

Examination of the phenomenological characteristics, reconsolidation update, and perceived temporal distance of intrusive memories in university students with high and low depressive symptoms

Depresif belirti düzeyleri yüksek ve düşük olan üniversite öğrencilerinin araya girici anılarının deneysel özellikler, yeniden yapılandırılma süreci ve algılanan zaman mesafesi bağlamında incelenmesi

Ekin Öztekin¹, Banu Yılmaz²

¹Res.Assis., Dokuz Eylül University Faculty of Letters Psychology Department, İzmir, Turkey
https://orcid.org/0000-0001-9562-4841

²Assoc. Prof., Ankara, Turkey https://orcid.org/0000-0003-1410-2246

SUMMARY

Objective: It is known that experiential and cognitive features of intrusive memories differ in accordance with the type and severity of psychological disorders. This investigation sought to gather all the experiential and cognitive dispositions of intrusive memories that take place in literature and to make comparisons in terms of the mentioned dispositions between participants with high and low depressive symptoms. It is also aimed to reveal perceived temporal distance and reconsolidation processes of intrusive memories. **Method:** 134 participants are asked to describe narratives of their intrusive-memories experienced in the preceding week. Beck Depression Inventory was applied in order to determine depression severity while the Post Traumatic Stress Symptom Inventory-Intrusion was applied in order to determine intrusions of memory. **Results:** It has been found that when the time of the memories intrude, the group with high depressive symptoms experience more helplessness and sadness and make more negative attributions to themselves and to the future compared to the group with low depressive symptoms. Finally, level of intrusion serves as mediator variable in the relation between depressive symptoms and reconsolidation process while reconsolidation process serves as mediator variable in the relation between level of intrusion and perceived temporal distance. **Discussion:** Phenomenological differences in accordance with depression severity have been discussed. Additionally, the mediator role of intrusion in the relation between depressive symptoms and reconsolidation process and the mediator role of reconsolidation process in the relation between intrusions and perceived temporal distance have been discussed. It is thought that more studies in the area of intrusive memories are needed.

Key Words: Intrusive memories, depression, autobiographical memory, reconsolidation process, perceived temporal distance

ÖZET

Amaç: Araya girici anıların deneysel özelliklerinin, psikolojik bozuklukların türü ve ciddiyetine göre değiştiği bilinmektedir. Bu çalışmada yüksek ve düşük depresif semptomlu katılımcıların araya girici anılarının deneysel özellikler bakımından nasıl farklılaştığının saptanması amaçlanmıştır. Bununla birlikte, algılanan zaman mesafesinin ve belleğin yeniden yapılandırılma sürecinin de araştırılması amaçlanmıştır. **Yöntem:** 134 katılımcıdan son bir hafta içinde deneyimledikleri araya girici anılarını aktarmaları ve deneysel özelliklerini puanlandırmaları beklenmiştir. Katılımcıların depresyon düzeyini saptamak için Beck Depresyon Envanteri, anıların araya giriş düzeyini belirlemek için de Travma Sonrası Stres Belirtileri Ölçeği-Araya Giriş alt boyutu uygulanmıştır. **Bulgular:** Araya girici anıların deneyimlendiği esnada, depresif belirtileri yüksek olan grubun daha çaresiz ve üzgün hissettiği ve kendilerine ve geleceğe daha fazla olumsuz atıfta buldukları tespit edilmiştir. Ek olarak, depresyon düzeyi ve belleğin yeniden yapılandırılması arasındaki ilişkiye araya giriş düzeyinin tam aracılık ettiği; araya giriş düzeyi ile algılanan zaman mesafesi arasındaki ilişkiye de belleğin yeniden yapılandırılmasının tam aracılık ettiği saptanmıştır. **Sonuç:** Depresif belirti şiddetine göre deneysel farklılıklar tartışılmıştır. Bununla birlikte, depresif belirtiler ile yeniden yapılandırılma süreci ilişkisinde araya giriş düzeyinin aracılık etkisi ve araya giriş düzeyi ile algılanan zaman mesafesi ilişkisinde yeniden yapılandırılma sürecinin aracılık etkisi tartışılmıştır. Sonuç olarak, araya girici anıların depresyon bağlamında incelendiği daha fazla sayıda çalışmaya ihtiyaç duyulduğu düşünülmektedir.

Anahtar Sözcükler: Araya girici anılar, depresyon, otobiyografik bellek, yeniden yapılandırılma, algılanan zaman mesafesi

(*Turkish J Clinical Psychiatry* 2020;23:142-152)

DOI: 10.5505/kpd.2020.58569

INTRODUCTION

Since the mid-90s, the accumulated body of evidence has been revealing that intrusive memories are common feature of depression (1,2,3). Additionally, these memories have a predictive value for depression (4). As is understood from previous studies, individuals with depression have a tendency to retrieve negative material (both semantic and autobiographical) more easily than their positive counterparts (5,6,7,8).

The prevalence of intrusive autobiographical memories varies from 73% to 96% in depressed samples (9,10). Spenceley and Jerom (1997) found that the intrusion rates of negative life events ascended in accordance with depressive symptoms (3). In other words, the more depressive symptoms become severe, the more intrusion frequency increases. On the other hand, in the study of Patel et al. (2007), only 44% of the participants with depression had experienced intrusive memories in the preceding week (11).

The content of intrusive autobiographical memories reported by individuals with depression varies across different negative life experiences including interpersonal issues, personal assault and abuse, death or illness of others, and illness or injury to the self (10,11,12,13). According to Tosun's study (2006), depressive content of intrusive memories was found to be consistent with Beck's cognitive triad (14). Intrusive memories of the participant with depressive symptoms are accompanied by sensory modalities including visual, auditory, olfactory and kinetic senses (13).

Comparative studies have given us a greater understanding of differences between clinically significant intrusive memories and their everyday versions. In a study by Brewin, Watson, McCarthy, Hymana and Dayson (1998), where intrusive memories experienced by cancer patients with and without depressive symptoms were compared, the memories of patients with depressive symptoms appeared to intrude more frequently (15). Similarly, Parry and O'Kearney (2013) found that depressive group had a tendency to experience intrusive memories more frequently than the control

(16). In another study, intrusive autobiographical memories belongs to clinical depression group were more vivid, and caused more distress and avoidance reactions than the memories belonging to control group (17).

Although the body of experiential and phenomenological characteristics concerning intrusive memories in the existing literature has been growing, there was a paucity of investigations that aimed to reveal intrusive memory structure including the reconsolidation process.

The reconsolidation process implies that "each time people remember the past experience; the original memory trace is retrieved. When memories retrieved once, they become susceptible to change, such that future retrievals call upon the changed information" (18). In other words, reconsolidation is a phase where memories can be altered after recall. During this phase, memories can be weakened or strengthened (19). This phenomenon was revealed through fear memory studies with animals by utilizing invasive techniques (20,21,22). The development of non-invasive procedures enabled it to be applied in research with human beings as well (23,24,25,26). To our knowledge, the reconsolidation studies in the existing literature have done with voluntary memories, and there has been no study examining the reconsolidation process of intrusive memories.

Another dimension that is new to the literature of intrusive memories, perceived temporal distance, refers to how far away from than its actual time an event seems to the person (27). In other words, perceived time distance implies the person's own comprehension about the event time rather than the actual date of the event. Ross and Wilson (2003) found that equally distant episodes feel remote or close according to their favourability or their damage on the current self (28). In another study, Janssen, Hearne and Takarangi (2015) revealed that people with depression perceived positive events more distant than their actual time as a result of overgeneralization (29). Finally, Siedlecka, Capper and Denson (2015) revealed that ruminating about negative events such as real-world anger provocations, guilt-inducing events, or

sad times in the previous year made these past events feel as though they happened more recently (30). The discrepancy between “the actual time” and “the perceived time” of the event has been examined in a couple of studies, however, the perceived temporal distance of the memory has not been elaborated in any intrusive memory research.

On the basis of the information outlined above, this study was designed to examine intrusive memory phenomenology, its (possible) reconsolidation process and perceived temporal distance.

With the purpose of gathering all the experiential characteristics of intrusive memories in the existing literature, it was aimed to reveal how the participants with high and low depressive symptoms differentiate each other in terms of the phenomenological characteristics. It was also aimed to obtain information about the structure of intrusive memories. Accordingly, the reconsolidation process of intrusive memories was explored with a verbal item prepared by the researchers by relying on the dialectic of reconsolidation literature. It was hypothesized that intrusion level serves as a mediator factor in the relationship between depressive symptoms and the reconsolidation processes of the targeted intrusive memory. Finally, it was thought that intrusions may make events close in time for the person who passed through. It was hypothesized that the reconsolidation update of the intrusive memory mediates the relationship between intrusion level and perceived temporal distance. Specifically, individuals who experience high levels of intrusion would perceive the time of the target memory closer than the actual date via the reconsolidation update of the memory.

Table 1. Distribution of content and sensory modalities.

	High Depressive Symptom Group N=29	Low Depressive Symptom Group N=105
Content (frequency/ %)		
Interpersonal events	11 (37.9)	46 (43.8)
Death/illness involving other	4 (13.8)	19 (18.1)
Illness/injury to self	2 (6.9)	1 (1)
Personal assault/abuse	5 (17.2)	23 (21.9)
Other	7 (24.1)	16 (15.2)
Sensory Modalities (frequency/ %)		
Visual	25 (86.2)	91 (86.7)
Auditory	17 (58.6)	70 (66.7)
Olfactory	1 (3.4)	5 (4.8)
Taste	0	2 (1.9)
Physical	12 (41.4)	32 (30.5)

N=134

METHOD

Participants

The participants of the study consisted of 145 undergraduate students studying psychology in Ankara University and Dokuz Eylül University.

The analyses were conducted on 134 participants as two students were excluded for not being in the age range ($M = 18-25$) and nine were excluded for not stating a specific memory or any memory at all.

Measures

Intrusive Memory Interview Paper-Pencil Version: The items of Intrusive Memory Interview (IMI) were developed by Hackmann, Ehlers, Speckens, and Clark and adapted to a paper-pencil format by Williams and Moulds (13,31). The items that are independently developed for examining multiple dimensions of human memory have been used in numerous studies (13,16,17,32). The items were translated into Turkish by the authors.

The purpose of IMI is to reveal participants' subjective experience of an intrusive memory. Information concerning intrusion frequency, content, distress created by the memory, sensory modalities, and emotional responses (fear, anger, sadness, shame, guilt, helplessness, disgust) were collected from participants who experienced intrusive memory within one week prior to the session. On the other hand, reconsolidation update of memory was addressed with the item “Every time I recall the event, I realize that ‘what I went through’ was much worse compared to the last time I remembered it”. Participants rated their answers on a 7-point Likert scale. Also, participants were asked to date the target event of the intrusive memory. Subsequently, participants were asked to rate whether the target event was perceived closer or further in time compared to the actual time (“how far/close does the memory feel to you?”). Participants had to rate their answers on a 7-point likert scale.

Beck Depression Inventory (BDI): A 21-item self-

Table 2. Correlational results

	M (SD)	1	2	3	4	5	6
1. Depression	11.18(7.64)	–					
2. Observer perspective	2.76(1.83)	.02	–				
3. Field perspective	5.23(1.83)	-.02	-1**	–			
4. Intrusion	21.42(6.34)	.32**	-.21*	.21*	–		
5. Reconsolidation process	4.19(1.70)	.21*	-.15	.15	.47**	–	
6. Perceived temporal distance	4.48(1.64)	-.06	-.10	.10	.29**	.35*	–

report measure was developed by Beck, Rush, Shaw, and Emery (1979) in order to determine the severity of depressive symptoms (33). In this study, the Turkish version of the scale, adapted by Hisli Şahin (1989), was used to determine participants who had depressive symptoms (34). In this study, the cut-off score was determined as 17, as indicated in the study by Tosun (14). BDI has high internal consistency. The split-half reliability was found to be $r=.74$ and its correlation with the MMPI-depression subscale was found to be $r=.50$. In the current study, the Cronbach's alpha of the BDI was found to be $r=.84$.

Post-Traumatic Stress Symptoms Scale - Intrusion Subscale (PTSS-Intrusion): A 36-item self-report measure developed by Hisli Şahin, Durak Batıgün and Yılmaz (2001) in order to assess the post-traumatic stress symptoms (35). The items of the scale were borrowed from the Post-trauma Stress Disorder Checklist (PCL) (36) and the Impact of Events Scale (37). Cronbach's alphas of subscales were found to vary from .89 to .91. In the current study, only the intrusion subscale was used to identify the participants' level of intrusion. In the current study, Cronbach's alphas of Intrusion subscale was found to be $r = .87$.

Procedure

After the study was approved by Ankara University Ethics Committee in 2016, the batteries were distributed to the participants in classroom environments. Suitable sampling was preferred for practical reasons. The batteries consisted of an informed consent, the IMI, BDI, and PTSS – Intrusion Scale.

Instructions of intrusive memories were both placed in the battery and explained verbally by the researchers. The participants were informed that the study was only about negative memories and asked not to participate if they had not experienced any negative intrusive memory within the last week. The completion of the batteries took approximately 30-40 minutes. All participants received course credit for their participation.

Statistical Analysis

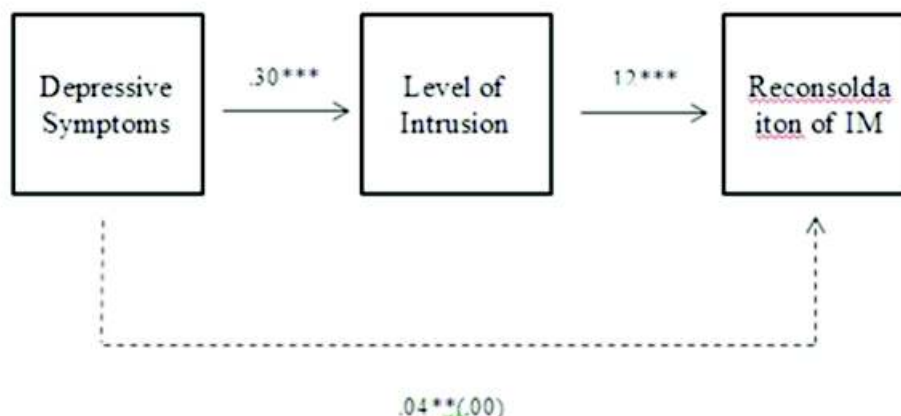
Correlational analyses and t test for independent samples with bootstrap method were done with SPSS 21 package program. Z scores were found normal. For mediation analysis bootstrap method was applied with the additional macro for SPSS. By applying mediation analysis, 4 assumption proposed by Baron and Kenny taken into consideration. According to the model proposed by Baron and Kenny (1986), a variable has to fulfil four conditions for being a mediator variable (38). Firstly, it requires a significant correlation between the predictor and the predicted variables in the first step. Secondly, it requires a significant correlation between the predictor variable and the mediator. Moreover, it also requires a significant correlation between the predicted variable and the mediator. In the final step, when the predictor variable and the mediator are entered in the regression equation simultaneously, it is expected that the relationship between the predictor and the predicted variable should be either less significant or no longer significant. After the mentioned conditions were met, the mediation effect was explored whether it significantly differentiated from zero or not - based on

Table 3. Group differences

	Low Depressive Symptom Group		High Depressive Symptom Group		t
	M	SD	M	SD	
Sadness	67.24	33.15	85.51	17.84	-2.85*
Helplessness	53.59	36.18	72.41	31.92	-2.54*
Negative attribution to self	3.19	1.83	4.55	1.55	-3.66*
Negative attribution to future	3.52	2.03	4.41	2.11	-2.08*

* $p<.05$

Figure 1.



Preacher and Hayes' (2008) Bootstrap method (39). This method is a nonparametric method which relies on resampling the procedure repeatedly (e.g.1000, 5000 times) with replacement. Indirect mediator effect is computed for each resampling. The significance of the mediation effect after resampling is determined in accordance with the computation of typical confidence interval and whether or not there is zero within this interval. Nonexistence of zero within confidence interval indicates that indirect effect is different from zero.

RESULTS

General Sample Characteristics

Analyses have been conducted on 134 participants. The mean age of 110 females and 24 males was found 19.74 years (SD=1.30). In the current study, participants scoring 17 and above on the BDI were assigned to the high depressive symptom group (N =29) while participants scoring 16 and below were assigned to the low depressive symptom group (N =105).

Descriptive Characteristics of Intrusive Memories

The memories were coded by two independent clinical psychologists by taking the memory content into account. The inter-rater reliability was found

strong ($\kappa=0.83$). Although the procedure applied blindly at the beginning, discrepant ratings were resolved following discussion.

Across the high depressive symptom group, 'interpersonal events' was the primary content of memories with a percentage of 37.9. This category was followed by 'other' such as suspecting somebody breaking into house (24.1%), 'personal assault/abuse' (17.2%), 'death/illness involving other' (13.8%), and 'illness/injury to self' (6.9%) respectively. Accordingly, 'interpersonal events' (43.7%) has also been found to be the primary content of memories of the low depressive symptom group. This category was followed by 'personal assault/abuse' (21.9%), 'death/illness involving other' (18.1%), 'other' (15.2%), and 'illness/injury to self' (1%), respectively. Regarding sensory modalities, high depressive symptom group experienced visual (86.5%), auditory (58.6%), physical (41.4%), and olfactory (3.4%) details in their memories. On the other hand, the low depressive symptom group experienced visual (86.7%), auditory (66.7%), physical (30.5%), olfactory (4.8%), and taste details (1.9%) in their memories. Memory contents and sensory modalities are presented in Table 1.

Correlations among Depression, Intrusions, Field-Observer Perspective, Reconsolidation Process, and Perceived Temporal Psychological Distance

Pearson product-moment correlation coefficient analysis were conducted to reveal the associations between depression and intrusion, perspective, reconsolidation process and perceived temporal

Table 4. Point estimation and bias-corrected and accelerated (BCa) confidence interval of the mediator effect on reconsolidation process

Variable	Product of coefficients		%95 BCa Confidence Interval	
	Point estimation	SE	High	Low
Level of Intrusion	.03	.01	.0210	.0623

Table 5. Point estimation and bias-corrected and accelerated (BCa) confidence interval of the mediator effect on perceived temporal distance

Variable	Product of coefficients		%95 BCa Confidence Interval	
	Point estimation	SE	Low	High
Reconsolidation	.03	.01	.0132	.0617

distance. While the relationships between most of the variables were in the expected direction, there were no significant relationships between depression and both perspectives and also perceived temporal distance. Similarly, no significant relationship between perspectives and reconsolidation update of memory, and perceived temporal distance was detected. Correlational results are shown in Table 2.

Intergroup Differences

One of the purposes of this study was to reveal experiential differences between high depressive symptom group and low high depressive symptom group. In order to determine group differences in terms of intrusion frequency, vividness, emotional responses to the memory, t-test for independent samples was applied. Since there has been huge population difference between the two groups, bootstrapping method which relied on resampling the procedure repeatedly (1000 times in this case) was applied.

Regarding to the emotions such as sadness and helplessness, subjects' mean ratings were significantly higher in the high depressive symptom group compared to low depressive symptom groups. Firstly, sadness ratings were significantly higher in the high depressive symptom group, M=85.51, than in low depressive symptom group, M=67.24, t =-2.85, P<.05. Secondly, helplessness ratings were

significantly higher in the high depressive symptom group, M=72.41, than in low depressive symptom group, M=53.59, t=-2.54, P<.05.

Besides the emotional responses, the groups were also differed in negative attributions to the self and to the future considering memory content. Negative attribution to the self ratings were significantly higher in the high depressive symptom group, M=4.55, compared to low depressive symptom group M=3.18, t=-3.66, P<.05. Moreover negative attribution to the future ratings were significantly higher in the high depressive symptom group, M=4.41, compared to low depressive symptom group M=3.52, t=-2.08, P<.05. T-test results have been shown in Table 3.

Mediation Analysis

Intrusion level as a mediator on the relationship between depressive symptoms and reconsolidation update

The first hypothesis of mediation model (the relationship between depressive symptoms and reconsolidation update of the memory in a more negative way was mediated by intrusion level) was tested based on Baron and Kenny's (1986) regression model (38). As can be seen in Figure 1, it was found that participants' depressive symptoms has significant direct effect on the (reconsolidation) negative update of the memory (B=.04, t=2.49, p<.01) (Step 1). It was also found that depressive symptoms had significant direct effect on intrusion level (B=.30, t=4.59, p<.001) (Step 2). It was revealed that intrusion level had significant direct effect on negative update of the memory (B=.12, t=5.58,

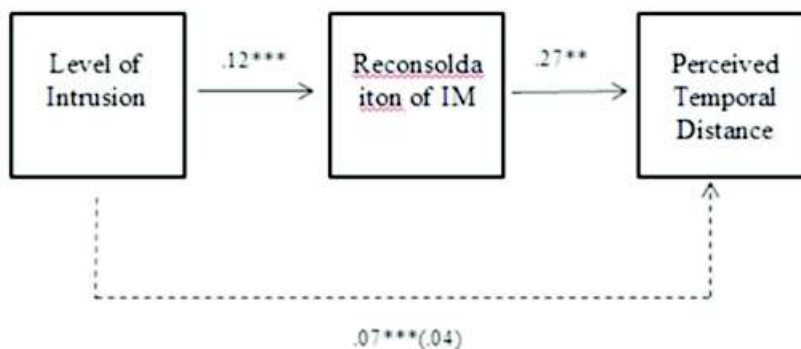


Figure 2.

$p < .001$) (Step 3). In the final step, when depressive symptoms and intrusion level were entered to the regression equation simultaneously, it was seen that the relationship in step 1 was no longer significant which underlies complete mediation model ($B = .00$, $t = .49$, $p > .05$). Moreover, it has been seen that the whole model was significant ($F(2, 131) = 19.41$, $p < .001$) and explained 21% of the variance.

Significance of the complete mediation effect of intrusion level was explored in bootstrap sample which consisted of 1000 participants. According to this, it has been seen that the complete mediation effect of intrusion level was found significant. Point estimation and bias-corrected and accelerated confidence interval of the mediator is given in Table 4.

Reconsolidation update as a mediator in the relation between intrusion level and perceived temporal distance

Another mediation hypothesis of the study (the relationship between depressive symptoms and reconsolidation update of the memory in more negative way was mediated by intrusion level) was also tested based on Baron and Kenny's (1986) regression model (38). As can be seen in Figure 2, it was found that the intrusion level had significant direct effect on perceived temporal distance in the first step ($B = .07$, $t = 3.49$, $p < .001$) (Step 1). It was also found that intrusion level had significant direct effect on negative update of memory (reconsolidation) ($B = .12$, $t = 6.23$, $p < .001$) (Step 2). It was revealed that negative update of the memory had significant direct effect on perceived temporal distance ($B = .27$, $t = 3.04$, $p < .01$) (Step 3). In the final step, when intrusion level and negative update of memory were entered to the regression equation simultaneously, it was seen that the relationship in step 1 was no longer significant which underlies complete mediation model ($B = .04$, $t = 1.71$, $p > .05$). Moreover, it has been seen that the whole model was significant ($F(2, 131) = 11.11$, $p < .001$) and explained 13% of the variance.

Significance of the complete mediation effect of reconsolidation process was examined in bootstrap sample that consisted of 1000 participants.

According to this, it has been seen that the complete mediation effect of negative update of memory level was found significant. Point estimation and bias-corrected and accelerated confidence interval of the mediator is given in Table 5.

DISCUSSION

Although intrusive memory studies in the clinical literature date back to the mid-90s, there are still gaps in both its phenomenology and structure. While the phenomenology studies occupy more space in the existing literature (12,13,16,17), there has been no investigation about the structure, including questions whether intrusive memories become more severe each time they are recalled, (and if they do) how that would come into existence. Furthermore, we also looked for an answer to the question "if the memory was rewritten each time they were recalled, would temporal distance be perceived closer in time than its actual date?".

In the current study, firstly, it was aimed to reveal phenomenological characteristics of intrusive memories that belong to the high or low depressive symptom group. Moreover, it was also aimed to investigate the reconsolidation phase and the perceived temporal distance of intrusive memories.

Results showed us the most common theme of intrusive memories for both the high and low depressive symptom groups was interpersonal event. This finding is consistent with the findings of Reynolds and Brewin's (1999) and Williams and Moulds' (2007) studies (12,13). However, in the study of Patel et al. (2007) conducted with Major depressive disorder patients, the interpersonal events category was not considered as one of the primary contents (11).

The intrusive memories were predominantly accompanied by the visual details in the current study. This result is supported by the studies of William and Moulds (2007) and Newby and Moulds (2011) (13,17). However, the percentage of visual details is dramatically different from the other studies. In the light of the results, a larger proportion of the associated literature supports interpersonal events containing visual details are

the most common type of intrusive memories both in the high and low depressive symptom samples. It was speculated that interpersonal events as a category can be wider ranging than the other categories which the raters did not tend to choose. Additionally, this study supported that intrusive memories come with sensory modalities, predominantly visual details.

When examining the inter-group differences, memories of the high and the low depressive symptom groups differed from each other in some aspects. Firstly, high depressive symptom group showed higher scores on the emotional reactions including sadness and helplessness relating to the memory. Newby and Moulds (2011) also found that the depressed felt sadder and more helpless than the non-depressed when they recalled a memory (17). Moreover, according to the study of Reynolds and Brewin (1999), the PTSD sample felt more helpless than the depressed one (12). On the other hand, Parry and O’Kearney (2013) found no difference between the depressed and non-depressed in terms of anger, fear, guiltiness, helplessness, sadness and shame concerning the memory (16).

Secondly, it is found that high depressive symptom group used more negative attributions towards themselves and the future when they considered the content of their intrusive memories. Similarly, in the study by Tosun (2006), in which participants’ attributions regarding their intrusive memories evaluated according to Beck’s cognitive triad, depressed sample was found consistent with Beck’s cognitive triad, while there was no such evidence for the non-depressed (14). In another study, Newby and Moulds (2012) found that depressed participants ruminated about their future, self and relationships when they considered the content of their intrusive memories and the situation of experiencing (10).

Another result underlined that the reconsolidation update of memory correlated with depressive symptoms, that is, the more depressive symptoms become severe, the more the participants reconsolidate their intrusive memory in a negative way. As far as is known, this study is one of the first example which gives place to reconsolidation phenomenon

in the clinical studies. That is why it is important that the preliminary evidence needs to be supported with further studies.

On the other hand, some of our results did not overlap with the results widely seen in the literature. For instance, high memory intrusion rates might be mentioned as a distinctive phenomenological characteristic for depression. Spenceley and Jerrom (1997) found that the depressed showed more intrusions than the non-depressed and the recovered group (3). Similarly, in the study of Brewin et al. (1998), depressed cancer patients’ memories intruded more frequently compared to the memories of non-depressed patients (15). Furthermore, intrusions were shown as the predictor of depression (2,16). However, we found no difference between high and low depressive symptom groups in terms of intrusion rates. This result might arise due to our participants. In our study, participants consisted of university student instead of diagnosed patients. Nevertheless, we revealed the level of intrusion positively correlated with the depressive symptoms. This result was supported by many other studies in the literature (2,13,14,15). Additionally, Parry and O’Kearney (2013) found that intrusions are related to depressive symptoms just as the way that they are related to PTSD symptoms (16).

Additionally, we find no relationship between field-observer perspective and depressive symptoms. This result also conflicts with many other studies in the literature. For example, Kuyken and Moulds (2009) found that experiencing intrusive memories in observer perspective was the predictor of depression scores (41). Moreover, according to Williams and Moulds (2007), dysphoric participants commonly use the observer perspective which has been associated with using avoidance mechanisms as maladaptive coping strategies (40). In another study, in which perspectives were manipulated experimentally, participants took place in a field perspective condition scored higher in the vividness and distress scales. When they shifted to the observer perspective, the scores decreased (42). Considering all the other results together, this finding might imply that cognitive coping mechanisms work in the short term, whereas it worsens depression in the long term. Interestingly, our results did

not show any correlation.

As one of the unique purposes of this research, we attempted to investigate how the intrusion level can worsen the relationship between depression and reconsolidation processes. Results yielded that the relation between depressive symptoms and reconsolidation update of the memory in a more negative way was completely mediated by intrusion level. Considering the notion that depression had a malign nature, we predicted that intrusive memories were reconsolidated more negatively in the presence of depressive symptoms depending on intrusion levels. While doing literature search, we saw an investigation which claims that memories can be reconsolidated in a more positive way if it was intervened when the time of memory is open to change. The study was conducted with PTSD patients and significant differences could be seen in participants after the intervention (43). The presence of two different results from different points of views implies that the intrusive memories may worsen in the case they are left alone, as well as it can have a healing effect for a person's depression if they are worked on.

Secondly, the relationship between intrusion level and perceived temporal distance was found to be completely mediated by reconsolidation update of intrusive memory. In other words, the more the intrusion level increased, the more the IMs were remembered sooner in time than their actual time with the presence of reconsolidation updates. This result may not be specific for the negative nature of the valance. It could be related to the structure of reconsolidation update mechanisms. Since we aimed to examine the malign nature of depression, we did not include positive memories. Therefore, it is suggested to replicate this result with positive involuntary memories in future studies.

Clinical Implications

In this study, it was aimed to contribute to the theoretical extent of science. However, results reveal some clinical implications, as well. Firstly, clinicians should keep in mind that intense reactions towards intrusive memory might a sign of a depressive tendency. These reactions may be the topics that are

ought to be handled in the psychotherapy.

Furthermore, the mediator role of intrusion level between depressive symptoms and reconsolidation processes has been seen as the particularly important point for clinical applications. In such cases when a client repeatedly recalls a specific memory, immediate interventions might be crucial to prevent the memory getting worse. Techniques such as imagination and cognitive reframing –which commonly used in cognitive distortions or situations that trigger anxiety- might also be applied to memories that intrude person's life. Readers should keep in mind that these suggestions are primitive and needed to be investigated widely.

Limitations and Suggestions

It is also important to mention the limitations and confounding points of the research as much as to examine current outputs and their clinical applications.

First of all, the depressive group was identified by using only Beck Depression Inventory. Interview procedures such as SCID were not used for each participant. Although we use the terms of high and low depressive symptom groups for identifying the groups, this should not be thought as an accurate diagnosis. For this reason, it is important to underline that the results cannot be generalized for clinical samples.

Secondly, this investigation was conducted with negative intrusive memories. There was no chance to compare them with positive involuntary memories. It is suggested to conduct further investigations which aim to reveal whether positive involuntary memories have been processed similarly or not.

In this study, participants were not expected to write about their memories which they thought of as the cause of depression. It is thought that such an expectation may contradict with the nature of intrusiveness and cause limitations. That is why depressive dispositions have been seen as a “trait” factor and accordingly treated as the predictor vari-

able in the current study. Although depressive disposition have been seen as a trait factor and treated as a predictor variable in this study, the relationship should be regarded reciprocal.

It was assumed that when negative memories were experienced without intervening, they would worsen every time they were retrieved. It is thought that treatment would be possible if the memories are intervened when the time of reconsolidation window is open. Unfortunately, no intervention program was included in the current study. Furthermore, the reconsolidation process was assessed with the item "Every time I recall the event that I went through, I notice the situation was more miserable than the last time I have remembered it" only once. Using a verbal item is not a classic way to study the reconsolidation phenomenon. To our knowledge, this is the first study that aimed to assess the reconsolidation phenomenon with a verbal item.

In the study, we presumed that 'narrowing the intrusive memory' might make the memory labile, or to put it another way, it might make the memory undergo the reconsolidation phase. Moreover, the method, in which participants narrowed their memory and then answered the item of reconsolidation, seemed to us as the most similar version of the nat-

ural (intrusive memory) reconsolidation. Although the results seemed to support our claim, there still is a big gap in validity issues, which needs to be supported with further studies. Additionally, it is thought that not only one assessment, but multiple assessments are required for gaining more reliable results. It is suggested to improve the applications of the procedure in further studies. Finally, other variables associated with both the perceived temporal distance and the reconsolidation update process should be taken into consideration.

In conclusion, we aimed to investigate phenomenological characteristics, temporal distance and reconsolidation update of intrusive memories which belong to high and low depressive symptom groups. Although the results appear to be consistent with our hypotheses, investigations in this area should go further by using improved methods and new variables.

Correspondence address: Res. Assis. Ekin Öztekin, Dokuz Eylül University Faculty of Letters Psychology Department, İzmir, Turkey ekin.oztekin@hotmail.com

REFERENCES

1. Brewin CR, Watson M, McCarthy S, Hymana P, Dayson D. Memory processes and the course of anxiety and depression in cancer patients. *Psychological Medicine* 1998; 28: 219-224.
2. Kuyken W, Brewin CR. Intrusive memories of childhood abuse during depressive episodes. *Behaviour, Research and Therapy* 1994; 32: 525-528.
3. Spenceley A, Jerrom B. Intrusive traumatic childhood memories in depression: A comparison between depressed, recovered and never depressed women. *Behavioural and Cognitive Psychotherapy* 1997; 25: 309-318.
4. Brewin CR. Intrusive autobiographical memories in depression and post-traumatic stress disorder. *Applied Cognitive Psychology* 1998; 12: 359-370.
5. Cláudio V, Aurélio JG, Machado PPP. Autobiographical memories in major depressive disorder. *Clinical Psychology and Psychotherapy* 2011; 19: 375-389.
6. Dalgleish T, Watts FN. Biases of attention and memory in disorders of anxiety and depression. *Clinical Psychology Review* 1990;10:589-604
7. Hipwell AE, Sapotichne B, Klostermann S, Battista D, Keenan K. Autobiographical memory as a predictor of depression vulnerability in girls. *Journal of Clinical Child and Adolescent Psychology*; 2011;40: 254-265.
8. Matt GE, Vazquez C, Campbell WK. Mood congruent recall of affectively toned stimuli: A meta-analytic review. *Clinical Psychology Review* 1992;12:227-255.
9. Brewin CR, Reynolds M, Tata P. Autobiographical memory processes and the course of depression. *Journal of Abnormal Psychology* 1999; 108: 511-517.
10. Newby JM, Moulds ML. A comparison of the content, themes, and features of intrusive memories and rumination in major depressive disorder. *British Journal of Clinical Psychology* 2012;51:197-205.
11. Patel T, Brewin CR, Wheatley J, Wells A, Fisher, Myers S. Intrusive images and memories in major depression. *Behaviour, Research and Therapy* 2007; 45: 2573-2580.
12. Reynolds M, Brewin CR. Intrusive memories in depression and posttraumatic stress disorder. *Behaviour Research and Therapy* 1999;37:201-215.
13. Williams AD, Moulds ML. An investigation of the cognitive and experiential features of intrusive memories in depression. *Memory* 2007;15: 912-920.

14. Tosun A. Intrusive autobiographical memory and its depressive theme on high depressive symptomatology. *Türk Psikoloji Dergisi* 2006;21:21-33.
15. Brewin CR, Watson M, McCarthy S, Hymana P, Dayson D. Intrusive memories and depression in cancer patients. *Behaviour Research and Therapy* 1998; 36(12): 1131-1142.
16. Parry L, O'Kearney R. A comparison of the quality of intrusive memories in post-traumatic stress disorder and depression. *Memory* 2013; 22:408-425.
17. Newby JM, Moulds ML. Characteristics of intrusive memories in a community sample of depressed, recovered depressed and never-depressed individuals. *Behaviour Research and Therapy* 2011; 49: 234-243.
18. Alberini LM, LeDoux JE. Memory reconsolidation. *Current Biology* 2013; 23:746-750.
19. Nadel L, Hupbach A, Gomez R, Newman-Smith K. Memory formation, consolidation and transformation. *Neuroscience and Behavioral Reviews* 2012; 36: 1640-1645.
20. Debiec J, LeDoux JE, Nader K. Cellular and systems reconsolidation in the hippocampus. *Neuron* 2002;36:527-538.
21. Duvarcı, S, Nader K. Characterization of fear memory reconsolidation. *Journal of Neuroscience* 2004;24:9269-9275
22. Nader K, Schafe GE, LeDoux JE. The labile nature of consolidation theory. *Nature Reviews Neuroscience* 2000;1:216-219
23. Björkstrand J, Agren T, Frick A, Engman J, Larsson EM, Furmark T, Fredrikson M. Disruption of memory reconsolidation erase fear memory trace in the human amygdala: An 18-month follow-up. *Plos One* 2015;10:1-8.
24. Högberg G, Hällström T. Mood regulation focused CBT based on memory reconsolidation, reduced suicidal ideation and depression in youth in a randomized controlled study. *International Journal of Environmental Research and Public Health* 2018;15:921-931.
25. Schwabe L, Wolf OT. Stress prompts habit behavior in humans. *The Journal of Neuroscience* 2009;29:7191-7198.
26. Schwabe L, Wolf OT. Learning under stress impair memory formation. *Neurobiology of Learning and Memory* 2010; 93: 183-188.
27. Ross M, Wilson AE. It feels like yesterday self-esteem, valence of personal past experiences, and judgments of subjective distance. *Journal of Personality and Social Psychology* 2002; 82:792-803.
28. Ross M, Wilson AE. Autobiographical memory and conceptions of self : Getting better all the time. *Current Directions in Psychological Science* 2003;12:66-69.
29. Janssen SMJ, Hearne TL, Takarangi, MKT. The relation between self-reported PTSD and depression symptoms and the psychological distance of positive and negative events. *Journal of Behavior Therapy and Experimental Psychiatry* 2015; 48: 177-184.
30. Siedlecka E, Capper M, Denson TF. Negative emotional events that people ruminate about feel closer in time. *Plos One* 2015;10:1-18.
31. Hackmann A, Ehlers A, Speckens A, Clark DM. Characteristics and content of intrusive memories in PTSD and their changes with treatment. *Journal of Traumatic Stress* 2004; 17:231-240.
32. Newby JM, Lang T, Werner-Seidler A, Holmes E, Moulds ML. Alleviating distressing intrusive memories in depression: a comparison between computerised cognitive bias modification and cognitive behavioural education. *Behaviour Research and Therapy* 2014; 56: 60-67.
33. Beck AT, Rush AJ, Shaw BF, Emery G, (1979). *Cognitive Therapy of Depression*. New York, Wiley.
34. Hisli N. Beck Depresyon Envanteri'nin üniversite öğrencileri için geçerliği ve güvenilirliği. *Türk Psikoloji Dergisi* 1989;7:3-13.
35. Hisli Şahin N, Batıgün AD, Yılmaz B. Debriefing with teachers after the Marmara earthquake: An evaluation study. *The Journal of Disaster Studies, Policy and Management* 2009;33: 747-761.
36. Weathers FW, Litz BT, Herman DS, Huska JA, Keane TM. The PTSD checklist: Reliability, validity, & diagnostic utility. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies 1993; San Antonio, TX, October.
37. Horowitz, MJ, Wilner N, Alvarez W. Impact of event scale: A measure of subjective stress. *Psychosomatic Medicine* 1979; 41:209-218.
38. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173-1182.
39. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods* 2008;40:879-891.
40. Williams AD, Moulds ML. Cognitive avoidance of intrusive memories: Recall vantage perspective and associations with depression. *Behaviour Research and Therapy* 2007;45:1141-1153.
41. Kuyken W, Moulds M. Remembering as an observer: How is autobiographical memory retrieval vantage perspective linked to depression? *Memory* 2009;17:624-634
42. Williams AD, Moulds ML. Manipulating recall vantage perspective of intrusive memories in dysphoria. *Memory* 2008;16: 742-750.
43. Kredlow MA, Otto MW. Interference with the reconsolidation of trauma related memories in adults. *Depression and Anxiety* 2015;32:32-37.