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Original Article

The Effect of Attentional Avoidance, Attentional Focusing, and Mindfulness on the Frequency of Voice-Hearing and Associated Distress in People with Schizophrenia: A Randomized Controlled Trial

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Abstract

Objective: The objective of this study was to determine the most effective coping mechanism to deal with auditory hallucinations that reduces the frequency of voice-hearing and associated distress. In the present randomized controlled trial, each of the three coping mechanisms of attentional avoidance, attentional focusing, and mindfulness were used in one group and the fourth group was the control group.
Method: A total of 64 patients with schizophrenia, categorized in three groups of attentional avoidance, attentional focusing and mindfulness and one control group, were asked to listen to an ambiguous auditory task depending on the type of their coping mechanism. After determining the baseline of distress, the task was performed in duplicate for each group. After playing the auditory task for the first time, participants were asked to rate out the level of their distress and compliance with instructions, and they were asked to estimate the likely number of words they had heard. After the second time, they were asked to note the words they hear during the task and rate out their distress and compliance with instructions again at the end of the task.
Results: There was a significant difference between groups in terms of distress with a medium effect size of 0.47. The post hoc analysis revealed that mindfulness group reported less distress compared to the attentional focusing group (P = 0.017) and the control group (P = 0.027). Also, a significant difference existed between groups in terms of the frequency of the identified words, with a moderately strong effect size of 0.59, and a very good statistical power of 0.99. The post hoc analysis showed that attentional avoidance (P = 0.013) and attentional focusing (P = 0.011) groups heard fewer words than the control group.
Conclusion: Attention is a good target for treating psychotic patients with auditory hallucinations. Also, manipulation of attention can affect the frequency of auditory hallucinations and associated distress.

Key words: *Auditory Hallucinations; Engagement; Distress; Mindfulness; Resistance; Schizophrenia*

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Hallucinatory experiences are usually associated with distress (1) and interfere with the social and professional functioning of those who experience them (2). They are also a source of anguish to patients of schizophrenia (3), almost in a third of cases are resistant to medication (4), and can eventually lead to harm to the patients or others and even to suicide (5). However, clinicians' most important intervention to reduce schizophrenia patients' hallucinations is medication treatments that often have side effects and do not help all (2).

It has also been said that non-medication coping mechanisms to deal with auditory hallucinations influence the frequency of hallucinations and associated distress (4).

These coping mechanisms have been divided into two groups of resistance and engagement as key styles of responding to voices (6, 7). Engagement is characterized by different ways such as elective listening, willing compliance, and doing things to bring voices. On the other hand, resistance is defined by arguing, shouting, rejecting, or complying reluctantly at maximum pressure and avoiding signs that trigger voices and distraction (8).

Attentional avoidance and attentional focusing have been described as two coping mechanisms of resistance and engagement, respectively (9). The cognitive component of attention associates the two mechanisms to each other. Another coping mechanism for dealing with auditory hallucinations that involves attention is mindfulness. This mechanism is defined as paying attention in a particular way: on purpose, in the present moment, and non-judgmentally (10).

Deficits in attention that lead to false beliefs and perceptions can predict the development of schizophrenia (11) and may play a causal role in the propensity for positive symptoms, including auditory hallucinations (12). This theory is described by the Self-Regulatory Executive Function (S-REF) Model. The model emphasizes further understanding of the underlying dysfunctional processing configurations and states that Cognitive Attentional Syndrome (CAS) leads to abnormal psychological functioning. The syndrome consists of self-focused attention, attentional bias, rumination, and activation of unproductive beliefs and appraisals (13).

It has been suggested that resistance, and thus strategies related to attentional avoidance, are counterproductive, predict more considerable distress than other forms of coping mechanisms, and lead to more hallucinatory experiences (8, 9, 14). Comparing these results with those of Singh *et al.* (15), who propose problem-solving strategies (which are a subgroup of engagement), reveals that they are associated with more severe distress and raise the likelihood that any direct effort to change voices or resist them is distressing. However, some researchers who have devised methods based on attentional avoidance and distraction (which are subgroups of resistance) report the positive results of using these methods concerning the frequency of auditory hallucinations and associated distress (14, 16).

It has also been reported that active coping and strategies related to attentional focusing are less likely to be associated with distress. They may even improve psychosocial functioning over the long-term when patients monitor their symptoms as they occur (17). However, results become complicated when mindfulness is added to this equation. Some studies have reported the positive results of the trait of mindfulness or the use of mindfulness in dealing with auditory hallucinations. However, evidence regarding the efficacy of mindfulness-based interventions for treating psychotic symptoms is inconsistent or, occasionally, has a negligible effect size (4, 18, 19, 20, 21, 22, 23, 24, 25, 26).

Although some research here and there has sporadically reported the effectiveness of coping strategies in dealing with hallucinations, many studies have yielded conflicting results, and few studies have examined hallucinations in terms of "attention." In addition, no research has been done to compare the three coping strategies of attentional avoidance, attentional focusing, and mindfulness against auditory hallucinations.

The present study aims to answer the following question: Among the three coping mechanisms of attentional avoidance, attentional focusing, and mindfulness, which one does have the most positive effect on the frequency of auditory hallucinations and associated distress? The hypotheses concerning the reduction of the frequency of voice-hearing and associated distress were as follows:

1. Mindfulness is more effective than attentional focusing.
2. Mindfulness is more effective than attentional avoidance.
3. Attentional focusing is more effective than attentional avoidance.

We also sought to find the location of "doing nothing" on the continuum of effectiveness of these coping mechanisms.

Materials and Methods

Design

The present study was conducted as a randomized clinical trial (IRCT20191022045197N1) with a control group. Three interventions (i.e., attentional avoidance, attentional focusing, and mindfulness) were used in three corresponding groups.[1] The fourth group was the control group. Based on the statistical power of 0.9, the significance level of 0.05, and an effect size of 0.5, and calculated by the GPower software, the planned sample size was 64, which is considered as medium by Savilovski (27). The effect size was considered medium because when it was considered larger, any result would probably be significant. On the other hand, considering it smaller would require a larger sample size, which is beyond the scope of this study. Eligible participants

[1] The full trial protocol: https://en.irct.ir/trial/43209

were selected from the Ehsan House Institute, a rehabilitation center for chronic mental patients, from December 16, 2019, to January 20, 2020. Randomization was done using the "random allocation rule" method, which provided a large block for the total sample size. The block members were randomly assigned to four parallel groups: attentional avoidance, attentional focusing, mindfulness, and control. The allocation ratio was 1:1:1:1. The Sealed Envelope online software was used to perform the randomization. The Research Ethics Committee of Allameh Tabataba'i University issued the Ethics Certificate for this research (IR.ATU.REC.1398). Allocation concealment was done by non-transparent sealed envelopes that were numbered sequentially. A total of 64 non-transparent envelopes were provided, and each random sequence was recorded on a sheet (which was sealed in the non-transparent envelope). The randomization, preparation of envelopes, and sealing them were done by someone other than the researchers.

Inclusion and exclusion criteria

The inclusion criteria were:

1. Diagnosis of schizophrenia disorder based on DSM-5;
2. Experiencing auditory hallucinations currently or a history of auditory hallucinations in the past six months:
3. Being within the age range of 18 to 64; and
4. Speaking in the Persian language .

The exclusion criteria were:

1. Drug or alcohol dependence;
2. Organ dysfunction (brain injury, vision loss, and hearing loss); and
3. Unwillingness to participate in the study.

Decisions on diagnosis of schizophrenia for a participant and whether they fell within the exclusion criteria were made based on what had been mentioned in the patient's files by the psychiatrist and the clinical psychologist. This diagnosis had been made based on DSM-5 criteria. Eligible participants and their legal guardians signed the written informed consent form. Subjects with a history of auditory hallucination were selected because medication treatments suppress positive symptoms, including auditory hallucinations, but do not eliminate underlying causes. Therefore, they had the same mechanism of unknown underlying auditory hallucinations that the other subjects had.

Measure

Visual Analogue Scale (VAS)

VAS was used to assess the level of distress and compliance with instructions. VAS is a measurement instrument that attempts to measure a feature that is in a range of continuous values and is not easily measurable (28). This scale is often used in clinical trials to measure the intensity of the symptoms (29). VAS is usually a horizontal line with a length of 100 mm that is closed with words describing the continuum's two ends. Hence, this scale provides 101 different levels of intensity. In this study, VAS was used to measure participants' distress and compliance with the instructions, as Tally *et al.* (9) did. Zero was described as "not at all distressed" and 100 as "the most possible distressed" concerning participants' distress during the task. Concerning participants' compliance with instructions, 0 was described as "non-compliance" and 100 as "complete compliance." Previously, Tally *et al*. (9) used the VAS scale to measure participants' distress in hearing an auditory task that was a recording of voices with randomly spliced one second sections played backwards.

Procedure

At first, distress was measured by VAS to provide a baseline. An auditory task was designed for this study. The task was decided to be ambiguous to simulate the underlying conditions of hallucinations in psychotic individuals to provoke such experiences. Subjects listened to the ambiguous auditory task. The auditory task consisted of 1-second voice sections recorded in Persian. It was randomly intertwined and played backward as described by Tally *et al.* (9). The auditory task was designed by Python programming language. A five-minute and 22-second task was played for the subjects with the HTC One (M7) cellphone's original headphones. It was shown that this task can cause participants to hear words and phrases on the tape when, in fact, none of them exist (30).

Participants listened to the task depending on the coping mechanism that had randomly been assigned to them. After determining the baseline of distress, the task was performed twice for each group. After playing the auditory task for the first time, participants were asked to rate their level of distress and compliance with instructions and estimate the likely number of words they have heard. After the second time, they were asked to note the words they heard while playing the voice and to rate out their distress and compliance with instructions again at the end of the task. Each subject was exposed to the task in one session. The task was performed twice to facilitate the study's execution process and adapt subjects to instructions. Some subjects that were unable to write were asked to repeat the words they heard. The researcher noted the words.

An ambiguous voice was chosen to avoid subjects' bias, since the voice value probably affects the process and outcome of the study. Before playing the task and after determining the baseline of distress, a brief training on mindfulness was provided to the mindfulness group. The training was a necessary explanation of the concept of mindfulness, followed by two exercises. The first exercise was to focus on an object (awareness attention). In the second exercise, patients should imagine sitting in a field looking out at the sky while their thoughts and emotions, on the clouds, are passing in front of their eyes (free and released mind) (31). After explaining the intervention instructions, they were asked to use the mindfulness skills while listening to the ambiguous voice.

The present study's task was first designed by Feelgood and Rantzen (32) as an ambiguous auditory stimulus in a

cassette tape. They asked participants to listen carefully to the cassette tape and to note any words or phrases they heard. They found that subjects who recognize more words or phrases in the task receive a higher score on the Launay-Slade Hallucination Scale (LSHS), which measures the level of the predisposition to hallucinations in normal individuals.

Feelgood and Rantzen (32) considered the experience of meaningful patterns during the auditory task as a hallucination phenomenon, because participants believed they had heard the words they reported. So, they suggested it as a way to seek the individuals' hallucinations in laboratory situations. Later, Tally *et al.* (9) used the task to test the effect of attentional avoidance and attentional focusing response styles on the frequency of voice-hearing and associated distress.

It may be argued that our demand from the participants made them report the words and phrases and that they are aware of their experiences' unreality. However, demand plays a role only in type I experiences (simple experiences), but not in more complex type II experiences (meaningful experiences) where personality variables influence the demand (32).

Some participants did not have ongoing hallucinations for reasons such as medication. If the auditory task elicits hallucinations, it will provoke hallucinations in both people with and without ongoing hallucinations, because both groups have the underlying mechanism for hallucinations.

Intervention instructions

Intervention instructions for groups of attentional avoidance and attentional focusing were almost the same as the instructions prepared by Tally *et al.* (9). Also, the instructions given to the mindfulness group were written regarding the concept and background of the response style and recommendations provided by Tally *et al.* (9). The instructions given to the control group were also explicit: do not follow any particular ways.

Instructions for the attentional avoidance group: "You listen to a voice recorded on the cellphone for about five minutes. Some people may hear meaningful words in Persian while playing the voice. When listening to the voice, try not to focus on any meaningful words you may hear and avoid listening out for them as much as possible."

Instructions for the attentional focusing group: "You listen to a voice recorded on the cellphone for about five minutes. Some people may hear meaningful words in Persian while playing the voice. When listening to the voice, try to focus on any meaningful words you may hear and listen out for them as much as possible."

Instructions for the mindfulness group: "You listen to a voice recorded on the cellphone for about five minutes. Some people may hear meaningful words in Persian while playing the voice. While listening to the voice with awareness and attention, you may hear meaningful words, but do not think of them and let your mind be free from the words."

Instructions for the control group: "You listen to a voice recorded on the cellphone for about five minutes. Some people may hear meaningful words in Persian while playing the voice. You may hear them too."

Statistical analysis

First, the compliance level of subjects with instructions was compared to determine whether any subsequent results concerning the hypotheses and the question of this study are affected by this variable. The possible difference between the groups concerning the level of compliance was a nuisance variable that could reduce the validity of any conclusions concerning the dependent variables of the frequency of voice-hearing and associated distress. A mixed ANOVA was used to investigate this issue. Data were normal both times.

A mixed ANCOVA was applied to detect a significant difference between groups concerning distress. Baseline and first-time distress scores were normal, but the distribution of distress scores in the second performance of the task was not normal in the attentional avoidance group. The only outlier data in this group was winsorized, and thus the data gathered by the second performance of the task were also normalized. The relatively conservative Bonferroni post hoc test was then applied.

A mixed ANOVA was also used to detect a significant difference between groups concerning the frequency of voice-hearing (number of words identified). The data were neither normal for the first time nor in the second time and were normalized by winsorizing the outliers. Since the assumption of homogeneity of variance was violated, the Games-Howell post hoc test was used. The data was analyzed using IBM SPSS Statistics 23 software.

Results

Baseline characteristic

The sample consisted of 64 subjects with schizophrenia disorder, of which 62 collaborated with the researcher (Figure 1). The two who did not collaborate were one woman and one man. The baseline characteristics of all the samples and of each group are presented in Tables 1 and 2, respectively.

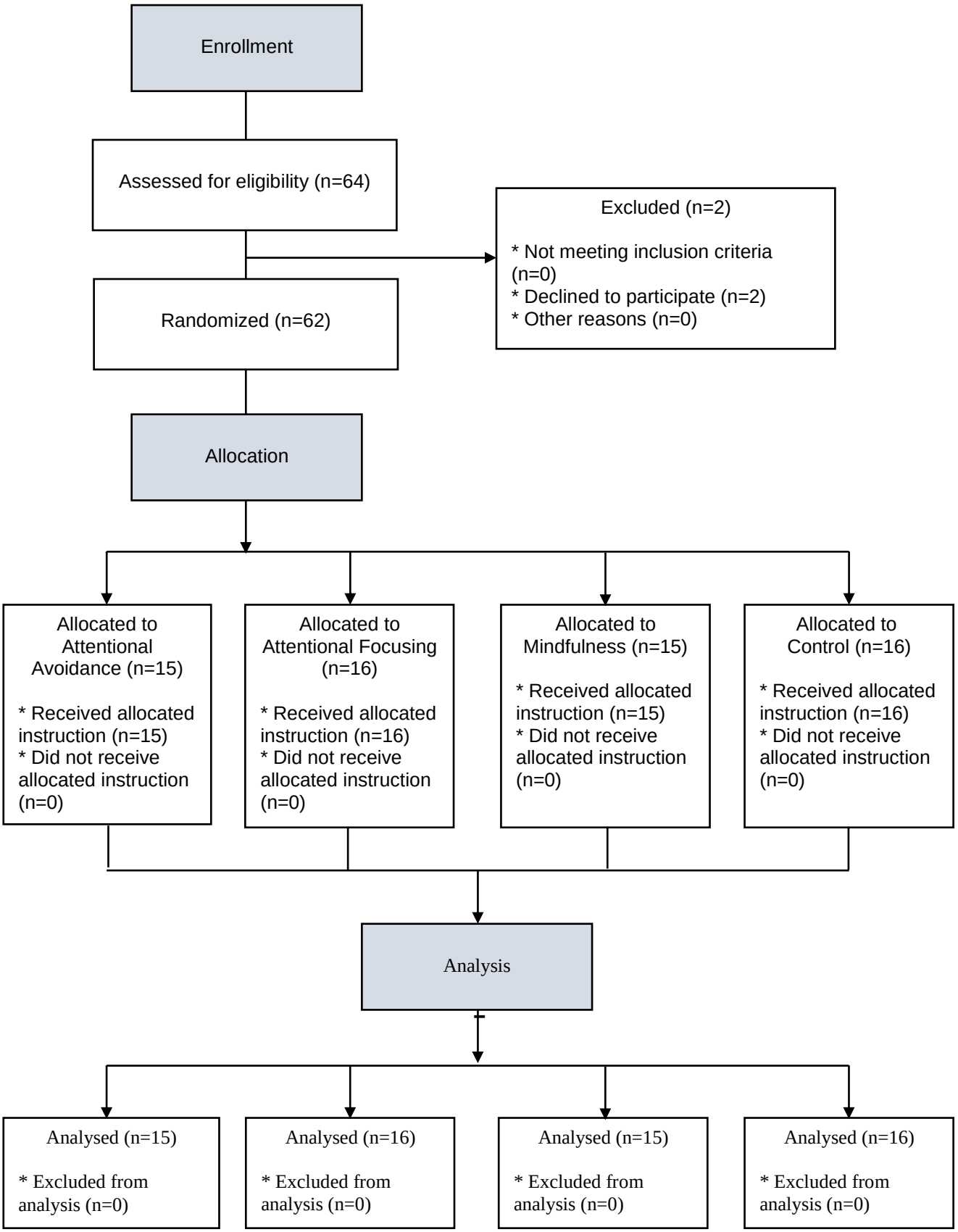

Figure 1. Flow Diagram of the Participant Progress through the Phases of a Four-Group Parallel Randomized Trial

Table 1. Baseline Characteristics of 62 Subjects with Schizophrenia Disorder

Sample Size (N)	62
Age	
Mean (SD)	46.47 (9.213)
Range	30-63
Gender	
Male	43
Female	19
Diagnosis	
Schizophrenia	62
Duration of Hospitalization	
Mean (SD)	10.59 (5.299)
Range	2-21
Voice-Hearing	
Current	31
Recent	31

Table 2. Characteristics of Subjects with Schizophrenia in Attentional Avoidance, Attentional Focusing, Mindfulness, and Control Groups

	Attentional avoidance	Attentional focusing	Mindfulness	Control
N	15	16	15	16
Age				
Mean (SD)	48.27 (10.00)	48.88 (8.09)	46.33 (9.67)	42.50 (8.52)
Range	31-63	34-62	33-62	30-58
Gender				
Male	11	13	10	9
Female	4	3	5	7
Diagnosis				
Schizophrenia	15	16	15	16
Duration of hospitalization				
Mean (SD)	10.70 (4.90)	10.31 (6.04)	12.00 (5.41)	9.44 (4.93)
Range	3-18	3-21	5-20	2-20
Voice-Hearing				
Current	7	7	7	10
Recent	8	9	8	6

Compliance

Table 3 shows compliance with instructions in each group. Mixed ANOVA was performed to detect a significant difference between the three groups of attentional avoidance, attentional focusing, and mindfulness in twice playing the auditory task. The control group was not included in this comparison, as no specific instructions had been given to this group. There was no significant interaction between groups and the first and second playing of the task in compliance with the provided instructions ($F(2,43) = 2.629$, $P = 0.084$). Moreover, there was no significant intra-group difference between the first and second performance of the task in compliance with instructions ($F(1,43) = 4.035$, $P = 0.051$). Consequently, there was no statistically significant difference in the level of compliance of the samples between the first and second exposure to the task. There was also no significant difference between the groups in their compliance with instructions ($F(2,43) = 0.102$, $P = 0.904$).

Table 3. Mean Scores for Distress, Words Identified, and Compliance, at Baseline, after the First Exposure to the Task, and after the Second Exposure to the Task, for Subjects with Schizophrenia in Attentional Avoidance, Attentional Focusing, Mindfulness, and Control Groups

	Attentional avoidance	Attentional focusing	Mindfulness	Control	Effect size	P-value
Distress					0.47	0.008
Baseline	26.87 (29.11)	34.56 (33.41)	51.33 (29.30)	44.00 (27.09)		
Time 1	31.20 (39.13)	40.69 (38.59)	32.00 (28.70)	49.63 (30.99)		
Time 2	19.73 (27.32)	44.19 (36.49)	26.27 (27.01)	44.84 (32.19)		
Words identified					0.59	0.001
Time 1	4.27 (5.57)	5.13 (9.14)	6.53 (10.39)	11.87 (24.58)		
Time 2	16.47 (18.19)	14.56 (15.68)	14.93 (9.43)	29.94 (23.52)		
Compliance					0.07	0.904
Time 1	62.27 (32.88)	57.37 (34.31)	63.80 (30.26)	-		
Time 2	61.00 (37.36)	74.88 (30.91)	68.67 (24.51)	-		

Distress

Mixed ANCOVA was performed to detect the presence of a significant difference between attentional avoidance, attentional focusing, mindfulness, and control groups in the distress level in twice playing the auditory task. The covariance variable was baseline distress. There was no significant interaction between groups and the first and second performance of the task in terms of distress ($F(3,57) = 2.060$, $P = 0.116$). The intra-group difference between the first and second performance of the task in terms of the distress level was significant, with a medium effect size of 0.39 ($F(1,57) = 8.671$, $P = 0.005$). As shown in Table 4, the sample distress was reduced the second time.

Table 4. Mean Scores for Distress, Words Identified, and Compliance, at Baseline, after the First Exposure to the Task, and after the Second Exposure to the Task, for All 62 Subjects with Schizophrenia, Regardless of their Groups

	Mean (SD)
Distress	
Baseline	39.19 (30.53)
Time 1	38.60 (34.64)
Time 2	34.10 (32.31)
Words identified	
Time 1	7.00 (14.49)
Time 2	19.08 (18.30)
Compliance with instructions	
Time 1	60.37 (32.05)
Time 2	68.33 (31.19)

There was also a significant difference between groups in terms of distress with a medium effect size of 0.47 ($F(3,57) = 4.298$, $P = 0.008$). The Bonferroni post hoc test indicated that the mindfulness group reports less voice-related distress than the attentional focusing group at a significant level of $P = 0.017$ and compared to the control group at a significant level of $P = 0.027$.

Frequency (Words Identified)

A mixed ANOVA was applied to detect a significant difference between the groups concerning the dependent variable of voice-hearing frequency when twice playing the auditory task. Also, there was a significant interaction between the groups and the first and second performance of the task on voice-hearing frequency ($F(3,58) = 4.636$, $P = 0.006$). The source of this significant interaction needs to be identified. One-way ANOVA showed no significant difference between groups in the frequency of voice-hearing for the first performance of the task ($F(3,58) = 1.445$, $P = 0.239$). In the second performance, however, there was a significant difference ($F(3,58) = 7.361$, $P < 0.001$), with a medium effect size of 0.52. Since the assumption of homogeneity of variance was violated, the Games-Howell post hoc test was performed. Both attentional avoidance and

attentional focusing groups identified a lower number of words while playing the auditory task compared to the control group, at a significance level of P = 0.010 and P = 0.011, respectively. We found significant differences between the two times of playing the ambiguous auditory task in the frequency of voice-hearing, separately in the attentional avoidance group (t (14) = -4.520, P < 0.001) (d = 1.16), in the attentional focusing group (t (15) = -4.584, P < 0/001) (d = 1.14), in the mindfulness group (t (14) = -5.398, P < 0/001) (d = 1.40), and in the control group (t (15) = -5.049, P < 0/001) (d = 1.26). These results probably indicate twice playing the task has facilitated the execution process of the study.

There was also a significant intra-group difference between the first and second performance of the task concerning the variable of frequency (F (1,58) = 82.389, P < 0/001), which showed that the participants had identified significantly more words in the second performance than in the first one, with an effect size of 1.19.

Moreover, a significant difference existed between groups in the frequency of the identified words (F (3,58) = 6.746, P = 0.001). Since the assumption of homogeneity of variance was violated, the Games-Howell post hoc test was performed. Results showed that the control group had identified significantly more words than the attentional avoidance group at a significance level of P = 0.013 and the attentional focusing group at a significance level of P = 0.011. It showed a moderately strong effect size of 0.59 with a very good statistical power of 0.99.

Discussion

The mindfulness group subjects reported lower levels of distress than the attentional focusing group (P = 0.017) and the control group (P = 0.027). Therefore, mindfulness effectively reduced voice-related distress compared to attentional focusing. Doing nothing is also counterproductive and increases distress compared to mindfulness.

The subjects in the attentional avoidance group and the attentional focusing group identified a lower number of words with P = 0.013 and P = 0.011, respectively, than the control group. Therefore, attentional avoidance and attentional focusing decreased the frequency of voice-hearing compared to doing nothing.

The current study showed that different ways of attention lead to different results about the frequency of voice-hearing and associated distress. This result is consistent with the findings of the study by Valmaggia *et al.* (33). These researchers concluded that attention training techniques (i.e., selective attention, attention switching, and divided attention rather than focused attention) lead to the treatment of auditory hallucinations and a marked reduction in symptoms (33).

According to the result of this study, attentional avoidance and attentional focusing have no advantage over each other in reducing neither the frequency of voice-hearing nor associated distress. However, both significantly reduced the frequency of voice-hearing, which contradicts the results found by Tally *et al.* (9). Tally *et al*. (9) assumed that both attentional avoidance and attentional focusing are counterproductive and concluded that these two coping strategies for dealing with auditory hallucinations concerning voice-related distress are not significantly different from each other, although attentional avoidance leads to a significant increase in the frequency of voice-hearing in people with schizophrenia compared to attentional focusing.

It was previously reported that resistance, represented in the present study by attentional avoidance, and problem-solving methods, including attentional focusing, which are a subset of engagement, are counterproductive and increase distress (34).

The present study, however, showed that attentional avoidance is not counterproductive about the frequency of voice-hearing and voice-related distress, but significantly reduces the former. Nevertheless, the result was different concerning attentional focusing. Although attentional focusing seems to reduce the voice-hearing frequency, it is as harmful as “doing nothing” about distress.

In addition to attentional avoidance and attentional focusing, this study includes mindfulness. In line with previous studies (4, 19, 20, 21), the present study showed that mindfulness reduces voice-related distress.

Attentional avoidance and attentional focusing in one way and mindfulness in another way may modify the frequency of voice-hearing and distress. The different consequences of these coping strategies can be attributed to the different mechanisms by which they work. Strauss *et al.* (25) propose that the reduction of distress caused by mindfulness occurs through three mechanisms, namely reorientation of attention, decentering, and acceptance of voices. Mindfulness probably targets rumination and worry processes, which both lead to anxiety and depression. Since voices are usually defined with malicious self-referent content, rumination and worry reduction may be due to the decentralization of the present moment experiences, including voices (25).

Besides, the mechanism of attentional avoidance can be considered as suppression (9), which is an attempt to control or stop disturbing voices. Thought suppression leads to an increase in intrusive thoughts and, therefore, auditory hallucinations (35); however, here, the effect of suppression has been reversed and has reduced the frequency of voice-hearing. It may show how suppression and attentional avoidance work in the short-term. If thought suppression is the inventor of auditory hallucinations, why do schizophrenic patients with hallucinations often use it? Perhaps, the use of suppression is accompanied by negative reinforcement.

Some authors believe that hallucinations arise due to a defective monitoring process, which causes the verbal material of internal production to be misattributed to an

external source. Attentional focusing reduces the likelihood of such misattribution (9). This approach increases the focus of people on the symptoms they experience. Thus, there may be an opportunity for them to give the experience a new meaning, know it better, and feel capable of coping with it. One explanation for the Janusian face of attentional focusing (i.e., reducing the frequency of voice-hearing and increasing associated distress) might be as follows: The increased focus can lead to increased rumination and worry (and thus distress), two factors that were reduced by mindfulness through inactivating them.

Limitations

There were several limitations to this study. First, subjects did not participate in any training program to learn various styles of attention before doing the study. Thus, only the specific instruction for each group was provided to the subjects, except for the mindfulness group that also received two additional mindfulness exercises. Second, manipulation of attention style as a mechanism for coping with auditory hallucinations may not be simple, especially in those who experience a high cognitive impairment level. The attentional habit is the third obstacle. Patients may be accustomed to a particular way of paying attention. It is difficult to manipulate their attention in these circumstances by exposing them to an ambiguous auditory task. Even their attentional habit may interfere with the attention style they must follow. Therefore, it is recommended to repeat this study with a broader program for training the mechanisms of attentional avoidance, attentional focusing, and mindfulness to subjects.

Moreover, the time factor was absent in this study. Using a particular mechanism over a long period may provide different results. Comparison of attentional avoidance, attentional focusing, and mindfulness in a research design that involves time, training, and repeated use of each of the mentioned coping techniques may lead to a closer examination of the hypotheses.

A broader perspective of the results can be obtained when the number of participants is higher and the component of voice-hearing status is considered as an independent variable in the study.

Researchers can also consider attention training techniques (ATT) as a coping mechanism of an assumptive fifth group and ask participants of this group to attend ATT training sessions before they are exposed to the task. In this paradigm, ATT can be compared with other attentional styles of the present study.

Finally, it is recommended to consider mindfulness training and practice as a part of the routine treatment plan for schizophrenia patients, especially for patients who get very distressed due to auditory hallucinations. Training the attentional focusing and attentional avoidance can also be a part of the treatment plan for patients who frequently experience auditory hallucinations, but they are accustomed to it and do not get distressed. It should be done with caution as it may cause unwanted side effects such as increased distress.

Conclusion

The present study showed that attention is a good target for any therapeutic intervention for psychotic individuals. It was said earlier that if attention is the central signifier that leads to the emergence of symptoms, including auditory hallucinations, different styles of attention (attentional avoidance, attentional focusing, and mindfulness) are likely to affect symptoms (auditory hallucination) and their consequences (distress). This issue has been addressed in the context of the Self-Regulatory Executive Function (S-REF) Model with focusing on Cognitive Attentional Syndrome (CAS).

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Conflict of Interest

None.

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