Study	1. Publication year	2. Country	3. Type of study	4. Study aim	5. Participant number	6. Mean age	7. Chronic diagnosis
Aali et al	2020	England	Review	To examine the effects of avatar therapy for people with schizophrenia or related disorders. Comparing avatar therapy with two other interventions; treatment as usual or supportive counselling	195	Not provided	Schizophrenia or related disorders
Andrade et al	2015	United States	12-week RCT (IG with avatar/CG: No avatar)	To determine whether an avatar-based, online, self-management program is an effective therapeutic. approach for women with overactive bladder (OAB).	41	61 (SD=6)	Overactive bladder
Cho et al	2020	United States	Focus groups (5 sessions) after six months RCT completion (IG: An avatar guided users through the app that provided users with self-care strategies with animated videos for ameliorating their symptoms/ CG: An avatar guided users through the app for weekly symptom assessments).	To understand consumers' perspectives on use of a self-management app following completion of a clinical trial that tested the efficacy of the app for improving health outcomes.	39	55 (SD=10.70)	HIV with HANA conditions
Clarke et al	2019	Ireland	Review of 21 articles (K 0.82)	To complete a clinical trial that tested the efficacy of the app for improving health outcomes.	1535	Not provided	Psychosis
Dang et al	2020	United States	Feasibility study	To evaluate patient adherence and the acceptability of an avatar-facilitated life review intervention.	11	Not provided	Cancer
du Sert et al	2018	Canada	Seven-week phase-II, randomized partial cross-over trial.	To test seven weekly sessions of VR-assisted therapy (VRT) in auditory verbal hallucinations.	19	42.9	Schizophrenia

Falconer et al	2017	England	Feasibility study	To study the feasibility and acceptability of using an avatar adjunct to conventional mentalization-based treatment (avatar-MBT) in the treatment of individuals with borderline personality disorder (BPD).	11	31.2	Borderline personality disorder
Leff et al	2013	England	Randomised, single blind, partial crossover trial	To develop a computerised system that enables the patient to create an avatar of their persecutor. To encourage them to engage in a dialogue with the avatar.	26	Not provided	Schizophrenia
Pinto et al	2013	United States	Pilot tested	To report preliminary evidence on the efficacy of an avatar based depression self-management intervention among young adults	28	Not provided	Depression
Robinson-Whelen et al	2020	United States	Randomized, controlled feasibility test	To test the feasibility of an online self-esteem intervention for women with spinal cord injury (SCI).	21	Not provided	Spinal cord injury
Rus-Calafell et al	2020	England	Randomised clinical trial	To explore the sense of voice presence in a psychological therapy for distressing auditory hallucinations. To explore, for the first time, the contribution of sense of voice presence, along with session-by-session reduction in anxiety and paranoid attributions about the avatar, to changes in primary outcomes following avatar therapy.	39	43,87 (SD=9.33)	Schizophrenia
Stewart et al	2010	United States	Narrative review	To test the explicit benefits of Second Life.	Not provided	Not provided	People with disabilities (physical, psychological, and cognitive rehabilitation or those who are chronically ill, convalescing, or homebound)
Thomas et al	2019	Australia	Narrative review	To determine the benefits and feasibility of the application of digital technology to hallucinatory experiences with a focus on schizophrenia	Not provided	Not provided	Schizophrenia

Tong et al	2020	China	Case series	To examine the long-term effects of virtual reality-based mirror therapy interventions on alleviating phantom limb pain and the accompanying changes in the motor imagery capacity involving the phantom limb.	5	50,2 (SD=7.73)	Phantom limb pain (brachial plexus avulsion injury and amputees' outpatients)
Tongpeth et al	2018	Australia	Feasibility pilot testing	To develop and evaluate an interactive, avatar-based education application for improving patients' knowledge of, and response to, acute coronary syndrome (ACS) symptoms.	10	52.2 (SD=10.4)	Acute coronary syndrome
Triberti et al	2019	Italy	Pilot testing	To test how breast cancer affects avatar-conveyed multiple representations (actual self, their ideal self, and their self connected to the disease experience). To explore the relation between user-customized avatars and anxiety and depression symptoms.	22	49,4 (SD=7.73)	Cancer
Wonggom et al	2019	Australia	Review (9 articles (from 8 studies))	To examine the effectiveness of patient education using avatar-based technology on knowledge and self-care behaviours in patients with chronic disease.	752	Not provided	Chronic disease (cardiovascular and chronic respiratory disease, diabetes, cancer)
Wonggom et al	2020	Australia	RCT	To evaluate the effectiveness of education using avatars for improving patients' heart failure knowledge and self-care.	36	67,5 (SD=11.3)	Heart failure
Note RCT: randomized controlled trial.							
IC: Treatment Group.							
CG: Control Group							
ACS Response Index: attitudes and beliefs about heart attack symptoms and response							
BAVQ-R: Revised Beliefs About Voices Questionnaire - Omnipotence and Malevolence subscales							
BDI-II: Beck Depression Inventory-II							
CDS: Calgary Depression Scale							

CESD-10: Center for Epidemiological Studies Depression Scale-10						
DASS-21: Depression, Anxiety and Stress Scale - 21 Items						
DES-SF: Diabetes Empowerment Scale-Short Form						
DHFKS: Dutch HF knowledge scale						
DSMQ: Diabetes Self-management Profile Questionnaire						
EORTC QLQ-C30: European Organization for Research and Treatment of Cancer-Quality of Life Questionnaire Core 30						
ESAS: Edmonton Symptom Assessment Sytem						
EuroQol (EQ-5D): European Quality of Life-5 Dimensions						
FACIT-Sp: Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale						
GAD-7: Anxiety will be assessed with Generalized Anxiety Disorder						
GSEI-UI: Geriatric Self-efficacy Index for Urinary Incontinence						
GSES: Generalized Self-Efficacy Scale						
HAD-S: Hospital Anxiety and Depression Scale						
HPLP-IR: Health Promoting Lifestyle Profile Interpersonal Relations						
HPLP-SG: Health Promoting Lifestyle Spiritual Growth/Self-Actualization						
HPLP-SM: Health Promoting Lifestyle Profile Stress Management						
MANSA: Manchester Short Assessment of Quality of Life						
MEMS: Medication Event Monitoring System						
MMAS: Medication Adherence Scale						
MoCA: Montreal cognitive assessment						
MOS-SS-EI: MOS-Social Support Emotional-Informational Support						
MZQ: Mentalization Questionnaire						

NRS: Numerical Rating Scale							
OABq: Overactive bladder questonnaire							
PANSS: Positive and Negative Syndrome Scale							
PCQ: PedCarbQuiz							
PedsQL: Pediatric Quality of Life Inventory							
PHQ-9: Patient Health Questionnaire-9							
PPBC: patient perception of bladder condition							
PRIME: personalized real-time intervention for motivational enhancement							
PSRS: Perceived Stress Reactivity Scale							
PSYRATS: Psychotic Symptom Rating Scale							
PSYRATS-AH: Psychotic SymptomRating Scales—AuditoryHallucinations,							
Q-LES-Q-SF: Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form							
REALM-SF: Rapid Estimate of Adult Literacy in Medicine—Short Form							
RSES: Rosenberg Self- Esteem Scale							
SANS: Scale for Assessment of Negative Symptoms)							
SAPS: Simplified Acute Physiology Score							
SCHFI: Self-care of Heart Failure Index							
SDSCA: Summary of Diabetes Self-Care Activities							
SF-MPQ: Short-Form McGill Pain Questionnaire							
SoA: Sense of Agency							
SoO: Sense of Ownership							
SSES: Self-efficacy Scale							
SSPS: State Social Paranoia Scale							

SSPS: State Social Paranoia Scale							
STOFHLA: Short Test of Functional Health literacy in Adults							
SUS: Sense of Presence Scale							
VAS: Visual Analog Scale							

Study	8. Type of avatar	9. Identification	10. Device	11. Variables/Instruments	12. Additional information	13. Results	14. Statistical methods	15. Effectiveness	16. Patients satisfaction
Aali et al	Virtual representation (F2F with symptoms)	Low	Created a computerised representation of the entity that they believed was the source of their main voice	Clinically important change in; mental state (PANSS, BAVQ-R, PSYRATS, CDS, DASS-21, SAPSS, SANS, PSRS), insight (BAVQ-R, RSES), global state, quality of life (QLESQ-SF, MANSA)	Review: three trials (1) avatar therapy. (2,3) Compared avatar therapy with treatment as usual.	There is no clear evidence for (or against) using avatar therapy as a treatment for people with serious mental illness.	Descriptive statistics, Chi-square analysis and fixed-effect model	Low	Not applicable
Andrade et al	Graphic representation (virtual health coach)	2 avatar coaches: a generic avatar coach (GAC) with low ID and a self-avatar "peer" mentor (SAP) with high ID	Online self management program	OAB-related QOL (OABq), Perception of Bladder Condition (PPBC- single-item, 6-point rating scale of participants subjective assessment of their bladder symptoms), OAB Symptoms (daily bladder diaries), self efficacy (GSEI-UI), and avatar Recognition ("Who did the avatar look like?").	Pre-post: Participants completed daily bladder diaries throughout the 12-week period and OAB related outcome measures at weeks 1, 6, and 12.	IC significantly improved OAB-related QOL (P <.05), and reduced their intake of caffeine (P <.05).	Chi-square analysis for categorical variables and independent sample t test comparisons for continuous variables, analysis of covariance (ANCOVA) and repeated measures analysis of variance (ANOVA)	Yes	Not applicable
Cho et al	Graphic representation (virtual health coach)	High	Not applicable	Perceived usefulness, Perceived ease of use (Audio recordings from the focus groups were transcribed).	Five focus group sessions followed by completion of the study trial/once per month.	IC reported perceived usefulness and perceived ease of use.	Descriptive statistics (frequencies and percentages)	Yes	Yes

Clarke et al	Virtual representation (F2F with symptoms)	Low	avatar therapy (n=4), phone apps (n=3), computer-assisted cognitive remediation (CACR) (n=14)	Cognitive remediation, effectiveness, ameliorating psychotic symptoms such as hallucinations (PRIME, FOCUS, Actissit, PANSS, PSYRATS)	Review 21 articles	CACR has no impact on psychotic symptoms, whilst web-based CBTp programs and phone apps such as Actissist may hold potential, and avatar-based therapies appear to hold most promise.	Descriptive statistics (mean, standard deviation), test for overall effect (Z), heterogeneity (Tau square, Chi square, df, l square) and meta-analysis	Low	Not applicable
Dang et al	Embodiment/immersive environments	High	Motion capture system and headset.	Global health (ESAS), spiritual well-being (FACIT-Sp), quality of life (EORTC QLQ-C30)	Baseline and follow-up	Improvements only in FACIT-Sp.	Descriptive statistics (mean and standard deviation)	No	Yes
du Sert et al	Embodiment/immersive environment and virtual representation (F2F with symptoms)	Both	Samsung GearVR head mounted display and Samsung Galaxy S6 smartphone.	AVH symptoms (PSYRATS), beliefs about voices (BAVQ-R), depressive symptoms (BDI-ll), quality of life (Q-LES-Q-SF), distress and anxiety symptoms (PANSS)	seven weeks of VRT and three months of follow-up	VRT produced significant improvements in AVH severity, depressive symptoms, and quality of life that remained stable at the three-month follow-up.	Linear mixed-effects model	Yes	Not applicable
Falconer et al	Virtual environment	Low	Desktop VR software	Self-report measures of mentalization, perspective-taking function and reflective functioning, attentional focus (MZQ), mood (DASS-21)	Four group sessions of avatar-MBT at weekly intervals.		Descriptive statistics (mean, standard deviation) and repeated measures analysis of variance (ANOVA)	No	Yes
Leff et al	Virtual representation (F2F with symptoms)	Low	Computerised system	Psychotic Symptom Rating Scale (PSYRATS), Omnipotence and Malevolence subscales of the Revised Beliefs About Voices Questionnaire (BAVQ-R); Calgary Depression Scale (CDS).	Six sessions of 30 min duration with, posttreatment and three-month follow-up.	Mean reductions in the total PSYRATS score (auditory hallucinations) of 8.75 (P = 0.003) and in the BAVQ-R combined score of omnipotence and malevolence of the voices	Repeated measures analysis of variance (ANOVA), one-sample t-test comparisons, paired t-tests comparisons, and independent-sample t-test comparisons	Yes	Not applicable

Pinto et al	Graphic representation (virtual health coach)	Low	Screen-based	Depression self-management (HAD-S)	Baseline, four weeks, and eight weeks	Participants who received eSMART-MH showed a statistically significant reduction in their depressive symptoms over the three-month study.	Descriptive statistics and repeated measures analysis of variance (RMANOVA)	Yes	Not applicable
Robinson-Whelen et al	Virtual environment	Not applicable	Online virtual world (computer)	Health promoting behaviours (HPLP-IR, HPLP-SM, HPLP-SG), social support (MOS-SS-EI), self-efficacy (GSES), self-esteem (RSES), depression (CESD-10, PHQ-9)	Post-test via telephone interview	Intervention participants experienced significantly greater change than controls on two measures of health-promoting behaviour (health promoting lifestyle profile-ii spiritual growth/self-actualization and interpersonal relations).	Multiple linear regression analyses and paired t-tests comparisons	Yes	Yes
Rus-Calafell et al	Virtual representation (F2F with symptoms)	Low	Not applicable	Psychotic Symptom Rating Scales (PSYRATS-AH); Beliefs about Voices Questionnaire (BAVQ-R); thoughts in relation to the virtual agents during the experience of a virtual environment (SSPS); Sense of presence (SUS), anxiety experienced in dialogue with the avatar (VAS).	At baseline, 12- and 24-week follow-up.		Descriptive analyses, repeated measures t-test differences comparisons and multiple linear regressions	Yes	Not applicable
Stewart et al	Virtual environment	Not applicable	The virtual world of Second Life®	Not applicable	Statement	-	Not applicable	-	Yes (not measure, feedback)
Thomas et al	Several types of avatars	Not applicable	Not applicable	Coping hallucinations in schizophrenia	Review literature	The application of digital technology to hallucinatory experiences is at a very early stage, but emergent technologies offer significant potential to target the perceptual, verbal, and person-like characteristics of hallucination.	Not applicable	-	Not applicable

Tong et al	Embodiment/immersive environments	High	Immersive room-scale VR through headset	Pain rating (SF-MPQ); Pain (VAS); Sense of embodiment (SoO and SoA); depression and anxiety levels (HADS)	Before and after the VR intervention.	A significant improvement in pain rating in the third session compared to the first session. Improvement in anxiety and/or depression levels.	Descriptive statistics (mean, standard deviation) and Wilcoxon signed-rank test	Yes	Not applicable
Tongpeth et al	Graphic representation (virtual health coach)	Low	App	Patients' knowledge, attitudes, and beliefs about heart attack symptoms and response (ACS Response Index); participants' satisfaction with the avatar-based education (avatar-based education app satisfaction questionnaire) app.	Before and after using the app	Increase in knowledge scores was found as well as patient satisfaction after using the app.	Descriptive statistics (means, standard deviation, frequencies and percentages)	Yes	Yes
Triberti et al	Graphic representation	High	App - Android mobile device	Participants' attitudes (attractiveness, representativeness, difficulty in customization; emotional intensity, pleasantness, and dominance) toward their three avatars (1–7 Likert scale); Depression symptoms (PHQ-9), anxiety symptoms (GAD-7).	After using the app	Depression and anxiety seem inversely related to positive attitudes (pleasantness, intensity, and attractiveness) toward the avatars representing patient´s actual self.	Multivariate analysis of variance and paired-sample t test comparisons	Not applicable	Not applicable
Wonggom et al	Several types of avatars	Not applicable	Tablet computer, desktop computer	Illness knowledge (DES-SF, SDSCA, PCQ, DSMQ, Modified Heart Failure Knowledge questionnaire, Chronic Disease Compliance Instrument, Assessment of Diabetes Knowledge), selfcare behaviours (Self-Care Heart Failure Index), self-efficacy (SES, Cognitive interview), quality of life (EuroQol:EQ-5D, PedsQL),	Two RCTs, one pilot randomized controlled trial, four single group pre–post-test studies, one prospective multi-centre pilot study	avatar-based technology in patient education can have a positive effect on a wide range of healthcare outcomes compared to usual care. Can improve knowledge, self-care behaviours and self-efficacy in patients with chronic conditions. There is limited evidence on improvement in HQoL and adherence to medication, and no evidence of effectiveness of using this	Mean differences IG-CG. No meta-analysis	Yes	Yes

				readmission and adherence to medication (MMAS, MEMS)		education technology on readmission.			
Wonggom et al	Graphic representation (virtual health coach)	Low	App - tablet computer	Heart Failure-specific knowledge (DHFKS), HF self-care behaviours, HF-related readmission and satisfaction, Montreal cognitive assessment (MoCA), Rapid Estimate of Adult Literacy in Medicine—Short Form (REALM-SF) and Short Test of Functional Health literacy in Adults (STOFHLA).	Baseline using medical record review and face-to-face interview and by telephone at 30-day and 90-day follow-up.	The addition of the avatar app is effective in improving HF knowledge and self-care behaviours compared with usual care.	Descriptive statistics (mean, standard deviation, percentage), independent sample t-test comparisons, Mann–Whitney U tests, Chi squared or Fisher's exact tests, analysis of covariance (ANCOVA) and bivariate exact binary logistic regressions	Yes	Yes