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Online Supplemental Material for

Degree of personalisation in tailored activities and its effect on behavioural and psychological symptoms and quality of life among people with dementia: A systematic review and meta-analysis

Citation (APA 7th)

Lu, S., Zhang, A. Y., Liu, T., Choy, J. C. P., Ma, M. S., Wong, G., & Lum, T. (2021). Degree of personalisation in tailored activities and its effect on behavioural and psychological symptoms and quality of life among people with dementia: a systematic review and meta-analysis. BMJ Open, 0(e048917), 1-15. https://doi.org/10.1136/bmjopen-2021-048917

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Supplementary Table 1. Summary of existing reviews on tailored activities for people with dementia/cognitive impairment

Author (Year)	**Study aim**	**Range of Years & # of studies included**	**Study Design**	**Targeted Group**	**Settings**	**Targeted Outcomes**	**Main Findings**
1.Trahan et al. (2014)	To identify different ways of engaging persons living with dementia effectively to enhance their quality of life and reduce BPSD	2000-2011 (N=28)	RCT, crossover, single-subject, etc.	Older adults aged 60 or above	Community or residential care	Patient engagement, behavioural disturbance, psychological symptoms, another patient-oriented behavioural outcome	Compared with the consistent effect of changes to space and social demands on engagement and BPSD, changes to objects are more common but the impact is mixed.
2.Testad et al. (2014)	To review the benefits of personalised psychosocial interventions for BPSD	2000-2012 (N=40)	RCT, quasi-experimental design	People with dementia	Care home and nursing home	Depression, anxiety, agitation, and psychotic symptoms	Pleasant activities with or without social interactions and reminiscence therapy showed strong effect on reducing agitation and improving mood respectively. The tailoring of care package according to the symptoms a person is experiencing is probably one of the explanations for the differential effects of the interventions
3.Travers et al (2016)	To review the effectiveness of meaningful occupational interventions on persons living with dementia	2004-2015 (N=34)	RCT, quasi-experimental design, pre-post-test design, cohort study, case study, cross-sectional study	People with dementia	Nursing home	Depression, anxiety, agitation, wandering, apathy, quality of life, mood, function, cognition, sleep	Individualised activities/recreational interventions work well on a range of BPSD; preferred music shows effectiveness on agitation, depression and anxiety.

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Supplementary Table 1 (Continued). Summary of existing reviews on tailored activities for people with dementia/cognitive impairment

Author (Year)	**Study aim**	**Range of Years & # of studies included**	**Study Design**	**Targeted Group**	**Settings**	**Targeted Outcomes**	**Main Findings**
4.Möhler et al (2018)	To assess the effects of personally tailored activities on psychosocial outcomes of persons living with dementia in long-term care	Up to 2017 (N=7)	RCT, quasi-experimental design	People with dementia	Long-term care facilities	Challenging behaviours, quality of life	As the effect of personally tailored activities on challenging behaviours of persons living with dementia is slight, recommendations on how to modify the factors (e.g., delivery, duration, frequency) for enhancing the intervention effectiveness cannot be made.
5.Möhler et al (2020)	To assess the effects of activities tailored to personal interests on psychosocial outcomes of persons living with dementia in the community	Up to 2019 (N=5)	RCT, quasi-experimental design	People with mild to moderate dementia	Community or home	Challenging behaviours, quality of life	Personally tailored activities may improve challenging behaviours and quality of life but have no effect on depression, affect, passivity, and engagement.
6.Möhler et al (2020)	To assess the effects of offering people with dementia living in their own homes activities tailored to their personal interests.	Up to 2019 (N=5)	RCT	People with dementia	Home only	challenging behaviour, quality of life, depression, and engagement, etc.	Personally tailored activities may improve challenging behaviour and slightly improve quality of life of people with dementia living in their own homes, but may have little or no effect on depression and engagement

Note: The full references for six reviews summarized in this table can be found in the Reference section #7-12.

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Supplementary Table 2. Full search strategy

Database	Search strategy
ProQuest (APA PsycArticles, APA Psyclnfo, Applied Social Sciences Index & Abstracts, Sociological Abstracts, Medical Database, PAIS Index)	ab("Cognitive impairment" OR "cognitive disorder" OR "dementia" OR "Alzheimer") AND ab("tailor*" OR "engage*" OR "individualized" OR "individual-centered" OR "personalized" OR "personalized" OR "person-centered") AND ab("activities" OR "program" OR "therapy" OR "intervention" OR "treatment*")
Web of Science	TS=("Cognitive impairment" OR "cognitive disorder" OR "dementia" OR "Alzheimer") AND TS=("tailor*" OR "engage*" OR "individualized" OR "individual-centered" OR "personalized" OR "personalized" OR "person-centered") AND TS=("activities" OR "program*" OR "therapy" OR "intervention" OR "treatment")
PubMed	(((("Cognitive impairment"[Title/Abstract] OR "cognitive disorder"[Title/Abstract] OR "dementia"[Title/Abstract] OR "Alzheimer"[Title/Abstract])) AND ("tailor*"[Title/Abstract] OR "engage*"[Title/Abstract] OR "individualized"[Title/Abstract] OR "individual-centered"[Title/Abstract] OR "personalized"[Title/Abstract] OR "personalized"[Title/Abstract] OR "person-centered"[Title/Abstract])) AND ("activities"[Title/Abstract] OR "program*"[Title/Abstract] OR "therapy"[Title/Abstract] OR "intervention"[Title/Abstract] OR "treatment"[Title/Abstract])
Ovid (Global health, Embase, Social Work abstract)	[Title and abstract search] (Cognitive impairment OR cognitive disorder OR dementia OR Alzheimer) AND ("tailor*" OR "engage*" OR "individualized" OR "individual-centered" OR "personalized" OR "person-centered") AND ("activities" OR "program" OR "therapy" OR "intervention" OR "treatment*")
Cochrane Library	[Title and abstract search] (Cognitive impairment OR cognitive disorder OR dementia OR Alzheimer) AND ("tailor*" OR "engage*" OR "individualized" OR "individual-centered" OR "personalized" OR "person-centered") AND ("activities" OR "program" OR "therapy" OR "intervention" OR "treatment*")
Cumulative Index to Nursing and Allied Health Literature (CINAHL)	[Title and abstract search] (Cognitive impairment OR cognitive disorder OR dementia OR Alzheimer) AND ("tailor*" OR "engage*" OR "individualized" OR "individual-centered" OR "personalized" OR "person-centered") AND ("activities" OR "program" OR "therapy" OR "intervention" OR "treatment*")

Note: No limit on the publication date

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Supplementary Table 3. Rating scheme for assessing the degree of personalisation in tailored activities

Level	Criteria
Low	• **Unclear/incomprehensive**: No pre-assessment / Pre-assessments were not clearly described / Pre-assessments on one PWD characteristic only, without describing how the assessment results were utilised to inform the tailored activities design; • Activity design targeted **only one domain** of tailoring as listed below, including capabilities, preferences, interests, life experience, and living environment; • Interventionists had **low flexibility and only minimal/marginal modifications** were allowed.
Middle	• **Semi-structured**: Pre-assessments were conducted by unstructured or semi-structured interviews, with some description on how the assessment results were utilised to inform the tailored activities design; • Activity design targeted **two or more domains** of tailoring systematically as listed below, including capabilities, preferences, interests, life experience, and external environment; • Interventionists had **some flexibility and some modifications** could be made based on their clinical knowledge and observation to accommodate the spontaneous needs of PWD during the intervention
High	• **Structured**: Pre-assessments were conducted by structured interviews, with clear and detailed description on how the assessment results were utilised to systematically inform the tailored activities design**;** • Activity design targeted **two or more domains** of tailoring systematically as listed below, including capabilities, preferences, interests, life experience, and external environment; • Interventionists had **high flexibility and any modifications** based on their clinical knowledge and observation to accommodate the spontaneous needs of PWD during the intervention.

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Supplementary Table 4. Characteristics of included studies

#	Author (Year) [Countries]	Age Mean(SD)	Dementia types/stage	Sample size	Study design	Study setting
1	Orsulic-Jeras et al. (2000) [USA]	I: 88 (4.3) C: 88 (4.3)	Dementia	I: 16; C: 16	Quasi-experiment	LTC facility
2	Cohen-Mansfield (2006) [USA]	I: 87.2 (6.6) C: 87.3 (7.1)	Dementia	I: 52; C: 41	RCT	LTC facility and adult day centres
3	Garland et al. (2007) [Australia]	I: 79.0 (66-93) C: 79 (66-93)	Dementia	I: 10; C: 10	RCT	LTC facility
4	Cohen-Mansfield (2007) [USA]	I: 88 (6.4) C: 85 (8.6)	Dementia	I: 89; C: 78	RCT	LTC facility
5	Gitlin et al. (2008) [USA]	I: 78 (9.2) C: 80.8 (9.5)	Dementia	I: 30; C: 30	RCT	Home
6	Dechamps et al. (2009) [France]	I: 83.2 (8.3) C: 83.2 (8.3)	Dementia	I: 24; C: 25	RCT	Hospital
7	Gitlin et al. (2010) [USA]	I: 83.1 (7.8) C: 81.8 (9.9)	Dementia	I: 102; C: 107	RCT	Community
8	Lam et al. (2010) [Hong Kong]	I: 83.1 (6.9) C: 83.8 (7)	Dementia	I: 37; C: 37	RCT	LTC facility
9	Sung et al. (2010) [Taiwan]	I: 78.1 (7.2) C: 82.7 (7.4)	Dementia	I: 29; C: 23	Quasi-experiment	LTC facility
10	Kolanowski et al. (2011) [USA]	I: 86 (7.1) C: 85.9 (4.9)	Dementia	I: 31; C: 32	RCT	LTC facility
11	Lin et al. (2011) [Taiwan]	I: 81.5 (7.3) C: 82.2 (6.3)	Dementia	I: 49; C: 51	RCT	LTC facility
12	Cohen-Mansfield et al. (2012) [USA]	I: 85.9 (8.6) C: 85.3 (9.6)	Dementia	I: 89; C: 36	RCT	LTC facility
13	van der Ploeg et al. (2012) [Australia]	I: 78.1 (9.8) C: 78.1 (9.8)	Dementia	I: 15; C: 29	Crossover RCT	LTC facility
14	Ridder et al. (2013) [Denmark and Norway]	I: 82.2 (8.8) C: 80.2 (8.7)	Dementia	I: 20; C: 21	RCT	LTC facility
15	Sakamoto et al. (2013) [Japan]	I: 80.4 (7.4) C: 81.5 (7.9)	Dementia	I: 13; C: 13	RCT	Hospital
16	Van Haitsma et al. (2013) [USA]	I: 87.7 (8.7) C: 89.2 (6.9)	Dementia	I: 44; C: 93	RCT	LTC facility
17	Yoon et al. (2013) [Korea]	I: 77.9 (7.5) C: 70.1 (12.2)	Dementia	I: 11; C: 9	RCT	LTC facility
18	Toba et al. (2014) [Japan]	I: 84.1 (7.1) C: 87.3 (7.1)	Dementia	I: 158; C: 54	Quasi-experiment	Geriatric health service facilities
19	Holthoff et al. (2015) [Germany]	I: 72.4 (4.3) C: 70.7 (5.4)	Early and moderate stage AD	I: 15; C: 15	RCT	Home
20	Telenius et al. (2015) [Norway]	I: 86.9 (7) C: 86.4 (7.8)	Mild or moderate dementia	I: 82; C: 81	RCT	LTC facility
21	Davison et al. (2016) [Australia]	I: 86 (5.2) C: 86 (5.2)	Dementia	I: 11; C: 11	RCT	LTC facility
22	Giuli et al. (2016) [Italy]	I: 76 (6.3) C: 76.5 (5.7)	Mild cognitive impairment/ Dementia	I: 48; C: 49	RCT	Hospital
23	Lu et al. (2016) [USA]	I: 71.2 (0.8) C: 76.5 (7.1)	Mild cognitive impairment	I: 20; C: 20	RCT	Community

Notes: I = Intervention group; C = control group; RCT = randomized clinical trial; LTC = long-term care

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Supplementary Table 4. (Continued) Characteristics of included studies

#	Author (Year) [Countries]	Age Mean(SD)	Dementia types/stage	Sample size	Study design	Study setting
24	Prick et al. (2016) [Netherlands]	I: 76 (7.6) C: 78 (7.2)	Dementia	I: 57; C: 54	RCT	Home
25	Bailey et al (2017) [USA]	I: 84.4 (7.7) C: 83.9 (9.2)	Mild to moderate cognitive impairment	I: 26; C: 25	RCT	LTC facility
26	Li et al. (2017) [China]	I: 83.1 (4.1) C: 81.1 (6.7)	Dementia	I: 19; C: 21	Quasi-experiment	LTC facility
27	Gitlin et al. (2017) [USA]	I: 80.4 (8.7) C: 80.4 (8.7)	Dementia	I: 51; C: 60	RCT	Come
28	Tanaka et al. (2017) [Japan]	I: 86 (7.4) C: 86.5 (8.3)	Dementia	I: 20; C: 20	RCT	Geriatric health service facility
29	Novelli et al. (2018) [Brazil]	I: 79.4 (7.7) C: 83.5 (7.1)	Dementia	I: 15; C: 15	RCT	Community
30	Kwak et al. (2018) [USA]	I: 88.9 (5.4) C: 84.9 (8.6)	Dementia or Alzheimer's disease	I: 30; C: 29	Crossover RCT	LTC facility
31	Jeon et al. (2020) [Australia]	I: 79.0 (N.A) C: 81.0 (N.A)	Mild cognitive impairment/Dementia	I: 9; C: 9	RCT	Home
32	de Oliveira et al. (2019) [Brazil]	I: 79 (5.7) C: 78.4 (6.2)	Dementia	I: 11; C: 10	RCT	Community medical centers
33	O'Connor et al. (2019) [Australia]	I: 62.1 (N.A) C: 65.6 (N.A)	Dementia	I: 9; C: 11	RCT	Home
34	Weise et al. (2020) [Germany]	I: 85.1 (5.9) C: 85.1 (5.9)	Moderate or severe stages of Dementia	I: 10; C: 10	RCT	LTC facility
35	Huber et al. (2020) [Switzerland]	I: 74-92 C: 74-92	Moderate to severe stages of dementia	I: 10; C: 13	Quasi-experiment	Community

Notes: I = Intervention group; C = control group; RCT = randomized clinical trial; LTC = long-term care

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Supplementary Table 5. Interventions and activities tailored for participants' characteristics

#	Author (Year)	PWD characteristics	Types	Content of tailored activities/intervention	Delivery	Comparator	Outcomes	Findings
1	Orsulic-Jeras et al. (2000)	Preserved abilities	MP	Montessori-Based Activities included individual-based and group activities. In individual activities, various aesthetically pleasing materials taken from the everyday environment were used. Group activities included memory bingo and group sorting.	Mode: Mixed; Interventionist: Research assistant/activities therapist; Duration: 3 months. Follow-up: 6 months	usual care	Level of engagement	IG showed more engagement than CG at post-intervention.
2	Cohen-Mansfield (2006)	Salience of identity roles, the severity of the dementia, ability	MP	Role-identity-based treatment involved a 2-step procedure, including the determination of role-identity salience and the determination of the intervention. Chosen activities were tailored for the roles identified. For example, a participant with a great sense of professional accomplishment enjoyed looking at his awards.	Mode: Individual; Interventionist: Research assistants; Duration: 5 days.	usual care	BPSD (Agitation), Engagement and Depression.	IG showed increased engagement and fewer BPSD in the treatment than CG.
3	Garland et al. (2007)	Preferred songs, performers and titles.	MU	Preferred music selected based on family members' reports of participants' preference.	Mode: Individual; Interventionist: Researcher; Duration: 4 weeks.	usual care	BPSD (Overall)	No significant difference in reducing BPSD between IG and CG.
4	Cohen-Mansfield (2007)	Ability, past history and preference	MP	Non-pharmacologic individualised interventions based on TREA framework	Mode: Mixed; Interventionist: Research assistants; Duration: 10 days. No follow-up assessment.	placebo	BPSD	IG showed decreases in overall BPSD compared to CG at post-intervention.
5	Gitlin et al. (2008)	Capabilities, previous roles, habits and interests	MP	TAP is based on the environmental vulnerability/reduced stress-threshold model, including a three-stage intervention: (1) structural assessments, (2) activity prescriptions, chosen activities tailored to match PWD characteristics, providing training to and working with caregivers in the implementation, and (3) helping caregivers to generalise strategies for future care challenges.	Mode: Individual; Interventionist: Occupational therapists and caregivers; Duration: 4 months.	wait-list	BPSD (overall), QoL, depression, and level of engagement	IG showed greater reduction in frequency of BPSD and greater engagement than CG.
6	Dechamps et al. (2009)	Abilities and discourse	MP	The Cognition-Action method does not rely on the use of a specific exercise, but rather is a guidance method intended to enhance active living and social interaction using motor actions as incentives.	Mode: Individual; Interventionist: Research assistants; Duration: 12 weeks.	usual care	BPSD (Overall), QoL, and depression	IG showed greater reduction in BPSD, depression and improvement in QoL compared to CG.
7	Gitlin et al. (2010)	Home environment, Caregiver-identified concerns and patient capabilities, routines, previous and current roles, habits and interests	MP	Care of Persons with Dementia in their Environments (COPE) targeted modifiable environmental stressors to decrease sensory, physical, and cognitive demands, align with patient capabilities, and re-engage patients in daily activities.	Mode: Individual; Interventionist: Occupational therapists; Duration: 4 months. Follow-up: 9 months	usual care	BPSD, QoL and engagement	IG showed increases in the level of engagement compared to the CG at post-intervention.

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Supplementary Table 5. (Continued) Interventions and activities tailored for participants' characteristics

#	Author (Year)	PWD characteristics	Types	Content of tailored activities/intervention	Delivery	Comparator	Outcomes	Findings
8	Lam et al. (2010)	Abilities, preference, needs	P	Individualised functional training programme	Mode: Individual; Interventionist: Occupational therapists; Duration: 8 weeks. Follow-up: 4 months	Attention control	BPSD (Depression) and cognition	IG showed reduction in depression compared to CG only at 4-month follow up.
9	Sung et al. (2010)	Music preference	MU	Preferred music listening intervention	Mode: Individual; Interventionist: Trained nursing staff; Duration: 6 weeks.	usual care	BPSD (Depression/Anxiety)	IG had a lower anxiety score compared with CG.
10	Kolanowski et al. (2011)	Functional level, personality style of interest	MP	Activities derived from the Need driven Dementia-compromised Behavior model tailored to the resident's functional level (cognitive and physical) and personality style of interest 3-arm intervention group design: (1) Personality style of interest group (PI); (2) Functional level (FL); (3) PI + FL	Mode: Group ; Interventionist: Nursing staff; Duration: 3 weeks	Active control	BPSD (Agitation) and Engagement	IG (PI) showed greater engagement than the other groups.
11	Lin et al. (2011)	Music Preference	MU	Group music intervention	Mode: Group; Interventionist: Researcher; Duration: 6 weeks. One-month follow up.	usual care	BPSD (Agitation)	IG showed reduction in BPSD compared to CG at post-intervention and follow-up.
12	Cohen-Mansfield et al. (2012)	Past identity, ability and preferences	MP	The TREA decision tree protocol was used to identify the possible reasons for agitated behaviour, needs, and preferences of participants. The activities included simulated animal-assisted therapy, one-on-one interaction, simulated interaction, group activities, arts and crafts, physical activities, games and music based on participants' preferences etc.	Mode: Mixed; Interventionist: Research assistants; Duration: 2 weeks.	placebo	BPSD (Agitation)	IG showed reduction in total agitation compared to CG.
13	van der Ploeg et al. (2012)	preserved abilities and Interest	MP	Montessori-based activities	Mode: Mixed; Interventionist: Psychologists and higher degree psychology student; Duration: 4 weeks	usual care	BPSD, engagement	IG showed more engagement than CG.
14	Ridder et al. (2013)	life-story/history	MU	Individual music therapy	Mode: Individual; Interventionist: Clinicians; Duration: 6 weeks. Follow-up: 7 weeks.	usual care	BPSD (Agitation), QoL	IG showed reduction in total agitation compared to CG at post-intervention.

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Supplementary Table 5. (Continued) Interventions and activities tailored for participants' characteristics

#	Author (Year)	PWD characteristics	Types	Content of tailored activities/intervention	Delivery	Comparator	Outcomes	Findings
15	Sakamoto et al. (2013)	Music preference	MU	Individualised music interventions	Mode: Individual; Interventionist: Music facilitator; Duration: 10 weeks.	usual care	BPSD (overall)	Greater long-term reduction in BPSD was observed in IG compared with CG.
16	Van Haitsma et al. (2013)	Interest and ability	MP	Individualised Positive Psychosocial Intervention based on participants' leisure interests that included physical exercise, music, ADLs, reminiscence and sensory stimulation.	Mode: Individual; Interventionist: Certified nursing assistants; Duration: 3 weeks	Attention control	BPSD (overall)	IG experienced more pleasure, alertness, engagement, positive touch, and positive verbal behavior compared with CG.
17	Yoon et al. (2013)	Ability level	MP	Cognitive activity combined with physical exercise	Mode: Group; Interventionist: Unspecified; Duration: 12 weeks	Attention control	Depression	IG showed improvement in cognition and reduction in depression compared to CG.
18	Toba et al. (2014)	Abilities and needs	MP	Intensive rehabilitation programme included reminiscence, reality orientation, memory rehabilitation, music therapy, physical exercise, occupational therapy, speech communication therapy and learning sessions	Mode: Individual; Interventionist: Physical, occupational or speech therapists; Duration: 3 months	usual care	BPSD, depression,	IG showed more reduction in BPSD and improvement in cognition compared to CG.
19	Holthoff et al. (2015)	Ability level	P	Physical activity training. Patients in the intervention group trained their lower body on a movement trainer with individually preassigned training flow. Caregivers were asked to choose a familiar chair prior to commencement of study.	Mode: Unspecified; Interventionist: Caregivers/ computer; Duration: 12 weeks. 3-month follow up test.	usual care	BPSD	IG experienced stable BPSD and CG experienced increases in BPSDs at follow-up.
20	Telenius et al. (2015)	Performance levels	P	Individually fitted High-Intensity Exercise Program	Mode: Individual; Interventionist: Physiotherapist; Duration: 12 weeks	Attention control	BPSD, QoL, depression,	IG experienced more reduction in BPSD compared to CG.
21	Davison et al. (2016)	Interest	C	Using a personal computer to play favourite music and display photographs, movies and messages selected by participants and family members	Mode: Individual; Interventionist: Research staff; Duration: 4 weeks	usual care	BPSD (Agitation), Depression, Anxiety	IG experienced reduction in depression and anxiety compared to CG.
22	Giuli et al. (2016)	cognitive function	C	Non-pharmacological intervention consisting of comprehensive cognitive training	Mode: Individual; Interventionist: Experienced psychologists; Duration: 10 weeks	usual care	Depression and cognition	Compared to CG, IG with Alzheimer's disease experienced improvement in cognition. IG with mild cognitive impairment experienced improvement in cognition.

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Supplementary Table 5. (Continued) Interventions and activities tailored for participants' characteristics

#	Author (Year)	PWD characteristics	Types	Content of tailored activities/intervention	Delivery	Comparator	Outcomes	Findings
23	Lu et al. (2016)	Congruence in level of awareness of functional ability, types and frequencies of meaningful activity, perceived barriers to engaging in these activities	MP	Daily Engagement of Meaningful Activities using the principles of problem-solving therapy and, consistent with the overall goals of this intervention, providing autonomy support by helping patients identify and prioritise meaningful activities, identify needs and goals, generate manageable solutions, and engage in self-selected activities with family support, etc.	Mode: Group; Interventionist: Trained nurse; Duration: 2 weeks. Follow up: 3 months	Attention control	BPSD (Depression)	IG showed less improvement in depressive symptoms than CG at follow-up.
24	Prick et al. (2016)	Physical capacities, information about pleasant activities for the dyad	MP	Multicomponent dyadic intervention comprising physical exercise training, psychoeducation, communication skills training, and pleasant activities training.	Mode: Individual; Interventionist: Personal coach; Duration: 3 months. 6 month follow up.	usual care	BPSD, depression, health	Analyses showed no beneficial effects over time on any of the outcome measures.
25	Bailey et al (2017)	participant's specific area of interest	MP	Multicomponent intervention including group activity sessions using question-asking-reading (QAR), reminiscence, cognitive-behavioural therapy techniques, environmental support and individualised behavioural activity programme.	Mode: Group; Interventionist: Two upper-level graduate students in clinical psychology and one PhD psychologist; Duration: 6 weeks	usual care	Depression, QoL and engagement	IG showed more improvement in depression than CG.
26	Li et al. (2017)	Interest, capacities and culture background	MP	Folk recreation programme plus personalised training on daily life activities and individual activity programme according to participants' interest.	Mode: Mixed; Interventionist: Researcher; Duration: 16 weeks	usual care	BPSD	The folk recreation programme has the potential to improve cognitive function, ability of daily living and behavioural and psychological symptoms of older people with dementia.
27	Gitlin et al. (2017)	Capabilities, functioning, interest, environment, caregivers	MP	Tailored activity programme	Mode: Individual; Interventionist: Occupational therapists; Duration: 4 months	Attention control	BPSD	Intervention group showed reduction in BPSDs and functional dependence.
28	Tanaka et al. (2017)	Meaningfulness, personal history	MP	Personal rehabilitation comprising cognitive rehabilitation and involving reminiscence therapy, reality orientation, and physical activity.	Mode: Mixed; Interventionist: Staff member; Duration: 12 weeks	usual care	Depression & QoL	No statistically significant differences between IG and CG in interested outcomes.
29	Novelli et al. (2018)	Capabilities, previous interests, frequency, and intensity of BPSD in PWD, daily care routines of the caregiver and home environment.	MP	Tailored activity programme	Mode: Individual; Interventionist: Occupational therapy, caregiver; Duration: 4 months	wait-list	BPSD and QoL	IG experienced reduced BPSD and improvement in QoL compared to CG

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Supplementary Table 5. (Continued) Interventions and activities tailored for participants' characteristics

#	Author (Year)	PWD characteristics	Types	Content of tailored activities/intervention	Delivery	Comparator	Outcomes	Findings
30	Kwak et al. (2018)	Music preference	MU	A passive music intervention using personalised music playlists delivered on digital music players.	Mode: Individual; Interventionist: Nursing home staff; Duration: 14 weeks	usual care	BPSD	No statistically significant differences between IG and CG in any of the outcomes measured.
31	Jeon et al. (2020)	Capacities/needs, environment	MP	A multi- and interdisciplinary plan tailored to meet the client's needs to enhance self-care ability and using person-centred goal setting included cognitive rehabilitation techniques, energy conservation and task simplification strategies, balance and strength exercises, pain relief management, anxiety management, problem solving, and medication simplification.	Mode: Individual; Interventionist: Occupational therapists, registered nurse, neuropsychologist; Duration: 4 months. 12 month follow-up.	usual care	Depression and QoL	No statistically significant differences between IG and CG in any of the outcomes measured.
32	de Oliveira et al. (2019)	Cognitive and functional capacities, previous abilities, interests, and roles	MP	Tailored activity programme	Mode: Individual; Interventionist: Occupational therapists; Duration: 3 months	Attention control	BPSD	Compared to CG, IG experienced reduction in BPSD.
33	O'Connor et al. (2019)	Capabilities, functioning, interest, environment, caregivers	MP	Tailored activity programme	Mode: Individual; Interventionist: Occupational therapists; Duration: 4 months	usual care	BPSD and Qol	IG showed an overall reduction of behavioural symptoms and maintenance of functional performance in the person with dementia, compared to CG.
34	Weise et al. (2020)	Preference for music	MU	Individualised recorded music	Mode: Individual; Interventionist: Social service staff and project staff; Duration: 4 weeks	wait-list	BPSD	No significant findings on reduction in BPSD between IG and CG.
35	Huber et al. (2020)	Preference, meaningfulness	MP	Individualised music listening	Mode: Individual; Interventionist: Caregivers/staff member; Duration: 4 weeks	usual care	BPSD, depression	Depression scores decreased significantly over time while agitated behaviour showed a constant moderate level without any significant decrease.

Note: P=physical; C=cognitive; MU=musical; MP=multiple; IG=intervention group; CG=control group. BPSD = behavioural and psychological symptoms of dementia; Qol=Quality of life.

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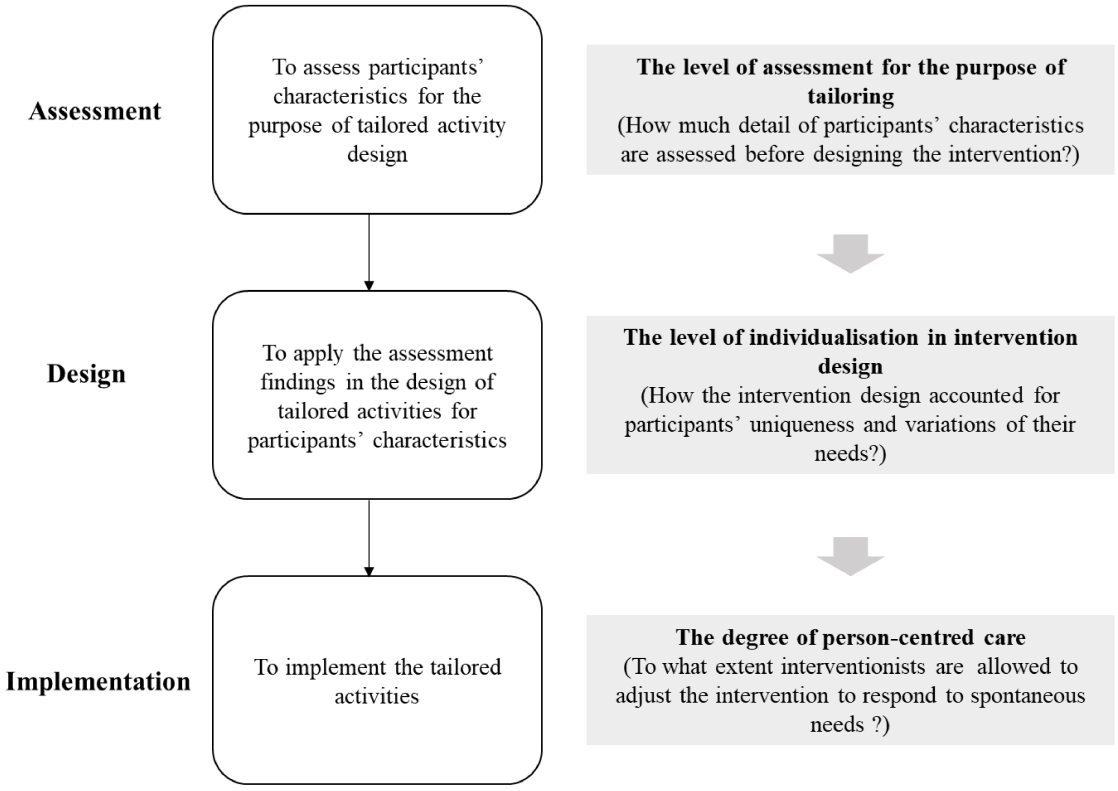
Supplementary Table 6. Sensitivity analyses: effect sizes when including studies with people with dementia only in their samples

Outcome	**Fixed effect models**		**Random effect models**	
	SMD (95% CI)	p-value	SMD (95% CI)	p-value
Main effects				
BPSD	-0.34 (-0.44 to -0.23)	<0.001	-0.38 (-0.56 to -0.19)	<0.001
Quality of life	0.43 (0.25 - 0.62)	<0.001	0.52 (0.27 - 0.77)	<0.001
Depression	-0.38 (-0.57 to -0.20)	<0.001	-0.38 (-0.57 to -0.20)	<0.001
Engagement	0.58 (0.41 - 0.75)	<0.001	0.84 (0.14 - 1.54)	0.019
Subgroup Analysis				
BPSD				
High	-0.46 (-0.62 to -0.3)	<0.001	-0.524 (-0.752 to -0.296)	<0.001
Medium	-0.34 (-0.51 to -0.16)	0.000	-0.363 (-0.774 to 0.048)	0.083
Low	-0.04 (-0.29 to 0.21)	0.750	-0.04 (-0.289 to 0.208)	0.750
Quality of life				
High	0.4 (0.18 to 0.62)	<0.001	0.6 (0.17 to 1.04)	0.010
Medium	0.43 (0.01 to 0.85)	0.027	0.43 (0.01 to 0.85)	0.040
Low	0.72 (0.08 to 1.36)	0.044	0.72 (0.08 to 1.36)	0.030
Depression				
High	-0.34 (-0.55 to -0.12)	0.002	-0.34 (-0.55 to -0.12)	0.002
Medium	-0.75 (-1.33 to -0.17)	0.011	-0.75 (-1.33 to -0.17)	0.011
Low	-0.38 (-0.82 to 0.06)	0.089	-0.38 (-0.82 to 0.06)	0.089
Engagement				
High	0.85 (0.32 to 1.38)	0.002	0.85 (0.32 to 1.38)	0.002
Medium	0.27 (0.05 to 0.49)	0.018	0.27 (0.05 to 0.49)	0.018
Low	0.39 (0.04 to 0.74)	0.029	0.39 (0.04 to 0.74)	0.029

Notes: Excluded studies that included patients with dementia and patients with cognitive impairment in the samples. BPSD: Holthoff et al. (2015) & Telenius et al. (2015); Quality of life: Bailey et al (2017) & Jeon et al. (2019); Depression: Bailey et al(2017) & Jeon et al. (2019) & Lu et al (2016) & Giuli et al (2016); Engagement: Bailey et al (2017)

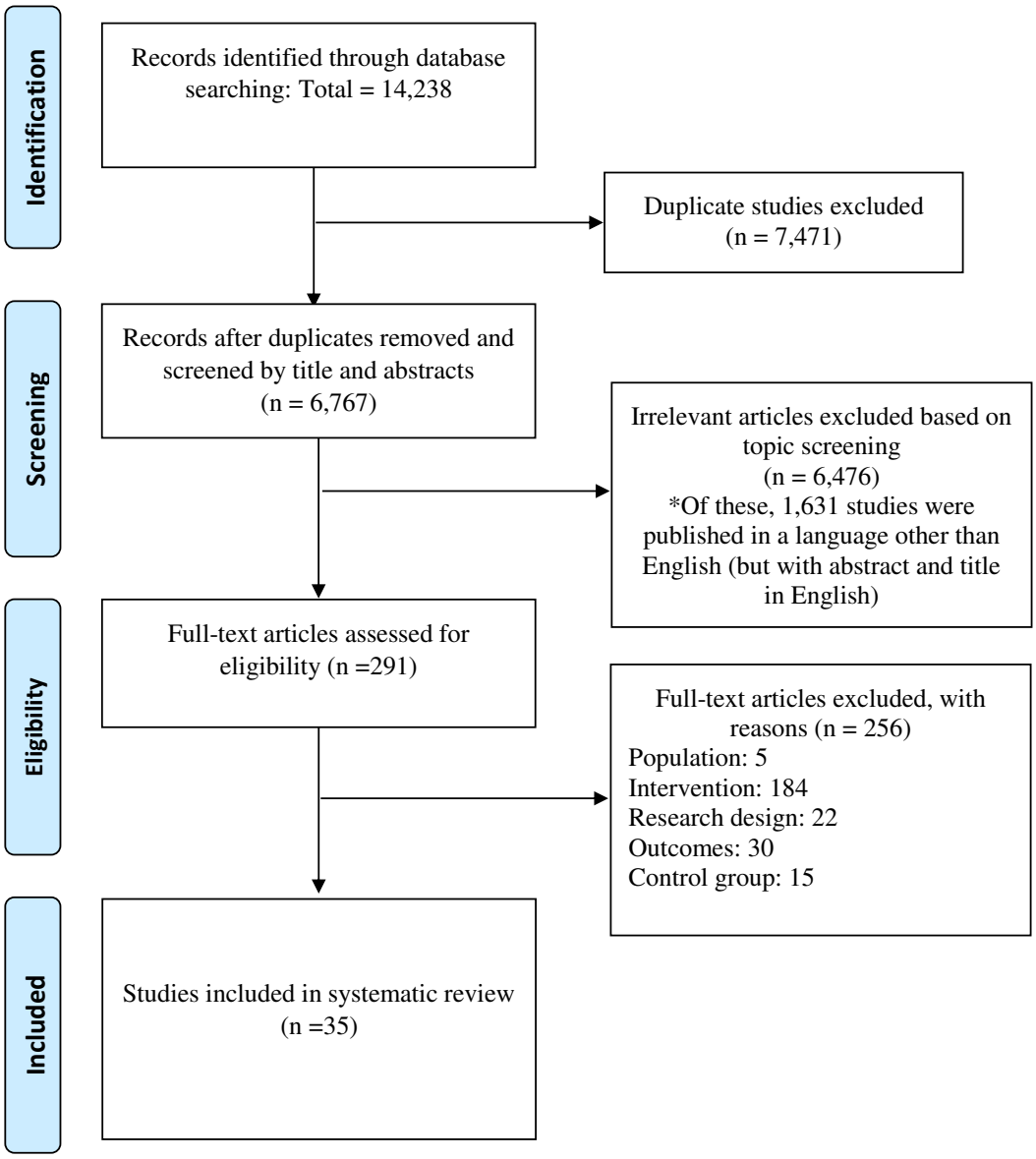
Lu et al. (2021).

Supplementary Figure 1. The process of tailoring and rating criteria



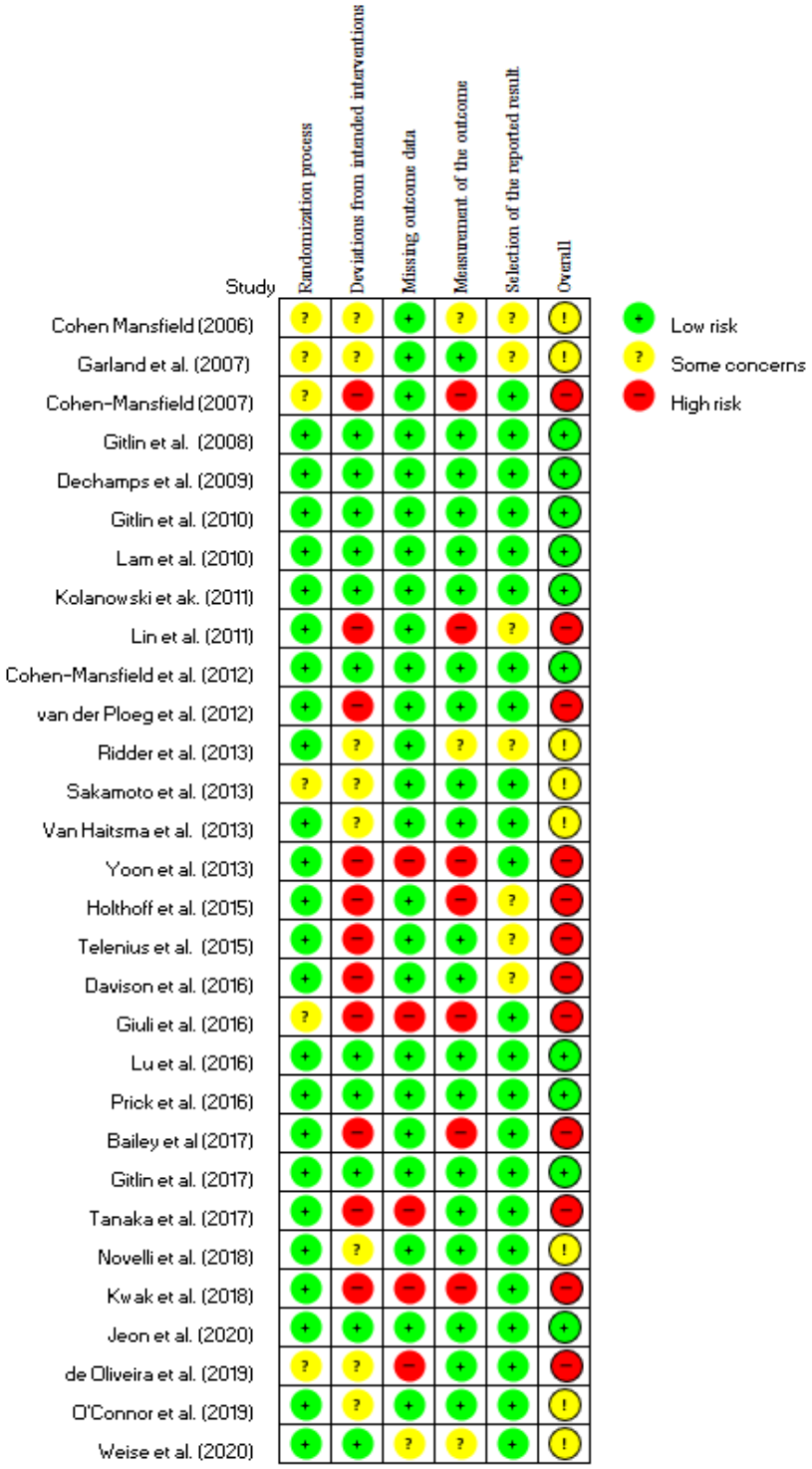
Lu et al. (2021).

Supplementary Figure 2. Flowchart of included articles



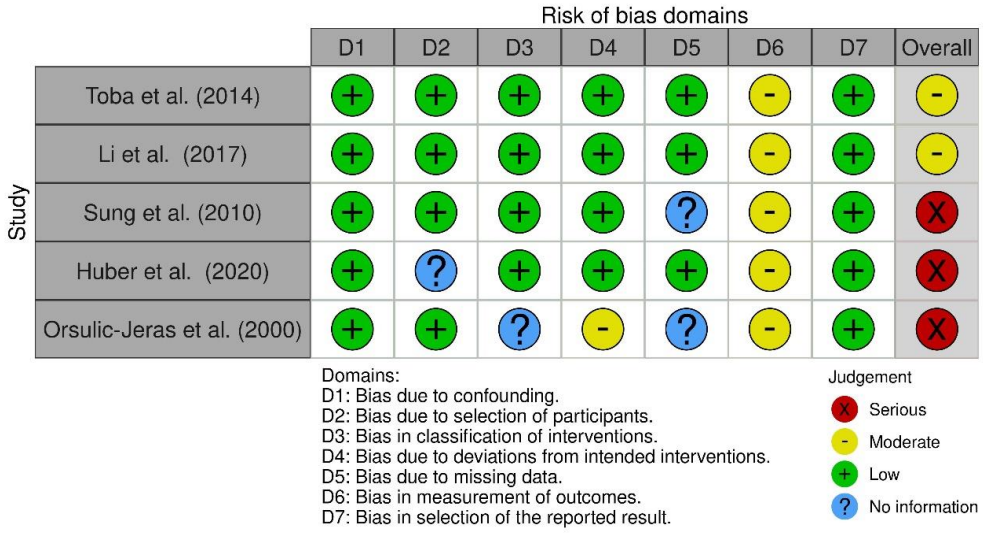
Lu et al. (2021).

Supplementary Figure 3. Risk of Bias Graph for RCT studies (N=30)



Lu et al. (2021).

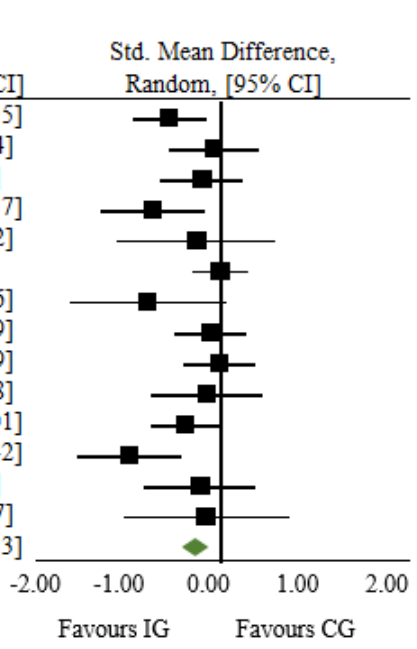
Supplementary Figure 4. Risk of Bias Graph for quasi-experimental studies (N=5)



Lu et al. (2021).

Supplementary Figure 5. Effects of tailored interventions on depression at post-intervention (N=14)

	Intervention group			Control group				Std. Mean Difference,
Studies	Mean	SD	Total	Mean	SD	Total	Weight	Random, [95% CI]
Cohen-Mansfield (2006)	1.31	0.48	52	1.67	0.79	41	5.92	-0.57 [-0.98, -0.15]
Gitlin et al. (2008)	9.00	4.60	30	8.70	4.70	30	9.40	-0.06 [-0.57, 0.44]
Lam et al. (2009)	3.27	2.89	37	2.69	2.88	37	3.06	-0.2 [-0.66, 0.26]
Dechamps et al. (2009)	5.90	3.70	24	8.60	3.50	25	5.97	-0.75 [-1.33, -0.17]
Yoon et al. (2013)	10.60	1.00	11	10.90	1.30	9	7.27	-0.26 [-1.15, 0.62]
Telenius et al. (2015)	3.80	5.20	82	3.80	3.80	81	9.84	0 [-0.31, 0.31]
Davison et al. (2016)	3.50	2.50	11	5.40	2.20	11	9.95	-0.81 [-1.68, 0.06]
Giuli et al.(MCI) (2016)	9.78	6.00	48	10.38	5.10	49	2.74	-0.11 [-0.51, 0.29]
Giuli et al. (AD) (2016)	9.96	6.90	48	9.89	6.10	47	8.37	-0.01 [-0.41, 0.39]
Lu et al. (2016)	2.37	3.85	20	2.91	3.67	20	5.37	-0.14 [-0.76, 0.48]
Prick et al. (2016)	7.71	4.78	57	5.87	4.71	54	10.65	-0.39 [-0.76, -0.01]
Bailey et al (2017)	6.92	4.88	26	11.75	4.71	25	5.35	-1.01 [-1.59, -0.42]
Tanaka et al. (2017)	2.10	0.40	20	2.20	0.50	20	13.14	-0.22 [-0.84, 0.4]
Jeon et al. (2020)	1.67	2.35	9	1.38	1.06	9	2.97	-0.16 [-1.08, 0.77]
Total			475			458	100.00	-0.29 [-0.45, -0.13]



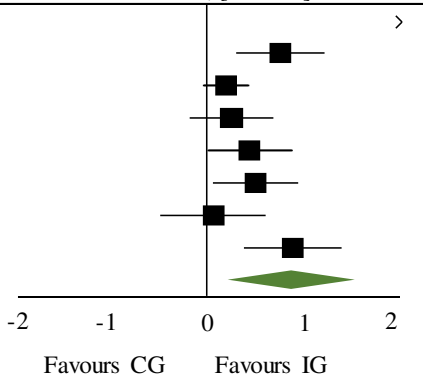
Heterogeneity: $Tau^2 = 0.03$; Q-value = 18.72, df= 13 (p =0.132); I^2 =30.55%
Test for overall effect: Z = -3.48 (p < 0.001)

Notes: Fixed effect: SMD_{pooled} = -0.26, 95% CI = -0.39 to -0.13, p < 0.001

Lu et al. (2021).

Supplementary Figure 6. Effects of tailored interventions on engagement at post-intervention (N =8)

	Intervention group			Control group				Std. Mean Difference,
Studies	Mean	SD	Total	Mean	SD	Total	Weight	Random, [95% CI]
Cohen-Mansfield et al. (2006)	0.92	0.14	52	0.25	0.24	41	6.36	3.52 [2.87, 4.17]
Gitlin et al. (2008)	2.30	0.30	30	2.00	0.40	30	9.64	0.85 [0.32, 1.38]
Gitlin et al. (2010)	2.00	0.40	102	1.90	0.50	107	36.37	0.22 [-0.05, 0.49]
Kolanowski et al. (2011)(C)	2.62	0.29	32	2.65	0.43	32	11.10	0.28 [-0.21, 0.78]
Kolanowski et al. (2011)(P)	2.86	0.43	32	2.65	0.43	32	10.87	0.5 [0, 1]
Kolanowski et al. (2011)(C+P)	2.90	0.29	32	2.65	0.43	32	10.78	0.57 [0.07, 1.07]
van der ploeg et al. (2012)	2.30	4.30	15	2.00	4.00	29	6.92	0.07 [-0.55, 0.7]
Bailey et al (2017)	4.85	0.37	26	4.25	0.77	25	7.94	1 [0.42, 1.58]
Total (95% CI)							100.00	0.86 [0.23, 1.48]

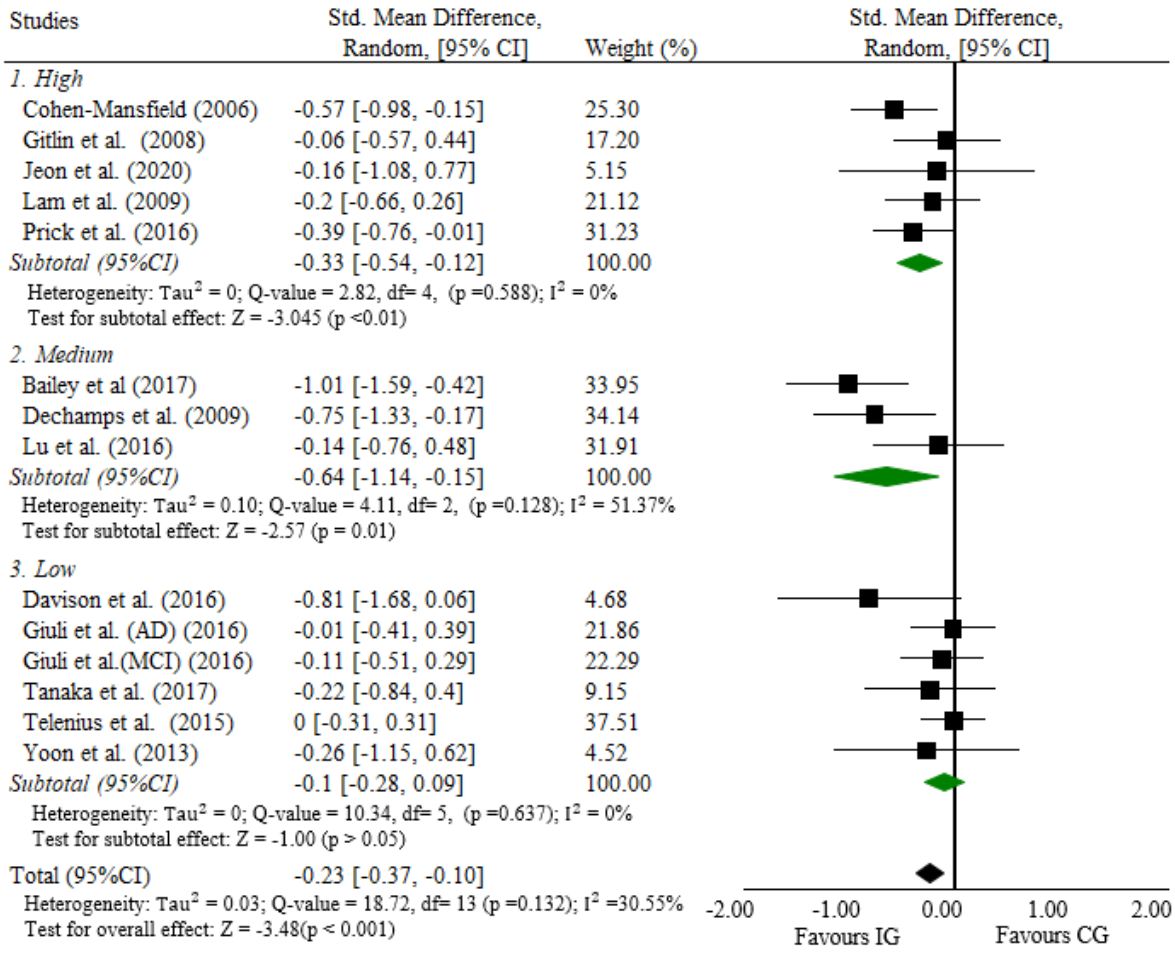


Heterogeneity: $Tau^2 = 0.74$; Q-value =91.87, df= 7 ($p<0.001$); $I^2 = 92.38\%$
Test for overall effect: Z = 2.70 (p = 0.007)

Notes: Fixed effects: $SMD_{pooled} = 0.62$, 95 % CI: (0.45 – 0.78), $p < 0.001$.

Lu et al. (2021).

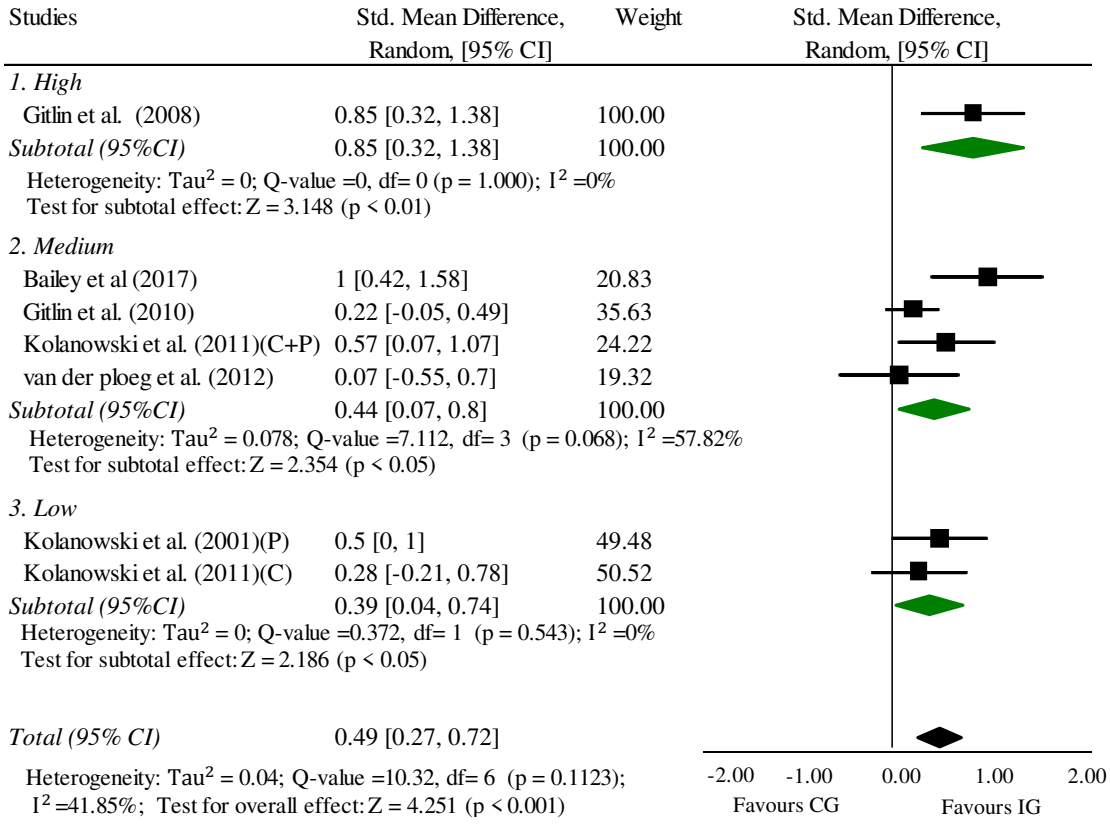
Supplementary Figure 7. Subgroup analysis: Effects of tailored interventions on depression at post-intervention by level of personalisation (N=14)



Notes: (1) High group. Fixed effect: SMD $_{pooled}$ = -0.33, 95% CI = -0.54 to -0.12, p = 0.002; Middle group. Fixed effect: SMD $_{pooled}$ = -0.65, 95% CI = -1.00 to -0.31, p < 0.001; Low group. Fixed effect: SMD $_{pooled}$ = -0.10, 95% CI = -0.28 to 0.09, p =0.316. (2) Test for the difference across three subgroups: Q-value = 8.373, df (Q) = 2, p = 0.015.

Lu et al. (2021).

Supplementary Figure 8. Subgroup analysis: Effects of tailored interventions on engagement at post-intervention by level of personalisation (N=7)



Note: (1) One study was not included in this meta-analysis based on the findings from Supplementary Figure 5 in order to reduce heterogeneity. (2) Fixed effects for three groups. High group. SMD $_{pooled}$ = 0.85, 95% CI = 0.32 to 1.38, p = 0.002; Middle group: SMD $_{pooled}$ = 0.36, 95% CI = 0.16 to 0.57, p = 0.001; Low group: SMD $_{pooled}$ = 0.39, 95% CI = 0.04 to 0.74, p = 0.029. (3) Test for the difference across three subgroups: Q-value = 2.836, df (Q) = 2, p = 0.242.

Lu et al. (2021).

Appendix 1. Data extraction form

#	Information	Instruction
1	Author (Year)	n/a
2	Countries	n/a
3	Age, Mean(SD)	n/a
4	Dementia/Cognitive impairment or mixed	n/a
5	Sample size [Intervention and control group)	Separate the sample size for the intervention and control groups
6	Study design	RCT/Quasi-experimental design
7	Study setting	Home/Community/long-term care facilities, etc.
8	Tailored for PWD characteristics	Capacity, interest/preferences, habits, roles, personal history, living environment, etc.
9	Activity Type	Physical, cognitive, musical, multiple activities
10	Content of tailored activities/intervention	Document the content of tailored activities in detail
11	Delivery mode	Individual, group or mixed
12	Interventionist	Document type of interventionist
13	Duration of the intervention	Document duration of the intervention
14	Comparator	Control group
15	Outcomes	Identify reported outcome(s) of interest in the study
16	Statistics	Pre and Post Mean and SD
17	Findings	Summarise the findings
18	Level of assessment for tailoring	Describe how the studies assessed participants' characteristics for the purpose of tailoring
19	Degree of individualization in design	Document the aspects of participants' characteristics targeted in the tailored activities
20	Degree of person-centred care in intervention delivery	Document the extent to which interventionists had the autonomy to adjust the intervention to respond to participants' needs