visual,

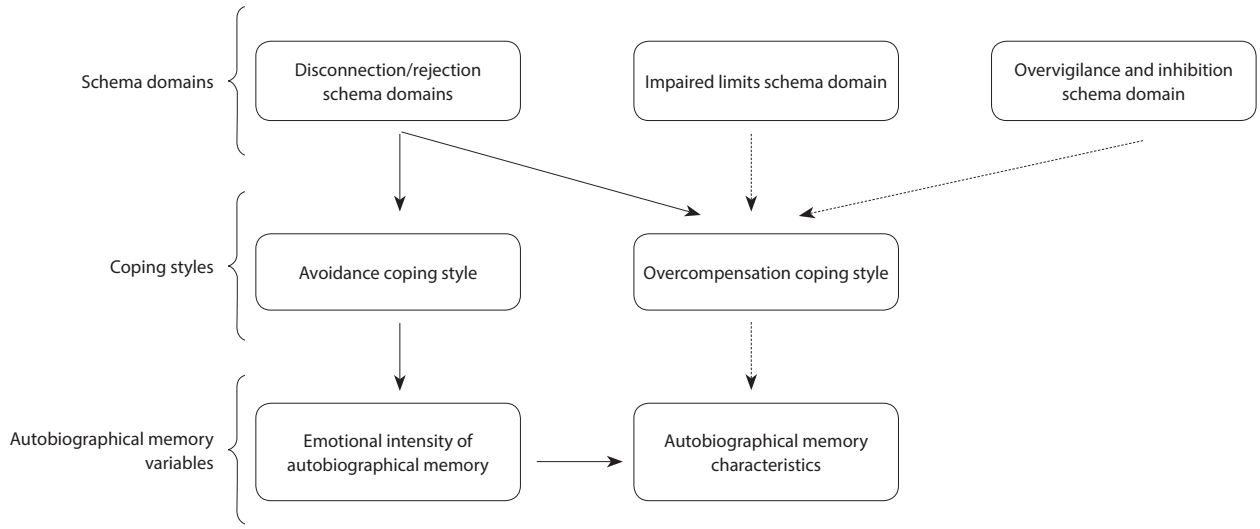

Figure 2: Correlations between variables according to the results of the path analysis model. Solid lines represent direct correlations, dashed lines indirect relations.

contact, and haptic details (8). Our study also found that the higher the emotional intensity coming with negative childhood memories, the more detailed the recall of an autobiographical memory was.

Evaluation of the Path Analysis Mediation Model Results

One of the results of our study is the mediating role played by overcompensation coping strategy in the relation between the schema domains impaired limits and overvigilance/inhibition. Consequently, the schema domains impaired limits and overvigilance/inhibition predict a more detailed and vivid recall of negative childhood memories, through mediator role of the coping style overcompensation. In other words, we see that the correlation between the two schema domains and the memory characteristics only exists in with the mediation of overcompensation. As mentioned in the introduction, overcompensation coping strategy tackles the schema by behaving as if the opposite of the schema was true (2). Overcompensation means that an individual is exaggerating the attempt to overcome any deficiency. People behave as if they felt the exact opposite of their emotions or do the exact opposite of what is expected of them (52). There are studies in the literature showing a statistically significant positive correlation between the schema domain impaired limits and the coping strategy overcompensation (30,31). In those studies, an increase in the scores for the schema domain impaired limits goes along with higher scores in the coping strategy overcompensation. At the same time the schema domain impaired limits and the coping strategy avoidance shows a significant, but weaker correlation. Individuals with an impaired limits schema domain may not have been directed in a functional way by their families how to cope with situations of discomfort or disquiet (2). These individuals, whose needs for direction during childhood were not met, may remember negative autobiographical memories in greater detail due to their use of overcompensation for coping with negative experiences. Individuals with a schema domain of overvigilance and inhibition try to reach internalized unrelenting standards (2). A correlation between unrelenting standards and overcompensation coping strategy has been supported both theoretically and empirically (2,32). Our study also confirms this relation. Our finding those with with this schema domain may recall autobiographical memories more vividly, clearly, and in more detail through overcompensation may be counted as a contribution we make to the literature. To summarize, the results of mediation analysis in this study indicate that individuals whose needs for direction in childhood were not met and who thus develop impaired limits, or those who have been made to feel "inadequate" in a harsh, demanding, and punitive family environment and thereby developed overvigilance and inhibition schema domains (2) may be able to recall early life memories in more detail. The correlations between variables showing the study results are reported in Figure 2.

Unsupported findings of this study are that there is no mediation role for overcompensation coping strategy in the relation between the schema domain

disconnection/rejection and autobiographical memory characteristics, nor for avoidance coping strategy in the relation between the schema domain disconnection/rejection and emotional intensity of memory; nor does the emotional intensity of autobiographical memory mediate between avoidance coping strategy and autobiographical memory characteristics. A first explanation why these were not supported might be related to a necessary orientation towards different mechanisms activating the schema (53): Duration and content of the administration may not have been of an appropriate level to activate the disconnection/rejection schema domain and memory characteristics, which may be related with the result that coping strategies and emotional intensity of the memory did not play a significant mediating role. Another explanation for the unsupported findings might be referring to schema modes. According to Young et al. (2), schema modes are sets of different schemas, which can be active simultaneously, defined by adaptive or maladaptive coping strategies accompanying sudden emotional changes triggered by life events that are sensitive for an individual. It is possible that participants entering the maladaptive schema mode "detached protector" may deny the schemas or emotions evoked by the memories revived in their minds by the imagination process. This interpretation is consistent with findings of another study examining the relation between psychological alienation and early maladaptive schemas (53).

Contrary to expectations, our study did not find a direct correlation between early maladaptive schemas and autobiographical memory characteristics. We had asked our participants to recall sad memories from early in life that may have prepared the ground for the development of schemas. From a methodological perspective, the content of the recalled memories, which schemas they may have prepared to develop, and its effects may be different for each participant. Therefore, considering that the autobiographical memories requested from the participants were elicited with a standard instruction, the different types of memories being recalled may have obscured the direct correlation between the two variables. On the other hand, the occurence of indirect relations between the two concepts by mediation through schema coping skills indicates that one's coping strategies may particularly affect the way in which autobiographical memories are remembered. Thus the failure to observe empirically the theoretically expected correlation between the two concepts may offer a different view to the fairly limited literature available on this topic.

To conclude, the findings of the present study indicate that one's schema domains are indirectly related to the way in which past memories are recalled: This relation occurs with the mediation of schemas and coping strategies. In this context, our results may have offered a new perspective on the autobiographical memories that are studied from a clinical angle in STM by means of imagination.

Limitations of The Study and Suggestions for Future Research

STM considers autobiographical memories a bridge between past and present and suggests that memories play an important role in gaining an integrative perspective on one's self-related schemas. It may also be therapeutically useful to understand components such as in how much detail memories are recalled, repetition of recall, coherence, detail, relevance, and effect. Until today, studies in the area of STM have given more importance to clinical samples, while our study shows the existence of early maladaptive schemas in a non-clinical sample and their connection with autobiographical memories, which is an important contribution. However, one serious limitation of our study is the size and composition of the sample. While adequate for the analyses carried out, the study sample may be insufficient for a generalization of the results. Another limitation is the reliance on self-report instruments, which needs to be taken into account considering the subjective information about current and past experiences the scale asked from the participants and looking at the content of the data collection form. Furthermore, the use of a group imagination method for the research may create some limitations, considering the nature of the procedure and the topic under investigation, however much the investigator tried to control, through the instructions provided (e.g., Now imagine yourself to be in your childhood, in a sad situation that you went through with your parents or caregivers…) and through questions asked after the administration if the content of the memory was adequate and if autobiographical memories were recalled. For example, no information was requested from the participants regarding the content of the recalled memories. And in the end, we should not forget that there is no clear distinction that would allow us to classify the emotions we are studying in universal or culture-dependent (54). Thus, the findings have to be evaluated in the context of these limitations. In our study, participants were asked to imagine a sad event experienced during their childhood.

It is conceivable that the intensity and number of repetitions of the imagined remembered event were not big enough to evoke early maladaptive schemas. We therefore recommend future studies to pay attention to these factors and pursue a comparative approach.

Studies conducted over the past 30 years with individuals suffering from depression, post-traumatic stress disorder, acute stress disorder, obsessive-compulsive disorder, or similar psychological conditions found a number of autobiographical memory disruptions, such as a tendency to remember an event in a general way rather than specifically (55-58). It has been mentioned that abuse or chronical problems experienced during childhood or youth may affect one's ability to learn how to control the memory recall process (50). There has also been found a correlation between one of the coping skills, avoidance, and depressive symptoms (30). From a clinical perspective, a vivid and detailed recall of autobiographical memories can be positive or negative for the individual. For example, a vivid and detailed recall of traumatic memories can be problematic especially for an individual with an inclination towards ruminative thought. On the other hand, a vivid and detailed recall of a traumatic memory during psychotherapy may help the person to reprocess the experience and achieve integrity of memory. The findings of this study should be considered in the light of this information. Given that early maladaptive schemas originate in early traumatic experiences and in turn may lead to psychopathologies, future studies with STM could be undertaken in clinical samples, or they could include an instrument measuring psychological symptoms, thus creating a useful contribution to the literature.

Contribution Categories		Author Initials
Category 1	Concept/Design	G.K., B.K.
	Data acquisition	G.K., B.K.
	Data analysis/Interpretation	G.K., B.K.
Category 2	Drafting manuscript	G.K.
	Critical revision of manuscript	B.K.
Category 3	Final approval and accountability	G.K., B.K.
Other	Technical or material support	N/A
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REFERENCES

1. Sarp N, Tosun A. Emotion and autobiographical memory. Current Approaches in Psychiatry 2011; 3:446-465. (Turkish)
2. Young JE, Klosko JS, Weishaar ME. Schema Therapy: A Practitioner's Guide. New York: The Guilford Press, 2003; 1-62.
3. Young JE. Cognitive Therapy for Personality Disorders. A Schema-Focused Approach. Third ed., Sarasota FL: Professional Resource Press, 1999.
4. McCann LI, Pearlman LA. Vicarious traumatization: a framework for understanding the psychological effects of working with victims. J Trauma Stress 1990; 3:131-149.
5. Conway MA, Pleydell-Pearce CW. The construction of autobiographical memories in the self-memory system. Psychol Rev 2000; 107:261-288.
6. Wilson AE, Ross M. The identity function of autobiographical memory: time is on our side. Memory 2003; 11:137-149.
7. Reviere SL, Bakeman R. The effects of early trauma on autobiographical memory and schematic self-representation. Appl Cogn Psychol 2001; 15:89-100.
8. Er N, Hosrik E, Ergun H, Serif M. The effect of mood induction on autobiographical memory. Turkish Journal of Psychology 2008; 23: 1-13. (Turkish)
9. Rubin DC. Introduction: In Rubin DC (editor). Autobiographical Memory. New York: Cambridge University Press, 1986, 3-16.
10. Rubin DC. A basic-systems approach to autobiographical memory. Curr Dir Psychol Sci 2005; 14:79-83.
11. Williams JM, Broadbent K. Autobiographical memory in suicide attempters. J Abnorm Psychol 1986; 95:144-149.
12. Conway MA, Singer JA, Tagini A. The self and autobiographical memory: correspondence and coherence. Soc Cogn 2004; 22:491-529.
13. Boyraz FU, Er N. Autobiographical memories for personal and public events in alzheimer's disease, depression, and healthy individuals. Turkish Journal of Psychology 2007; 22: 45-69. (Turkish)
14. Conway MA. Autobiographical Knowledge and Autobiographical Memories. In Rubin DC (editor). Remembering Our Past: Studies in Autobiographical Memory. Cambridge: Cambridge University Pres., 1996, 67-93.
15. Gulguz S, Rubin DC. Retrieval of personal memories: a descriptive study. Turkish Journal of Psychology 2001; 16: 37-51. (Turkish)
16. Vrijsen JN, van Amen CT, Koekkoek B, van Oostrom I, Schene AH, Tendolkar I. Childhood trauma and negative memory bias as shared risk factors for psychopathology and comorbidity in a naturalistic psychiatric patient sample. Brain Behav 2017; 7: e00693.
17. Tosun A. Intrusive autobiographical memory and its depressive theme on high depressive symptomatology. Turkish Journal of Psychology 2006; 21: 21-33.

18. Burnside E, Startup M, Byatt M, Rollinson L, Hill J. The role of overgeneral autobiographical memory in the development of adult depression following childhood trauma. Br J Clin Psychol 2004; 43:365-376.

19. Talarico JM, LaBar KS, Rubin DC. Emotional intensity predicts autobiographical memory experience. Mem Cognit 2004; 32:1118-1132.

20. Van der Kolk BA. The body keeps the score: memory and evolving psychobiology of posttraumatic stress. Harv Rev Psychiatry 1994; 1:253-265.

21. Bower GH. Mood and memory. Am Psychol 1981; 36:129-148.

22. Er N, Ucar F. An Investigation of Autobiographical Memory Patterns of the Extremely Emotional Life Events: Personal Memory Telling and Reference Points. Turkish Journal of Psychology 2004; 19: 1-18. (Turkish)

23. Buchanan TW. Retrieval of emotional memories. Psychol Bull 2007; 133:761-779.

24. Leigland LA, Schulz LE, Janowsky JS. Age related changes in emotional memory. Neurobiol Aging 2004; 25:1117-1124.

25. Ramponi C, Handelsman G, Barnard PJ. The memory enhancement effect of emotion is absent in conceptual implicit memory. Emotion 2010; 10:294-299.

26. Soygut G, Karaosmanoglu A, Cakir Z. Assessment of early maladaptive schemas: a psychometric study of the Turkish Young Schema Questionnaire-Short Form-3. Turk Psikiyatri Derg 2009; 20:75-84. (Turkish)

27. Karaosmanoglu HA, Soygut G, Kabul A. Psychometric properties of the Turkish Young Compensation Inventory. Clin Psychol Psychother 2013; 20:171-179.

28. Sheffield A, Waller G, Emanuelli F, Murray J, Meyer C. Do schema processes mediate links between parenting and eating pathology? Eur Eat Disord Rev 2009; 17:290-300.

29. Spranger SC, Waller G, Bryant-Waugh R. Schema avoidance in bulimic and non-eating disordered women. Int J Eat Disord 2001; 29:302-306.

30. Gok A. Associated factors of psychological well-being: early maladaptive schemas, schema coping processes, and parenting styles. Master's Thesis, Middle East Technical University, Ankara, 2012.

31. Unal E. The effects of child abuse and neglect on psychopathological symptomatology: the roles of early maladaptive schemas and schema coping processes. Master's Thesis, Middle East Technical University, Ankara, 2014.

32. Taskale N. Study of Women Who are Victims of Family Violence from the Perspective of the Schema Therapy Model. Master's Thesis, Hacettepe University, 2014. (Turkish)

33. Balola M, Claudio V, Raimundo L, Vieira L. Relationship between voluntary and involuntary autobiographical memories, early maladaptive schemas, attachment styles and interpersonal relations. Int J Behav Med 2012; 19:57.

34. Vieira L, Balola M, Claudio V, Raimundo L. Attachment and early maladaptive schemas in autobiographical memory recall. Int J Psychol 2012; 47:89.

35. Erkus A. The Process of Scientific Research. Fourth ed., Ankara: Seckin Publishers, 2013, 122-123. (Turkish)

36. Kaynar G, Er N. The Overgenerality in Autobiographical Memory: The Investigation of Autobiographical Memory with the Childhood Trauma. Turk Psikoloji Dergisi 2014; 30: 1-14. (Turkish)

37. Young, JE, Rygh J. Young-Rygh Avoidance Inventory (YRAI) (On-line). New York, NY: Cognitive Therapy Center, 1994, (Available: http://www.schematherapy.com).

38. Cakir Z. Relations Early Between Maladaptive Schemas, Perceived Parenting Styles, and Schema-Perpetuating Coping Behavior in Antisocial Personality Disorder: A Study in the Framework of the Schema Therapy Model. Master's Thesis, Hacettepe University, 2007. (Turkish)

39. Young, JE. Young Compensatory Inventory (YCI) (On-line). New York, NY: Cognitive Therapy Center, 1995, (Available: http://www.schematherapy.com).

40. Shapiro, F. Eye movement desensitization and reprocessing (EMDR): evaluation of controlled PTSD research. J Behav Ther Exp Psychiatry 1996; 27:209-218.

41. Shrout, PE, Bolger N. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol Methods 2002; 7:422-445.

42. Tabachnick BG, Fidell LS. Using Multivariate Statistics. Sixth ed., Boston MA: Allyn & Bacon/Pearson Education, 2012, 49-65.

43. Khine MS. Structural equation modeling approaches in educational research and practice: In Khine SM (editor). Application of Structural Equation Modeling in Educational Research and Practice. First ed. Rotterdam: Sense Publishers, 2013, 279-285.

44. Byrne BM. Structural equation modeling with AMOS: Basic concepts, applications, and programming. Third ed., Routledge, 2016, 69-114.

45. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Structural Equation Modeling 1999; 6:1-55.

46. Levine LJ. Emotion regulation and bias in memory for emotion. Phys Life Rev 2010; 7:134-135.

47. Hermans D, Defranc A, Raes F, Williams JM, Eelen P. Reduced autobiographical memory specificity as an avoidant coping style. Br J Clin Psychol 2005; 44:583-589.

48. Kuyken W, Brewin CR. Autobiographical memory functioning in depression and reports of early abuse. J Abnorm Psychol 1995; 104:585-591.

49. Richards JM, Gross JJ. Emotion regulation and memory: the cognitive costs of keeping one's cool. J Pers Soc Psychol 2000; 79:410-424.

50. Williams JMG. Depression and the specificity of autobiographical memory: In Rubin DC (editor). Remembering Our Past: Studies in Autobiographical Memory. First ed. Cambridge: Cambridge University Press, 1996, 244-267.

51. Williams JMG, Barnhofer T, Crane C, Herman D, Raes F, Watkins E, Dalgleish T. Autobiographical memory specificity and emotional disorder. Psychol Bull 2007; 133:122-148.

52. Jacob G, van Genderen H, Seebauer L. Mode Therapy: Explore New Avenues, Understand and Change Life Patterns. Sasioglu M (Translation editor) Second ed. Istanbul: Psikonet Publishers, 2014, 95-100. (Turkish)

53. Komurcu B, Soygut Pekak G. The relationship between early maladaptive schemas, parenting styles and psychological symptoms and the needs threats. Turkish Journal of Clinical Psychiatry 2017; 20:6-18. (Turkish)

54. Rubin DC. Emotion and autobiographical memory: considerations from posttraumatic stress disorder. Phys Life Rev 2010; 7:132-133.

55. Brittlebank AD, Scott J, Williams JM, Ferrier IN. Autobiographical memory in depression: state or trait marker? Br J Psychiatry 1993; 162:118-121.

56. McNally RJ, Lasko NB, Macklin ML, Pitman RK. Autobiographical memory disturbance in combat-related posttraumatic stress disorder. Behav Res Ther 1995; 6:619-630.

57. Harvey AG, Bryant RA. Dang ST. Autobiographical memory in acute stress disorder. J Consult Clin Psychol 1998; 3:500-506.

58. Wilhelm S. McNally RJ, Baer L. Florin I. Autobiographical memory in obsessive-compulsive disorder. Br J Clin Psychol 1997; 36:21-31.