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Imagery-Focused Cognitive Behavioral Therapy Techniques for Auditory Verbal Hallucinations in Psychosis Spectrum Disorders: Four Experimental Case Series

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***Background*: In psychosis spectrum disorders, maladaptive mental imagery is associated with auditory verbal hallucinations (AVHs). This study evaluates the feasibility, acceptability, and effectiveness of the following 4 imagery techniques in targeting mental imagery and AVHs severity: Imagery Rescripting (ImRs), Promoting positive Imagery de novo (Pos-Im), Metacognitive Imagery techniques (Meta-Im), and playing Tetris.**

***Study Design*: Four replicated single-case series experimental designs were used. Participants were randomized to 1 of the 4 treatment conditions. Primary, we measured the severity of mental imagery and AVHs thrice daily on an 11-point VAS scale during a 2-week baseline, throughout 3 weeks of therapy, and during a 2-week follow-up phase. Randomization tests were used to examine whether daily severity levels of momentary mental imagery and AVHs decreased post-therapy. Secondary, questionnaires assessing the severity of AVHs, mental imagery characteristics, and levels of mood, anxiety, and functioning were administered at baseline, before, and posttreatment.**

***Results*: Twenty-eight participants completed all treatment sessions. Mental imagery significantly decreased after ImRs ($P < .001$, $d = 1.13$) and Pos-Im ($P = .039$, $d = 0.22$), with no significant effects observed following Meta-Im or Tetris. AVHs significantly decreased with all treatment conditions, with largest effects for ImRs ($P = .001$, $d = 1.39$) and Pos-Im ($P < .001$, $d = 1.99$). Secondary results demonstrated reductions in the severity of AVHs, mood, anxiety, imagery frequency, and appraisals.**

***Conclusions*: Imagery techniques appear feasible and acceptable for addressing mental imagery and AVHs in the psychosis continuum and may be valuable additions to current treatment for AVHs.**

Keywords: psychosis; mental imagery.auditory verbal hallucinations.hearing voices.imagery rescripting.

Introduction

Mental imagery, originally defined as "perceptual information accessed from memory, giving rise to the experience of 'seeing with the mind's eye' or 'hearing with the mind's ear', without the presence of external stimuli,"[1] impacts emotion, motivation, and behavior across various mental disorders.[2,3] In psychosis, maladaptive mental imagery is closely linked to experiences such as auditory verbal hallucinations (AVHs; eg, hearing voices that others cannot hear).[4–7] While AVHs were traditionally considered characteristic of psychosis spectrum disorders, they are now recognized as part of a broader continuum that includes nonclinical individuals experiencing brief psychotic-like experiences, those with subclinical psychotic symptoms,

and those diagnosed with psychosis spectrum disorders. Thus, individuals experience a varying frequency, intensity, and distress and need for care from their symptoms across the continuum.[8,9] This view underscores the potential of targeting maladaptive mental imagery as a novel approach to addressing AVHs across the psychosis continuum.

In cognitive behavioral therapy (CBT), mental imagery is conceptualized as a form of cognition that, like verbal cognitions, can both maintain and alleviate distress.[10] Recent years have seen growing attention to mental imagery in CBT, with research exploring how it can enhance CBT effectiveness for various mental disorders. For example, targeting imagery appraisals in social phobia proved superior to regular CBT in reducing mental imagery distress and anxiety.[11] Addressing imagery vividness in exposure has shown benefits for anxiety and trauma symptoms.[12] Imagery-focused CBT for bipolar disorder[13] also appeared effective in reducing anxiety and mood instability,[14–16] aligning with the emotional amplifier theory,[17] proposing that maladaptive mental imagery amplifies emotion and behavior in several other mental health problems.[2]

So far, only a few studies have explored the effects of imagery techniques on psychotic symptoms. These studies have shown promise in reducing maladaptive mental imagery and psychotic symptoms.[18–22] Also, studies have shown reduced trauma intrusions and psychotic symptoms for psychological interventions using Imagery Rescripting according to the schema therapy manual of Arntz and Weertman[23] to target trauma intrusions in individuals with AVHs.[24–28] Imagery-focused CBT for psychosis[29] including imagery CBT techniques[10,13] and imagery techniques from schema therapy[30,31] was feasible in patients with delusions and associated with a reduction in the level of schematic beliefs, imagery distress, and delusions.[32,33]

Integrating mental imagery into current standard treatment approaches for AVHs offers a unique opportunity to explore the often-ignored mental imagery aspects of thought patterns related to AVHs. This seems particularly relevant due to its impact on emotion and behavior.[34,35] To date, there is no specific evidence-based imagery-focused CBT manual for working with AVHs. Moreover, the precise working mechanism of imagery-focused CBT for psychotic symptoms is unclear.

The primary aim of the present study was to assess the feasibility, acceptability, and effectiveness on daily measured levels of mental imagery and AVHs severity of 4 imagery techniques for individuals with AVHs, all part of the imagery-focused CBT manual of Holmes et al.[13] The imagery techniques included in the present study were (1) imagery rescripting, (2) metacognitive imagery techniques, (3) promoting positive imagery de novo, and (4) a visuospatial task.[13] We selected these techniques as they are accessible imagery-focused CBT techniques, outlined in an established protocol. We hypothesized that all 4 imagery techniques will be associated with a significant decrease in the momentary severity of mental imagery and of AVHs; no serious adverse side effects will occur; and dropout rates of therapy will be low.

The second aim was to examine, with exploratory analyses, the effectiveness of the 4 selected imagery techniques on the severity of AVHs, mental imagery characteristics (including frequency, appraisals, and quality), and levels of mood, anxiety, and functioning as measured with cross-sectional questionnaires.

Methods

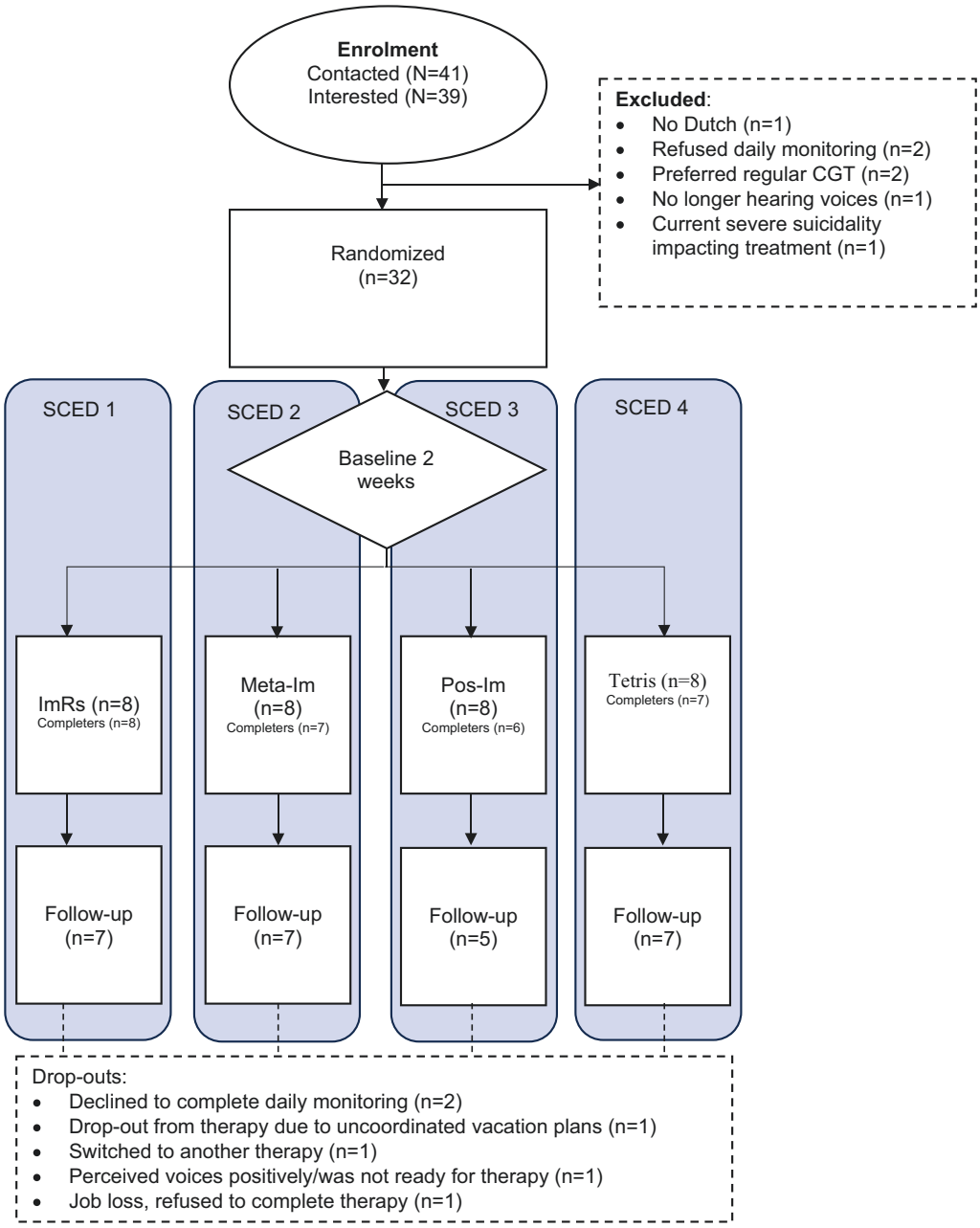
Study Design

Four replicated Single-Case Experimental Designs (SCEDs) were used. The design of the 4 SCEDs was identical, with the only difference being the treatment condition (see **Figure 1**). In contrast to the original imagery-focused CBT manual,[13] where imagery techniques are assigned based on a micro-formulation, in our study participants were randomly assigned to 1 of the 4 treatment conditions via an electronic system, using investigator-blinded block randomization. Each block comprised 8 participants, with each treatment condition represented twice. Inclusion date served as the block factor to control for time-related confounders, such as seasonal effects. The SCEDs had 3 phases: (1) Baseline (Phase A_1), lasting 2 weeks, (2) Treatment (Phase B) lasting 3 weeks, and (3) Follow-up (Phase A_2), lasting 2 weeks.

The study included feasibility and acceptability measures, daily online self-report measurements to assess severity of AVHs and mental imagery throughout the duration of the study and self-report questionnaires to assess severity of AVHs, mental imagery, anxiety, depression, and functioning at the start of baseline, pretreatment, and posttreatment.

Participants underwent a 2-week baseline period (A1) without interventions, during which they completed thrice-daily online self-reports assessing AVHs and mental imagery, yielding 42 assessments. Each participant then received six 1-hour treatment sessions with 1 of the 4 imagery techniques over 3 weeks (B) half face-to-face and half online—continuing the thrice-daily assessments, resulting in 63 assessments. The treatment phase was followed by a 2-week follow-up phase (A2) with 42 assessments.

Standard care, including psychiatric or pharmacotherapy support, was maintained throughout the study. The study was conducted at a Dutch psychiatric hospital specializing in voice-hearing and psychotic experiences from April 2022 to February 2024. This trial was registered at Clinicaltrials.gov (identifier NCT05603260) in November 2022. Ethical approval was given by METC azM/UM (NL79610.068.21/METC21-077).



Note. ImRs = Imagery Rescripting. Meta-Im = Metacognitive Imagery techniques. Pos-Im = Promoting positive imagery de novo, SCED = Single Case Experimental Design.

Figure 1. Study Flow Chart. Abbreviations: ImRs = Imagery Rescripting; Meta-Im = Metacognitive Imagery techniques; Pos-Im = Promoting positive imagery de novo; SCED = Single-Case Experimental Design.

Participants

Individuals who were hearing voices and were referred to the specialized center for voice-hearing and psychotic experiences were given written and oral information and were invited to participate in the present study. Inclusion criteria for the study were as follows: (1) Hearing voices as indicated by an intensity score of 4 or more on subscale 1.3 (perceptual abnormalities) of the Comprehensive Assessment of At Risk Mental States (CAARMS[36];), or as indicated by a score of 3 or more on item P3 (hallucinatory behavior) of the Positive and Negative Syndrome Scale (PANSS[37];). (2) A DSM-5 (APA, 2013) diagnosis in the psychosis spectrum (DSM-5 codes: 297.1; 298.8; 295.40; 295.90; 295.70; 298.8; 298.9) as confirmed by the administration of the mini-SCAN (Schedules for Clinical Assessment in Neuropsychiatry[38]), or a condition defined as Ultra High Risk/At Risk Mental State (ARMS or UHR) according to the CAARMS estimated by a clinician. Exclusion criteria were: (1) moderate/

severe learning difficulties (IQ < 70) estimated by a clinician; (2) any current or previous brain injury/neurological impairment, (3) acute confusional state or delirium not caused by a psychotic disorder, and (4) current severe substance or alcohol misuse judged by a clinician. Participants gave informed consent according to the principles of the Declaration of Helsinki (2013).[39] Full details of the informed consent procedure are provided in the Supplementary Materials (S1).

The diagnosis of a participant was confirmed by the participant's psychologist or psychiatrist, along with a case note review and the administration of the mini-SCAN.[38] This assessment tool was also employed to screen participants for comorbid diagnoses.

Treatment

Treatment consisted of an in-depth identification of images (2 sessions), followed by the imagery technique (2 sessions), and a consolidation phase (2 sessions), all based on the imagery-focused CBT manual of Holmes et al.[13] The in-depth identification of images concerned the identification of images related to AVHs, together with the participant, and constructing a micro-formulation along the lines of current best practice CBT.[29] In this micro-formulation, triggers, quality aspects, and appraisals of problematic mental imagery were identified. Subsequently, maladaptive behavior and possible links with earlier experiences were inventoried, as well as maintaining factors. Next and based on the treatment condition, patients received one of the following imagery techniques, adapted from the manual of Holmes et al.[13]:

(1) *Imagery Rescripting (ImRs)* according to Holmes et al.[13] involved imagery interventions following a micro-formulation (different to ImRs in schema therapy[23]) aiming to transform maladaptive images into more functional or benign ones. In addition, targeting associated mental imagery using ImRs, we also rescripted the voice directly into other, less distressing sounds.
(2) *Metacognitive imagery techniques (Meta-Im)* were aimed at creating emotional distance from a mental image which reduces the likelihood or power of an image. For example, changing the perceptual properties of an image (changing it into a cartoon for example) to reinforce the experience that the image is just an image and not "real."
(3) *Promoting positive imagery* de novo *(Pos-Im)* involved creating a new stand-alone positive and compassionate image to help participants to increase their ability to self-soothe and reduce fear.
(4) *Tetris* was used as a visuospatial working memory task competing with the intrusion of the unwanted image to reduce its frequency: We provided participants with a Tetris hand game device to practice the imagery technique at home, instructing them to use it at least 3 times a day for 15 minutes each session, while actively recall the voices and the associated image themselves while playing the game.

In the consolidation phase relapse prevention strategies were practiced. The treatment was delivered by qualified psychologists trained in CBT and imagery intervention techniques. The therapists delivering the imagery techniques received weekly supervision from a clinical psychologist with expertise in imagery-enhanced CBT and formally trained by the developers of the imagery-focused CBT manual.[13] In addition, 10% of the therapy sessions were recorded and checked by an independent research assistant using a bespoke manual checklist to assess treatment adherence to the imagery intervention manual. A high fidelity to manual was demonstrated (ie, all recorded sessions were in line with the imagery intervention manual).

Measures

Primary Measures.

Feasibility and Acceptability To assess that the provided treatments did not worsen AVHs or cause other adverse effects, therapists asked participants every session about serious adverse events and dropout rates were measured. To date, the current literature in the field of psychosis and AVHs lacks a defined criterion for therapeutic safety. For this reason, we reported detailed account of participants whose AVHs severity increased during therapy.

In addition, a self-report qualitative evaluation of the treatment adapted from an earlier study[16] was conducted at the end of the consolidation phase to determine whether the treatment was experienced as feasible and acceptable. In this self-report assessment, participants were asked to report on their treatment satisfaction, the subjective treatment effects on AVHs, their perceived problems in present daily functioning, their mood and anxiety symptoms, and satisfaction with the therapeutic alliance, using 5-point VAS scales, ranging from 0 ("not at all") to 10 ("very much"). We computed average scores across all these questions as a measure of treatment quality. The full self-report assessment is presented in the Supplementary Materials (S2).

Effectiveness—Daily Self-Report Measurements on Mental Imagery and AVHs Severity Participants completed the daily online self-report measurements in their natural environments, 3 times a day for the duration of the study. Assessments were prompted at equidistant time points with 4-hour intervals in between. Participants received a text message on their mobile phone with a link to the self-report measurements. They were asked to fill

out the measurements immediately after the alert, or, if impossible, the same day. We established a minimum data threshold of over 33%, based on previous studies employing the Experience Sampling Method, to determine eligibility for this measure.[40] Participants who did not meet this threshold were excluded from further analysis.

Visual Analogue Scales of Imagery Characteristics (VAS-Imagery): Following earlier imagery work,[13] 7 imagery questions were administered thrice daily using online self-report methods. The questions consisted of the following: (1) "How vivid and clear were your images?" (2) "How compelling were your images?" (3) "Did you have the feeling that this image encouraged you to make plans to do something?" (4) "To what extent did this image tell you something about yourself?" (5) "To what extent did you believe this might happen now you thought about it?" (6) "To what extent did this image feel real, like something that is happening right now?" And lastly, (7) "From what perspective did you view this image? Through your own eyes or observing yourself from an external point of view?" Questions 1-6 were rated on a 11-point VAS scale, ranging from 0 ("not at all") to 10 ("all the time or very much/intense"). The seventh item was rated on a VAS scale, ranging from 0 ("observing myself from an external view"), 5 ("mixed"), to 10 ("completely through my own eyes"). By summing the scores of all items at each daily measurement point, we computed a total severity score of momentary mental imagery which ranges from 0 to 70. Summing the scores aligns with prior studies.[16,32,41] Previous studies using similar scales report alpha values of around 0.80-0.90, indicating strong reliability.[42,43]

Visual Analogue Scales of AVHs (VAS-AVHs): Five AVHs questions were administered thrice daily using online self-report methods. Questions were: "How badly or how much did you suffer from the voices?" "How often were you bothered by the voices?" "How much sense of control did you experience over the voices?" and "How loud were the voices the last time you had them?" rated on 11-point VAS scales, ranging from 0 ("not at all") to 10 ("all the time or very much/intense"). We computed a total severity score of momentary AVHs at each daily measurement point, which ranged from 0 to 50. Studies about questionnaires including comparable questions typically report alpha values in the range of 0.70-0.90, suggesting acceptable to excellent internal consistency.[44]

Secondary Measures.

Pre and Post Measures (at Start Baseline, Pretreatment and Posttreatment) Level of auditory verbal hallucinations: The Auditory Vocal Hallucination Rating Scale (AVHRS-Q[44]) assesses several characteristics of auditory vocal hallucinations (number of voices, separately or simultaneously, frequency, duration, hypnagogic and/or hypnopompic voices, location, form of address, loudness, positive or negative content, severity of negative content, anxiety, interference with daily functioning, interference with thoughts, control, attribution of origin, frequency of distress, intensity of distress) and provides an overall severity index score of auditory vocal hallucinations[44] in the previous weeks. The AVHRS-Q comprises 17 items, 15 items are scored on a 4- or 5-point scale, scores range from 0 (not applicable) to 3 or 4 (most applicable). Two items were scored on a 10-point scale, ranging from 1 (not at all/never) to 10 (extremely/always). A severity index score can be calculated from the items, this score ranges from 0 to 14. The AVHRS-Q has good internal consistency (Cronbach's alpha .78), convergent validity, and divergent validity.[44]

Imagery characteristics: Several characteristics of mental imagery were assessed with the Dutch Imagery Survey (DimS) which is a self-report measure based on the original imagery interview.[42,45] The DimS consists of 5 scales: (1) vividness, (2) compellingness, (3) metacognitive beliefs, (4) encapsulated beliefs, and (5) effect on emotion and behavior. The DimS starts with a clear definition of mental imagery. Thereafter, participants were asked to recall and describe an example of an image in conjunction to their AVHs that is typical of the mental imagery they have experienced over the previous 2 weeks. Participants were instructed to recall this image and keep this image in mind while answering the subsequent questions regarding imagery.[42] All items of the DimS are rated on a 9-point Likert scale. The internal consistency of all subscales of the DimS is adequate to good (Cronbach's alphas ranging from .71 to .87), and consistency over time is also good.

Anxiety Level: Beck Anxiety Inventory (BAI[46]) is a 21-item self-report questionnaire with good psychometric properties used for measuring the severity of anxiety. Answers were rated on a 4-point Likert scale, ranging from 0 ("not at all") to 3 ("very much").

Depression level: Beck Depression Inventory-II (BDI-II[47]) is a widely used self-report questionnaire to assess symptoms of depression and the severity of depression (Dutch version[48]). The BDI-II consists of 21 items. Good reliability and validity of the BDI-II have been supported by different studies.[49]

Level of social and occupational functioning: Social and Occupational Functioning Scale (SOFAS[36]) was used to assess overall functioning in a single score. The SOFAS is a modified version of the Global Assessment of Functioning scale and ranges from 0 to 100.

Data Analysis

Primary Measures.

Feasibility and Acceptability Descriptive summary statistics were reported for feasibility measures, and an overview of the results of a retrospective self-report

assessment for a qualitative evaluation of treatment was presented.

Effectiveness—Daily Self-Report Measurements on Mental Imagery and AVHs Severity For each replicated SCED, randomization test procedures were conducted to examine pre- to post-changes in daily online self-reported levels of mental imagery and AVHs severity. A power and sample size analysis was conducted before the start of the current study. The power analysis indicated that a minimum of 3 participants per treatment condition is required to detect a therapeutic effect comparable to the smallest effect found by a previous study.[32] Full details of the power analysis are provided in the Supplementary Materials (Table S2). As the number of participants per condition was small ($n = 8$), the asymptotic assumptions regarding parametric analyses such as mixed regression analysis could probably not be warranted. We therefore used a randomization test procedure according to Bulte and Onghena.[50]

The randomization test was used to compare different AVHs and imagery measures for phase baseline (A_1) and treatment (B), treatment (B) and follow-up (A_2), and baseline (A_1) and follow-up (A_2) at the individual and group levels. In the randomization test, the mean difference between the observations within 2 phases is compared with a randomized mean difference distribution formed by resampling the observations for a participant. The statistical significance is then defined as the number of random mean differences that were equal to or more extreme than the observed mean difference.

By combining the results at the individual level, we evaluated the group effect for all the participants together. The overall *P*-value was calculated by using the property of *P*-values that they are uniformly [0,1] distributed when the null hypothesis is true. Accordingly, the sum of the *P*-values is a random draw from all possible sums of *P*-values. Then, the overall *P*-value is the proportion of combinations of *P*-values that would give a sum (S) as small as or smaller than the observed sum (S_{obs}):

$$P(S \geq S_{obs}) = \sum_{k=0}^{s} (-1)^K \binom{n}{k} \frac{(s-k)^n}{n!}$$

in which k are integers starting at 0 and with the maximum closest integer being smaller than S.[51] We used this randomization test procedure to compare the imagery and AVHs measures for phases A_1 and B, B and A_2, and A_1 and A_2.

In randomization test procedures, applying a correction for the *P*-value is unnecessary as the tests are conducted within different participants. While an expectation of 5 errors out of 100 tests exists (ie, Type 1 error), discovering significant effects with large effect sizes often signals a reduced risk of Type I error. In the randomization test procedures, standardized effect size Cohen's *d* was used to compare the mean difference between phases within a participant and was calculated by dividing the mean difference between the phases by the pooled standard deviation.

Secondary Measures (Exploratory Analyses) Following a previous study[32] change scores were calculated for all secondary measures at individual level from measurements at the start of the baseline, immediately before the start of treatment, and immediately after treatment. The results were assessed according to the criteria established by Durham et al.,[52] as applied in a previous study.[32] Specifically, a 25% reduction is considered a "clinically significant change," while a 50% reduction is classified as "much improved."

In line with a previous study,[32] the exploratory group-level analysis did not include *P*-values in its reporting. The standard deviations of the change scores were used. This was calculated as follows: Cohen's $d = (\text{mean}_{\text{pretreatment score}} - \text{mean}_{\text{posttreatment score}})/\text{SD}(\text{mean}_{\text{pretreatment}} - \text{mean}_{\text{posttreatment}})$.

Results

Demographic and Clinical Details

Out of 39 individuals who expressed an interest in participation, 32 were ultimately enrolled in the study (see **Figure 1** for participant details and attrition). Of these, 28 attended all 6 therapy sessions with a treatment duration of 20.2 days (SD = 6.49; range = 16-42) on average. Further demographic details for each intervention group are provided in **Table 1**.

Primary Questions

Feasibility and Acceptability. Adherence to therapy was acceptable, with 28 participants attending all sessions and 4 patients having dropped out (12.5%) during treatment. Of these dropouts, 1 participant attended 4 sessions, 2 participants attended 3 sessions, and 1 participant attended 1 session. Of the remaining 28 participants, there were 2 withdrawals from daily self-report assessments. No serious adverse events were reported during the study. The level of AVHs as measured with the AVHRS-Q of 5 participants (17.9%) exacerbated, as indicated by a mild increase of symptoms (range 1.67%-10.9%). As decided by an independent researcher blinded for therapy condition, there were 3 potential adverse therapy effects, which were all relatively minor. Participant 31 reported an increase in the level of depression immediately after treatment, which coincided with the participant's typical seasonal pattern of depression onsets during winter months. Participants 10 and 26 described the replacement of treated mental images with new (traumatic) memories

Table 1. Baseline Characteristics of the Study Cohort Including Demographics, Diagnosis, Comorbidity, and Medication

	ImRs (n = 8)	Meta-Im (n = 7)	Pos-Im (n = 6)	Tetris (n = 7)
Demographic information				
Age years, mean (SD)	28.5 (11.3)	38.1 (14.0)	34.5 (12.7)	29.3 (12.5)
Gender, *n* (%)				
Female	1 (12.5%)	5 (62.5%)	4 (66.7%)	3 (42.9%)
Male	7 (87.5%)	3 (37.5%)	2 (33.3%)	4 (57.1%)
Treatment duration				
Days, mean (SD)	20.0 (4.00)	24.9 (9.82)	17.8 (2.04)	21.9 (6.44)
Level of education, *n* (%)				
Primary education	1 (12.5%)	—	—	2 (28.6%)
Prevocational secondary education/secondary vocational education	2 (25.0%)	6 (85.7%)	2 (33.3%)	4 (57.1%)
Senior general secondary education/pre-university education/higher professional education	5 (62.5%)	1 (14.3%)	4 (66.7%)	1 (14.3%)
Work status, *n* (%)				
Employed	2 (25.0%)	1 (14.3%)	4 (66.7%)	4 (57.1%)
Unemployed	6 (75.0%)	6 (85.7%)	2 (33.3%)	3 (42.9%)
Diagnosis schizophrenia spectrum and UHR/ARMS, *n* (%)				
Psychotic disorder	6 (75.5%)	3 (42.9%)	4 (50.0%)	4 (57.1%)
Ultra High Risk/At Risk Mental State	2 (25.0%)	4 (57.1%)	4 (50.0%)	3 (42.9%)
Comorbidity, *n* (%)				
Mood disorders	2 (25.0%)	4 (57.1%)	3 (50.0%)	—
Anxiety disorders	2 (25.0%)	—	2 (33.3%)	—
Trauma-related disorders	1 (12.5%)	2 (28.6%)	2 (33.3%)	2 (28.6%)
Somatic symptom disorders	—	1 (14.3%)	1 (16.7%)	—
Alcohol/use disorders (light)	1 (12.5%)	1 (14.3%)	—	1 (14.3%)
Dissociative disorders	1 (12.5%)	—	—	—
Personality disorders	3 (37.5%)	2 (28.6%)	2 (33.3%)	1 (14.3%)
Autism spectrum disorder	2 (25.0%)	1 (14.3%)	1 (16.7%)	3 (42.9%)
ADHD	—	—	1 (16.7%)	—
Clinical course in years, *n* (%)				
0-1 years	3 (37.5%)	—	3 (50.0%)	2 (28.6%)
2-5 years	4 (50.0%)	4 (57.1%)	2 (33.3%)	3 (42.9%)
6-10 years	1 (12.5%)	3 (42.9%)	—	—
>10 years	—	—	1 (16.7%)	2 (28.6%)
Medication at screening, *n* (%)				
Antipsychotic	4 (50.0%)	5 (71.4%)	4 (66.7%)	4 (57.1%)
Antidepressant	2 (25.0%)	2 (28.6%)	—	4 (57.1%)
Anxiolytic	2 (25.0%)	1 (14.3%)	1 (16.7%)	2 (28.6%)

Abbreviations: ImRs = Imagery Rescripting; Meta-Im = Metacognitive Imagery techniques; Pos-Im = Promoting positive imagery de novo.

after Tetris. Participant 26 reported this as distressing, whereas participant 10 did not.

Table 4 provides an overview of the results of treatment quality per intervention group. Participants expressed high satisfaction with therapy for all treatment conditions (range 3.97-4.50). Participants rated the effect on symptoms and functioning as moderate to quite substantial (range 2.80-3.82). The therapeutic alliance was also evaluated as very strong (range 4.29-4.67).

Effectiveness—Daily Self-Report Measurements on Mental Imagery and AVHs Severity.

ImRs Findings of randomization tests showed that the ImRs led to a significant decrease in the level of mental imagery for 2 participants in Phase B-A_1, 4 participants in Phase A_2-B, and 5 participants in Phase A_2-A_1 (**Table 2**, Figure S1). Symptoms reduced immediately after treatment and persisted during follow-up. All phase comparisons at group level were significant (B-A_1: $P < .001$, $d = 0.36$; A_2-B: $P = .002$, $d = 0.76$; A_2-A_1: $P < .001$, $d = 1.13$), indicating an overall effect of ImRs across all phases, with effect sizes varying from small to large.

In addition, **Table 3** and Figure S1 show that for 5 out of 7 participants ImRs reduced the severity of AVHs, with symptoms decreasing immediately after therapy and persisting during follow-up. All phase comparisons were significant (B-A_1: $P < .001$, $d = 0.73$; A_2-B: $P = .002$, $d = 0.61$; A_2-A_1: $P = .002$, $d = 1.16$), indicating an overall effect for all phase comparisons of ImRs, with medium to large effect sizes.

Table 2. Mean VAS-Imagery Values and Cohen's *d* Effect Sizes and *P*-Values for All Phases.

	A_1	B	A_2	B-A_1		A_2-B		A_2-A_1	
	Mean			*d*	*P*	*d*	*P*	*d*	*P*
ImRs									
Participant									
pp2	22.2	20.8	19.8	0.89	.001*	0.84	.001*	1.40	.001*
pp3	24.0	18.3	17.1	0.35	.062	0.08	.332	0.42	.035*
pp11	10.5	9.90	10.8	0.14	.269	−0.28	.904	−0.07	.615
pp18	45.7	43.4	26.5	0.33	.055	2.62	.001*	4.42	.001*
pp20	14.3	14.4	10.0	−0.01	.491	0.83	.001*	0.52	.008*
pp28	15.9	15.2	15.0	0.17	.222	0.28	.097	0.23	.165
pp30	22.2	18.3	16.3	0.64	.003*	0.93	.001*	1.03	.001*
Overall effects									
Cohen's *d*					0.36		0.76		1.13
Sum *P*					1.10		1.34		0.83
Overall *P*					<.001*		.002*		<.001*
Meta-Im									
Participant									
pp7	53.9	56.0	57.8	−0.72	.998	−1.07	.999	−1.35	.999
pp9	37.6	43.2	51.3	−0.28	.907	−0.52	.979	−0.72	.999
pp13	28.9	37.1	25.5	−0.42	.982	0.65	.004*	0.19	.174
pp19	12.2	24.2	25.3	−1.62	.999	−0.13	.728	−2.86	.999
pp21	46.2	57.7	57.8	−2.26	.999	−0.03	.544	−2.42	.999
pp29	50.3	52.5	59.5	−0.45	.984	−1.44	.999	−2.51	.999
pp32	41.1	42.3	42.3	−0.27	.922	0.05	.423	−0.22	.842
Overall effects									
Cohen's *d*					−0.86		−0.36		−1.41
Sum *P*					6.79		4.68		6.02
Overall *P*					.999		.938		.999
Pos-Im									
Participant									
pp1	17.9	12.2	11.8	0.85	.001*	0.12	.334	0.90	.001*
pp15	10.4	12.4	10.6	−0.40	.979	0.33	.048*	−0.06	.563
pp24	14.1	19.0	15.3	−0.54	.994	0.36	.042*	−0.12	.813
pp27	11.3	10.0	10.2	0.33	.175	−0.19	.934	0.26	.153
pp31	18.8	12.3	10.0	0.79	.002*	0.50	.006*	1.23	.001*
Overall effects									
Cohen's *d*					0.21		0.22		0.44
Sum *P*					2.15		1.36		1.53
Overall *P*					.245		.039*		.068
Tetris									
Participant									
pp6	15.8	16.8	17.5	−0.20	.759	−0.15	.700	−0.36	.913
pp10	33.5	36.2	52.0	−0.24	.845	−1.50	.999	−2.42	.999
pp12	11.2	10.0	10.0	0.35	.021*	−0.25	.970	0.31	.036*
pp17	48.3	48.2	49.2	0.03	.409	−0.38	.965	−0.22	.796
pp22	26.3	29.8	23.8	−0.45	.977	0.74	.001*	0.33	.064
pp25	25.0	24.8	23.0	0.03	.441	0.22	.123	0.30	.083
pp26	20.4	12.0	11.5	1.00	.001*	0.10	.315	0.92	.001*
Overall effects									
Cohen's *d*					0.07		−0.18		−0.16
Sum *P*					3.45		4.07		2.89
Overall *P*					.476		.770		.217

Abbreviations: ImRs = Imagery Rescripting; Meta-Im = Metacognitive Imagery techniques; Pos-Im = Promoting positive imagery de novo. Significant *P*-values are marked with an *.

Meta-Im Meta-Im failed to yield a statistically significant reduction in the level of mental imagery for 7 out of 8 participants. Significant effects were observed only in Participant 4 during Phase A_2-B, suggesting a decrease in mental imagery following therapy in the follow-up phase (**Table 2**, Figure S2).

Table 3 and Figure S2 show that for 4 out of 7 participants who received Meta-Im, the severity of AVHs decreased

Table 3. Mean VAS-AVHs Values and Cohen's *d* Effect Sizes and *P*-Values for All Phases

	A_1	B	A_2	$B\text{-}A_1$		$A_2\text{-}B$		$A_2\text{-}A_1$	
	Mean			*d*	P	d	P	d	P
ImRs									
Participant									
pp2	32.5	27.7	25.3	2.38	.001*	1.09	.001*	3.02	.001*
pp3	17.8	14.2	13.6	0.40	.020*	0.08	.341	0.46	.033*
pp11	22.7	15.0	7.33	1.20	.001*	1.08	.001*	2.69	.001*
pp18	28.4	26.9	15.7	0.24	.104	2.23	.001*	2.96	.001*
pp20	19.9	20.4	18.0	−0.05	.591	0.39	.031*	0.25	.133
pp28	27.8	26.8	28.6	0.45	.016*	−1.13	.999	−0.54	.994
pp30	30.1	28.5	27.3	0.48	.012*	0.57	.003*	0.91	.001*
Overall effects									
Cohen's *d*					0.73		0.61		1.39
Sum *P*					0.75		1.38		1.16
Overall *P*					<.001*		.002*		.001*
Meta-Im									
Participant									
pp7	48.5	49.7	49.9	−0.37	.925	−0.22	.822	−0.48	.986
pp9	18.7	20.9	2.9	−0.22	.847	2.00	.001*	1.61	.001*
pp13	20.7	21.5	15.2	−0.07	.609	0.60	.003*	0.50	.010*
pp19	26.8	25.5	22.3	0.15	.261	0.41	.038*	0.54	.009*
pp21	48.7	48.8	48.5	−0.07	.647	0.22	.140	0.08	.340
pp29	36.8	38.3	39.6	−0.45	.986	−0.43	.995	−1.07	.999
pp32	20.3	19.5	16.4	0.15	.194	0.64	.001*	0.96	.001*
Overall effects									
Cohen's *d*					−0.13		0.46		0.31
Sum *P*					4.47		2.00		2.35
Overall *P*					.895		.024*		.067
Pos-Im									
Participant									
pp1	17.2	10.5	5.30	0.91	.001*	1.05	.001*	1.88	.001*
pp15	2.14	2.80	1.41	−0.11	.693	0.24	.128	0.15	.242
pp24	18.9	17.3	13.5	0.20	.152	0.50	.006*	0.80	.001*
pp27	10.8	8.87	4.44	0.73	.001*	1.53	.001*	2.53	.001*
pp31	24.59	15.4	2.05	1.63	.001*	2.66	.001*	4.61	.001*
Overall effects									
Cohen's *d*					0.67		1.20		1.99
Sum *P*					0.85		0.14		0.25
Overall *P*					.004*		<.001*		<.001*
Tetris									
Participant									
pp6	11.7	10.3	10.0	0.50	.071	0.24	.555	0.64	.021*
pp10	20.7	19.8	13.5	0.14	.280	1.12	.001*	1.28	.001*
pp12	34.5	27.7	30.4	0.99	.001*	−0.42	.984	0.60	.004*
pp17	46.3	45.9	46.5	0.31	.058	−0.34	.938	−0.10	.678
pp22	19.3	19.4	15.5	−0.02	.561	0.65	.002*	0.72	.001*
pp25	33.4	33.9	26.3	−0.08	.626	1.26	.001*	1.03	.001*
pp26	46.6	48.6	48.6	−0.51	.994	0.00	.480	−0.52	.988
Overall effects									
Cohen's *d*					0.19		0.36		0.52
Sum *P*					2.59		2.69		1.69
Overall *P*					.120		.124		.008*

Abbreviations: ImRs = Imagery Rescripting; Meta-Im = Metacognitive Imagery techniques; Pos-Im = Promoting positive imagery de novo; Significant *P*-values are marked with an *.

significantly in Phase A_2 compared to B, and Phase A_2 compared to A_1. AVHs symptoms of the remaining 3 participants remained stable or showed a minimal increase immediately after therapy. None of the individual levels of AVHs between Phase A_1 and B showed significant differences. Only the overall results of the randomization tests in Phase A_2 and B were significant ($P = .024$, $d = 0.46$), indicating an overall effect for follow-up compared to

Table 4. Outcome Data and Cohen's *d* Effect Sizes Per Condition (Secondary Measures)

		Start baseline	Pretreatment	Posttreatment	Clinically significant change at individual level		Group-level effect sizes
Measure	Condition	Mean (SD)	Mean (SD)	Mean (SD)	*N*	%	*d*
AHRS-Q	ImRs	47.3 (5.12)	45.8 (5.70)	36.9 (7.95)	3	37.5	1.44
	Meta-Im	49.1 (7.84)	48.1 (8.57)	44.6 (14.0)	1	14.3	0.49
	Pos-Im	49.8 (7.28)	48.1 (8.57)	44.6 (14.0)	4	66.7	0.57
	Tetris	48.3 (9.89)	47.7 (11.8)	43.1 (14.1)	1	14.3	0.57
BAI	ImRs	20.3 (10.2)	18.4 (11.7)	11.5 (8.14)	6	85.7	1.67
	Meta-Im	49.0 (28.1)	39.0 (28.9)	37.0 (24.0)	4	57.1	1.25
	Pos-Im	30.0 (15.8)	26.2 (12.3)	10.5 (8.17)	6	100.0	1.44
	Tetris	27.4 (17.3)	23.1 (17.5)	23.7 (13.9)	2	28.6	0.24
BDI-II	ImRs	28.0 (14.2)	26.9 (14.8)	24.1 (15.0)	3	37.5	0.73
	Meta-Im	32.4 (14.0)	29.6 (7.93)	28.3 (15.0)	2	28.6	0.46
	Pos-Im	29.2 (8.68)	29.5 (9.19)	22.3 (15.1)	3	50.0	0.85
	Tetris	36.4 (15.1)	31.6 (12.5)	29.6 (15.4)	3	42.9	0.64
SOFAS	ImRs	48.1 (8.4)	45.9 (10.7)	46.4 (12.3)	3	57.1	0.15
	Meta-Im	45.7 (6.63)	46.4 (9.81)	48.7 (11.1)	1	14.3	−0.31
	Pos-Im	49.3 (20.1)	51.8 (23.5)	60.3 (17.2)	2	33.3	−0.96
	Tetris	47.3 (8.61)	49.0 (10.7)	48.7 (11.3)	2	28.6	−0.10
DImS imagery frequency	ImRs	6.25 (1.98)	5.88 (2.75)	5.88 (2.17)	2	25.0	0.14
	Meta-Im	7.71 (2.14)	6.86 (3.08)	7.71 (2.22)	1	14.3	0.00
	Pos-Im	6.50 (2.07)	5.17 (3.49)	5.33 (2.94)	2	33.3	0.68
	Tetris	7.29 (1.98)	6.00 (2.08)	5.00 (2.45)	3	42.9	0.89
DImS liveliness	ImRs	6.19 (2.10)	6.19 (1.98)	5.00 (2.09)	2	25.0	0.81
	Meta-Im	8.00 (1.50)	8.07 (0.98)	7.93 (1.24)	2	28.6	0.03
	Pos-Im	8.00 (1.10)	8.33 (1.21)	7.83 (1.97)	1	16.7	0.09
	Tetris	6.29 (2.00)	6.86 (2.32)	5.86 (1.52)	1	14.3	0.25
DImS compellingness	ImRs	5.13 (2.10)	5.05 (1.73)	4.48 (2.29)	3	37.5	0.24
	Meta-Im	7.69 (1.15)	7.17 (1.08)	6.34 (1.12)	3	42.9	0.70
	Pos-Im	7.23 (2.11)	7.17 (1.98)	5.83 (1.87)	1	16.7	0.65
	Tetris	6.63 (2.37)	6.43 (1.76)	5.26 (2.26)	4	57.1	0.62
DImS negative encapsulated beliefs	ImRs	3.67 (2.50)	3.79 (2.73)	3.66 (2.50)	3	37.5	−0.3
	Meta-Im	4.00 (2.86)	4.95 (3.09)	4.05 (2.95)	1	14.3	−0.02
	Pos-Im	6.17 (2.15)	5.39 (2.86)	3.39 (3.53)	4	66.7	1.30
	Tetris	4.62 (2.41)	5.05 (2.56)	4.05 (3.42)	4	57.1	0.22
DImS positive encapsulated beliefs	ImRs	2.33 (2.00)	2.04 (1.20)	3.17 (2.91)	3	37.5	−0.25
	Meta-Im	1.62 (1.50)	1.71 (1.31)	3.00 (1.96)	3	42.9	−0.85
	Pos-Im	1.06 (0.14)	2.00 (1.71)	3.17 (1.81)	4	66.7	−1.19
	Tetris	3.10 (3.07)	2.57 (1.34)	2.71 (1.67)	3	42.9	0.12
DImS negative metacognitions	ImRs	3.83 (2.29)	3.58 (2.20)	3.08 (1.85)	3	37.5	0.30
	Meta-Im	6.05 (3.06)	6.38 (2.06)	4.86 (2.77)	2	28.6	0.99
	Pos-Im	6.83 (2.87)	5.06 (3.26)	3.44 (3.10)	5	83.3	1.28
	Tetris	4.62 (2.41)	4.76 (2.34)	3.81 (2.84)	3	42.9	0.23
DImS positive metacognitions	ImRs	2.78 (1.57)	2.78 (1.15)	1.63 (1.07)	4	50.0	0.65
	Meta-Im	4.63 (1.44)	4.94 (1.17)	4.54 (1.48)	2	28.6	0.04
	Pos-Im	4.40 (0.82)	3.63 (1.36)	4.76 (2.29)	1	16.7	−0.13
	Tetris	4.86 (2.10)	4.40 (2.12)	4.29 (2.23)	1	14.3	0.83
Treatment quality—satisfaction	ImRs			3.97 (0.67)			
	Meta-Im			4.29 (0.51)			
	Pos-Im			4.29 (0.56)			
	Tetris			4.50 (3.86)			
Treatment quality—subjective treatment effects	ImRs			2.93 (0.71)			
	Meta-Im			3.44 (0.87)			
	Pos-Im			3.87 (0.91)			
	Tetris			3.08 (0.80)			
Treatment quality—therapeutic alliance	ImRs			4.29 (0.54)			

Table 4. Continued

Measure	Condition	Start baseline Mean (SD)	Pretreatment Mean (SD)	Posttreatment Mean (SD)	Clinically significant change at individual level *N*	*%*	Group-level effect sizes *d*
	Meta-Im			4.67 (0.47)			
	Pos-Im			4.61 (0.46)			
	Tetris			4.38 (0.37)			

Abbreviations: AHRS-Q = Auditory Vocal Hallucination Rating Scale; BAI = Beck Anxiety Questionnaire; BDI-II = Beck Depression Inventory-II; DImS = Dutch Imagery Survey; ImRs = Imagery Rescripting; Meta-Im = Metacognitive Imagery techniques; Pos-Im = Promoting positive imagery de novo; SOFAS = Social and Occupational Functioning Scale. Clinically significant change: according to Durham et al.[52] criteria we reported the number and proportion of patients who met the criterion of a clinically significant change (eg, >25%).

treatment, with a small effect size. Other phase comparisons for Meta-IM at group level were not significant.

Pos-Im **Table 2** and Figure S3 show that Pos-Im resulted in a significant reduction in the severity of mental imagery in Phase A_1-B and A_1-A_2 for Participants 1 and 31, and in Phase B-A_2 for Participants 15, 24, and 31, as presented in **Table 2**. The overall results of the randomization tests in Phase A_2 and B were significant ($P = .039$, $d = 0.22$), indicating an overall effect for a decrease of mental imagery severity for Pos-Im in the follow-up phase with a small effect size. Other phase comparisons at group level were not significant.

In addition, **Table 3** and Figure S3 illustrate that the Pos-Im led to a decrease in the severity of AVHs for 4 out of 5 participants. Symptoms decreased immediately after treatment and remained so during the follow-up phase. All phase comparisons were significant (B-A_1: $P = .004$, $d = 0.67$; A_2-B: $P < .001$, $d = 1.20$; A_2-A_1: $P < .001$, $d = 1.99$), indicating an overall effect for all phase comparisons of Pos-Im in the single-case series design with medium to large effect sizes.

Tetris Only Participants 12 and 26 showed significant reductions in the severity of mental imagery in Phase A_1-B and A_1-A_2, and Participant 22 in Phase A_2-B (**Table 2**, Figure S4). All other phase comparisons at individual and group level were not significant.

Table 3 and Figure S4 show that for 5 out of 7 participants receiving Tetris the severity of AVHs decreased significantly in Phase A_2 compared to A_1, and for 3 out of 7 participants the severity of AVHs decreased significantly in Phase A_2 compared to B. All individual levels of AVHs between Phase A_1 and B failed to show statistically significant differences. Participant 26 showed a minor increase in symptoms after Tetris. Participant 17 showed a minor decrease in symptoms after Tetris, which slightly increased during the follow-up phase again. Only the overall results of the randomization tests in Phase A_2 and A_1 were significant ($P = .008$, $d = 0.52$), indicating an overall effect for Phase A_2 vs A_1, with a medium effect size. Other phase comparisons at group level were not significant.

Secondary Questions

Table 4 presents a summary of the explorative secondary analysis results, showing reductions in the severity of AVHs, anxiety, and depression. Five participants in the ImRs and Pos-Im conditions showed >50% ("much improved") reductions in anxiety.

Table 4 also provides data on the reductions in various dimensions of mental imagery across different imagery techniques. Results at group level showed that for Tetris, imagery frequency notably decreased with a large effect size ($d = 0.89$). Three participants in the Tetris condition achieved a ≥50% ("much improved") reduction in imagery frequency, indicating much improvement. Across participants, reductions in negative encapsulated beliefs ($d = 1.30$) and negative metacognitions ($d = 1.28$) were reported for Pos-Im, alongside an increase in positive encapsulated beliefs ($d = 1.19$). This is reflected in individual results (**Table 4**), with 4 participants showing >50% reductions in negative encapsulated beliefs and metacognitions, and 4 showing >50% increases in positive encapsulated beliefs. Positive metacognitions decreased substantially for ImRs with 3 participants showing a reduction of more than 50% and a medium effect size at group level ($d = 0.65$), indicating that participants felt less inclined to attribute causality to mental images.

Discussion

This study investigated the feasibility, acceptability, and effectiveness of 4 imagery techniques (ImRs, Meta-Im,

Pos-Im, and Tetris) for individuals with AVHs within the psychosis spectrum, utilizing 4 replicated SCEDs. Participants responded positively to the imagery techniques, as evidenced by low dropout rates and favorable qualitative feedback on therapy. There were no serious adverse events reported. Following the interventions, momentary measured levels of mental imagery severity decreased significantly after ImRs and Pos-Im, with the most pronounced effects observed in the ImRs condition. Momentary measured levels of AVHs severity significantly decreased in the majority of the participants across all treatment conditions, with sustained reductions observed in the ImRs and Pos-Im conditions during the follow-up phase. Secondary analyses provided preliminary evidence for differential effects for the abovementioned imagery techniques on different aspects of mental imagery, which we will discuss below. Reductions in AVHs severity, anxiety, and depression levels were reported across all therapy groups, with the most prominent reduction observed in anxiety for ImRs and Pos-Im. However, in terms of social and occupational functioning, marginal improvements were noted, or even slight decreases.

Feasibility, Acceptability, and Effectiveness on Momentary Mental Imagery and AVHs Severity of 4 Imagery Techniques

In the present study, the imagery techniques were feasible and acceptable in individuals with AVHs. Moreover, the imagery techniques were associated with significant reductions in the severity of momentary mental imagery after ImRs and Pos-Im. Also, momentary AVHs severity decreased across all treatment conditions, with strong individual and group effects in daily measurements. These reductions in severity of AVHs maintained during the follow-up phase after ImRs and Pos-Im. As the follow-up phase was short (2 weeks), it needs to be further studied if there is potential to alter long-term outcomes in addressing AVHs. These results align with previous research findings indicating that imagery techniques were feasible and effective in treating trauma memories in individuals with AVHs[24–27] or symptoms of psychosis in individuals with delusions[19,20,32] and visual hallucinations.[22] Our findings are further supported by prior research showing that positive imagery techniques, like competitive memory training, effectively reduce AVHs in populations with persistent psychosis-related AVHs.[53] These studies highlight the potential value of incorporating experiential techniques, such as imagery techniques, into psychosis treatment, suggesting that these techniques, each in their own way, facilitate a form of distancing from AVHs.

Given the reduction in momentary AVHs severity observed in both the Meta-Im and Tetris conditions, a corresponding decrease in the momentary severity of mental imagery would have been anticipated. However, this was not reflected in the data from these treatment conditions. These results indicate that the reduction in AVHs severity following Meta-Im and Tetris is not associated to a decrease in momentary mental imagery severity. This can be interpreted in different ways, for example, methodological: the questions posed in the daily assessments to assess mental imagery were general and not specific enough to provide insight into the content of mental imagery (see Supplementary Materials for further details of the daily mental imagery questions). Alternatively, the results could suggest that unchanged mental imagery scores reflect persistent maladaptive imagery, or that AVHs effects are not mediated by mental imagery. This needs further study.

Secondary Outcomes: Mental Imagery Characteristics, Severity of AVHs, and Levels of Mood, Anxiety, and Functioning at Baseline, Before Treatment, and Posttreatment

Although our exploratory findings should be interpreted with caution, they align with previous research,[54,55] suggesting that Pos-Im, ImRs, and Meta-Im may affect imagery appraisals, such as encapsulated beliefs and metacognitions, while Tetris may reduce imagery frequency.

Reductions in AVHs severity, anxiety, and depression levels were noted across all therapy groups, with the most notable decrease observed in anxiety within the ImRs and Pos-Im conditions. This is in line with the emotional amplifier theory[17] stating that mental imagery influences emotion and behavior across various mental health problems, and that imagery interventions target emotions through mental imagery itself.

The findings on social and occupational functioning were minimal. The short duration of treatment may have limited a possible effect on functioning, as improvements in functioning might only become noticeable over a longer period.[56] Additionally, the 1-item rating scale used to assess functioning (SOFAS) may have lacked sensitivity to accurately capture changes, as it is known to be less responsive over short periods.[57,58] Other studies using the SOFAS in psychosis treatments persistently have shown continued impaired functioning immediately after treatment termination[59]; our findings are not unique in that respect. Reassessing with the SOFAS 6 months later could capture longer-term changes.

Differential Effects

In general, the treatment effects of ImRs and Pos-Im were more pronounced compared to Meta-Im and Tetris, suggesting that ImRs and Pos-Im may be more effective as stand-alone treatments. These differential effects of the 4 imagery techniques may also be influenced by participant characteristics. The Meta-Im condition

primarily included individuals with a longer psychiatric history, while 2 participants in the Tetris condition were diagnosed with complex PTSD. Posttreatment, they reported replacing treated images with new traumatic ones. Additionally, altering metacognitions is a challenging process given their association with psychological distress.[60–62] Given the briefness of our treatment, significant changes in the severity of AVHs and mental imagery through metacognitive mechanisms may not have occurred. It may be preferable to tailor imagery techniques to individual needs and specific mental imagery aspects, as guided by the micro-formulation consistent with the existing imagery-focused CBT manuals.[13,22]

The strong treatment effects for ImRs suggest that our novel approach to ImRs for AVHs, targeting both the voices directly and the accompanying mental image, was a well-considered and effective choice. This addresses a gap in the existing literature, where most ImRs work is used in the context of trauma or trauma-related mental imagery. Our results may offer a promising avenue for some individuals with AVHs, emphasizing the broader applicability of imagery interventions in mental health problems. This finding is in line with earlier studies showing that imagery interventions are more broadly applicable to other non-trauma-related mental health problems.[3,63]

It also is noteworthy to mention that not all participants benefited from treatment. This finding, again, emphasizes the need to tailor imagery techniques to specific aspects of mental imagery of people suffering from AVHs. Also, the short treatment duration may have contributed to limited improvement in some participants. Nevertheless, delivering 2 sessions per week, a potential study strength, complies with the benefits of higher session frequency that have been linked to improved treatment outcomes in various mental health problems.[64,65] Moreover, despite the short duration of our treatment, the overall effects on the daily level of AVHs were strong, suggesting the potential of these interventions in treating AVHs.

Methodological Considerations

Our study has several limitations. While SCED designs provide robust results for daily measurements and offer enhanced ecological validity, closely resembling clinical practice, and thus provide valuable evidence for generalizing therapeutic outcomes to real-world settings, other designs are needed to assess the replicability of our exploratory measures (eg, questionnaires administered at the start of the baseline, immediately before the start of treatment and immediately after treatment). Second, a significant portion of our results was exploratory in nature, suggesting the need for further confirmatory research. Third, the lack of direct comparisons between treatment conditions, as well as the absence of a comparison with treatment as usual or control condition, implies that it is difficult to confidently attribute the improvements solely to the imagery techniques. Fourth, the mediating treatment effects between mental imagery and AVHs, as well as mood and anxiety, were not investigated. Future research should investigate how changes in mental imagery and AVHs are correlated over time within and across treatment conditions. Fifth, while participants were randomized to treatment conditions in our study, this approach may not fully reflect real-world clinical practice, where imagery techniques are often tailored to individual symptom presentations. Finally, due to the short follow-up duration, it remains unclear whether the relatively strong effects persist over time, especially in conditions such as psychosis. Future research should aim to address these limitations and explore the effectiveness of an integrated approach with different imagery techniques in the treatment of AVHs.

Conclusions

Our study showed that imagery techniques were feasible and acceptable in the treatment of mental imagery and AVHs in the psychosis spectrum. ImRs and Pos-Im were associated with reduced daily levels of mental imagery and AVHs severity; Meta-Im and Tetris were associated with reductions in daily levels of AVHs severity. The uniqueness of our study lies in the application of ImRs, where we both rescripted the voices directly and altered the images associated with AVHs. This represents a novel application and a previously unexplored aspect in the field, demonstrating potential for individuals with impactful mental imagery and psychosis. While replication is needed, this study suggests that imagery intervention techniques, especially ImRs and Pos-Im, may complement standard psychological treatment for AVHs, offering an alternative approach to symptom modification by addressing mental imagery alongside maladaptive verbal thoughts associated with AVHs. A better self-regulation on mental imagery aspects may contribute to maintaining or regaining mental balance and to the individual process of recovery.

Supplementary Material

Supplementary material is available at https://academic.oup.com/schizophreniabulletin.

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Conflicts of Interest

None declared.

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