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Non-pharmacological interventions for people with dementia: A systematic review contextualised to healthcare buildings in Ibadan City, Nigeria

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ABSTRACT

Background*: Pain and the behavioural and psychological symptoms of dementia (BPSD) are common but undertreated, and pharmacological management risks sedation, falls, and interactions.* ***Objectives****: This review synthesises evidence on non-pharmacological interventions for people with dementia and contextualises it to healthcare buildings in Ibadan, Nigeria, using two contrasting facilities (private HC1, government HC2).* ***Methods****: The synthesis builds on Liao et al. (2021)—11 studies, 486 participants—integrated with the author's mixed-methods fieldwork in HC1 and HC2.* ***Results****: Person-centred, preference-based, and environmentally mediated interventions were the most consistent performers, converging with fieldwork in which excessive noise, heat, and poor lighting were associated with agitation and wandering. Most studies were small, low-to-mixed quality, and rarely replicated.* ***Conclusion****: Environmental interventions are safe, low-cost, and applicable across dementia stages, but the evidence is thin and skewed toward high-income temperate settings; tropical, low-resource contexts remain almost absent.*

1. Introduction

Dementia is a growing global health challenge and is currently among the leading causes of death worldwide, with more than 55 million people affected and over 60% of them living in low- and middle-income countries [2, 3]. In sub-Saharan Africa, cases are projected to rise sharply, and in Nigeria the number of people aged 60 years and older living with dementia increased by more than 400% between 1995 and 2015 [3, 4]. Yet diagnosis, social protection, and long-term care remain limited, and dementia is frequently interpreted as a normal feature of ageing, compounding stigma and under-reporting [5].

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People living with dementia commonly experience pain and the behavioural and psychological symptoms of dementia (BPSD)—agitation, aggression, anxiety, wandering, repetitive vocalisation, and disturbed sleep [6]. Pain is particularly consequential: it is highly prevalent, difficult to assess in people with impaired communication, and frequently expressed behaviourally rather than verbally, so that untreated pain manifests as agitation and is often mismanaged as a psychiatric rather than a physical problem [7]. Medications remain the primary approach, but there is no gold standard for pharmacological pain management in dementia, and drug use carries risks of respiratory depression, constipation, sedation, delirium, and falls [8, 1].

Against this background, non-pharmacological interventions have emerged as a safer first-line option. They are relatively safe, low in adverse effects, and can reduce reliance on pain and psychotropic medication [1]. Crucially, the landmark cluster-randomised trial by Husebo et al. [7] demonstrated that systematically treating pain reduced agitation in people with moderate to severe dementia, establishing the principle that addressing a modifiable underlying cause—rather than sedating the symptom—improves behaviour. The indoor built environment is one such modifiable cause. Ulrich's [9, 10] theory of supportive design holds that the physical environment reduces stress when it provides perceived control, social support, and positive distraction; conversely, poor lighting, thermal discomfort, and uncontrolled noise dismantle these supports and exacerbate BPSD [11, 12].

Recent systematic and umbrella reviews consistently find that non-pharmacological interventions—reminiscence therapy, music therapy, exercise, cognitive stimulation, person-centred care, and environmental modification—are effective for BPSD and, in several syntheses, more effective than pharmacological approaches while imposing lower risk and cost [13, 14, 15]. Reviews of indoor environmental quality (IEQ) in healthcare reach a parallel conclusion: favourable IEQ improves patient recovery, staff performance, and outcomes, but the evidence is overwhelmingly drawn from high-income, temperate settings, and tropical, low-resource contexts are markedly under-represented [16, 17]. This geographic imbalance is the central gap this review addresses.

Nigeria illustrates the gap acutely. Care facilities for older adults are only recently emerging, family-based care predominates, and the mental-health budget is a small fraction of national allocation [5]. Where residential care exists, it operates in a hot-humid tropical climate with intermittent electricity and an intense external soundscape, so that the environmental interventions validated in sealed, mechanically serviced European and North American facilities are only partially transferable [12]. The evidence base offers little guidance for this context.

1.1 Aim and objectives

This review aims to synthesize current evidence on non-pharmacological interventions for people with dementia and to contextualize that evidence to healthcare buildings in Ibadan, Nigeria. The specific objectives are:

(a) to synthesize the types, dosages, and reported effects of non-pharmacological interventions for pain and BPSD in people with dementia, using Liao et al. [1] as the evidentiary core;

(b) to appraise the quality and level of evidence of the included studies and identify the methodological limitations that constrain current conclusions;

(c) to integrate this synthesis with empirical fieldwork from two contrasting Nigerian care facilities (HC1, HC2) that quantified environmental conditions and behavioural incidents; and

(d) to establish the research gap and derive transferable recommendations for embedding non-pharmacological and environmental interventions into dementia care in tropical, low-resource settings.

1.2 Contribution and research gap

This review makes three contributions. First, it consolidates the fragmented evidence on non-pharmacological interventions for people with dementia into a single critical synthesis, moving beyond description to appraise why the evidence remains weak—single-study interventions, small and homogeneous samples, low baseline pain, and heterogeneous assessment tools—rather than cataloguing effects uncritically. Second, and most consequentially, it is one of the first to bridge that global evidence to a tropical, low-resource healthcare-building context using primary Nigerian fieldwork rather than importing conclusions wholesale; this matters because not one of the studies in the evidentiary core was conducted in Africa, in a tropical climate, or in a low- or middle-income country, precisely the settings in which most of the world's future dementia burden will fall. Third, by linking environmental interventions (lighting, noise, thermal comfort) to the wider non-pharmacological repertoire, it reframes building design itself as a therapeutic, non-pharmacological modality—an argument that recent IEQ and dementia-care reviews support but rarely operationalise for the Global South [16, 12].

2. Methods

2.1 Design and evidentiary core

This is a structured, contextualising review built on an existing systematic review conducted to PRISMA standards. The evidentiary core is the systematic review by Liao et al. [1], registered with PROSPERO (CRD42021247653), which searched PubMed, CINAHL, Scopus, and Web of Science for peer-reviewed original quantitative studies testing non-pharmacological interventions on pain in people with dementia. Its inclusion and exclusion criteria, screening, and quality appraisal are adopted here as the basis of synthesis, and its findings are extended through integration with the author's doctoral fieldwork and with seminal and recent (2020–2025) literature retrieved from the same databases. Figure 1 shows the study-selection flow.

Figure 1. PRISMA study-selection flow

(evidentiary core: Liao et al., 2021), with contextual layer added

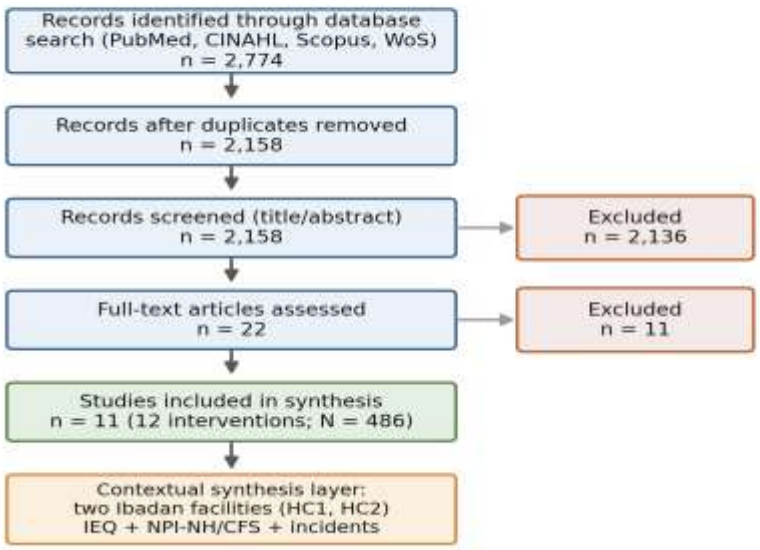

Figure 1. PRISMA flow of study selection for the evidentiary core (adapted from [1]), with the contextual synthesis layer for the two Ibadan facilities added at the base.

2.2 Eligibility criteria

Following Liao et al. [1], studies were eligible if they were peer-reviewed original quantitative research, tested a non-pharmacological intervention on pain (or, in the extended synthesis, on BPSD) in people with dementia,

and were published in English. Studies were excluded if they combined pharmacological and non-pharmacological interventions without reporting separate results; enrolled participants with and without dementia without separate dementia results; tested dietary supplements; or were not original research (reviews, editorials, commentaries, case studies). Of 2,774 records identified, 2,158 remained after de-duplication, 22 proceeded to full-text screening, and 11 studies (12 interventions; 486 participants) met the criteria.

2.3 Quality appraisal

Study quality was appraised in the core review using the Cochrane Risk of Bias tool—used to assess the risk of systematic error in a study, particularly randomised controlled trials (RCTs)—across seven domains (random sequence generation, allocation concealment, blinding of participants and researchers, blinding of outcome assessment, incomplete outcome data, selective reporting, and other bias) and the Johns Hopkins levels of evidence (I for randomised controlled trials, II for quasi-experimental, III for non-experimental; quality graded A–C). These appraisals are reproduced and interpreted in Section 3.

2.4 Contextual fieldwork integration

To ground the synthesis in a tropical, low-resource setting, the review draws on the author's mixed-methods doctoral study of two contrasting healthcare facilities in Ibadan [12]: HC1, the privately operated Omisina Memorial Aged People (OMAP) Foundation, and HC2, the government-run Sir Kessington Adebutu Geriatric Rehabilitation Centre. That study combined full-scale environmental measurements (daylighting, temperature, CO_2, and A-weighted sound level), a 135-respondent perceptual survey using the Neuropsychiatric Inventory–Nursing Home version (NPI-NH) and the Clinical Frailty Scale (CFS), and a one-year review of clinical incident reports (agitation, anxiety, wandering, falls), analysed in SPSS with correlation and multiple-regression modelling. These data are used here to test whether the environmentally mediated interventions identified in the global literature align with observed behaviour in the Nigerian setting.

3. Results

3.1 Characteristics of included studies

The 11 included studies comprised 7 randomised controlled trials, 3 quasi-experimental studies, and 1 cohort study, with a combined sample of 486 participants (range 9–111 per study). The majority of participants were female (62–90%), and where race was reported it was predominantly Caucasian (86–100%). Studies were conducted in Australia (3), South Korea (2), France (2), the United States (2), Hong Kong (1), and Spain (1). Two studies focused on community-dwelling individuals, one on a hospital setting, and the remaining eight on residential long-term care. Dementia stage ranged from mild to severe; four studies restricted enrolment to a specific stage. Notably, no included study was conducted in Africa or in a tropical climate, and none in a low- or middle-income country—a distribution that is itself a principal finding [1, 12].

Table 1. Summary of non-pharmacological interventions, designs, and reported effects on pain in people with dementia (from [1])

Study (year, country)	Design	N	Intervention (dose, period)	Reported effect on pain
Cipher (2007, USA) [18]	Cohort	44	Cognitive-behavioural therapy; 8 sessions / 5 wks	Significant ↓ pain (5.05→3.42; F = 12.99)
Ellis (2019, Australia) [19]	Quasi-exp.	30	Tailored pain programme (physio-selected); 8 wks	↓ pain (2.3→1.0 proxy) post-intervention
Hodgson (2008, USA) [20]	RCT crossover	21	Reflexology vs friendly visits; 8 wks	Significant ↓ nonverbal pain vs control (p = .031)
Kapoor (2017, Australia) [21]	RCT	10	Massage; 10 min × 4/wk, 4 wks	No significant difference (p = .87)
Maltais (2018, France) [22]	RCT	dm.	Physical / social activity; individualised	Mixed; group differences at baseline

Study (year, country)	Design	N	Intervention (dose, period)	Reported effect on pain
Park (2010, S. Korea) [23]	Quasi-exp.	dm.	Person-centred music therapy; preference-based	↓ pain (1.2→0.6 with >30 min; p < .05)
Park (2015, S. Korea) [24]	Quasi-exp.	9	Person-centred environment programme; 16 sessions	↓ pain severity (multisensory personalisation)
Pongan (2017, France) [25]	RCT	59	Painting vs singing; mild AD; 3 hospitals	↓ chronic pain (e.g., 1.89→1.1, ≥6 sessions)
Pu (2020, Australia) [26]	RCT pilot	43	Personal assistive robot (PARO); 30 min × 5/wk, 6 wks	↓ pain; ↓ as-needed medication use
Rodríguez-Mansilla (2015, Spain) [27]	RCT (double-blind)	111	Massage vs ear acupressure vs control; 20 min	Ear acupressure & massage ↓ pain (low bias)
Tse (2018, Hong Kong) [28]	RCT	dm.	Play activity; themed, dosed	↓ chronic pain (2→0.6; p = .019)

Note. ↓ = reduction. "dm." = sample not separately extractable for the dementia subgroup in the source table. Pain scales differ across studies; values are on each study's own tool. Compiled from Liao et al. [1].

3.2 Effectiveness of interventions

More than half of the interventions reported at least some positive effect on pain. Ear acupressure, music therapy, reflexology, tailored pain intervention, cognitive-behavioural therapy, the personal assistive robot, painting and singing, play activity, and the person-centred environment programme all showed pain reduction in at least one study (Figure 2). Massage produced mixed results: it was non-significant in a very small trial (N = 10) but significant in a larger, lower-bias trial (N = 111) that used longer duration on the lower back and limbs—a divergence the synthesis attributes to sample size and dosage rather than to the modality itself. Two features recur across the more successful interventions and are central to interpretation: person-centredness (tailoring to individual preference, cognitive capacity, and functional level) and environmental mediation (modifying the sensory environment—auditory, visual, tactile). The person-centred environment programme [24], which personalised visual, auditory, olfactory, and tactile stimuli, exemplifies both, and it maps directly onto the environmental interventions examined in the Nigerian fieldwork.

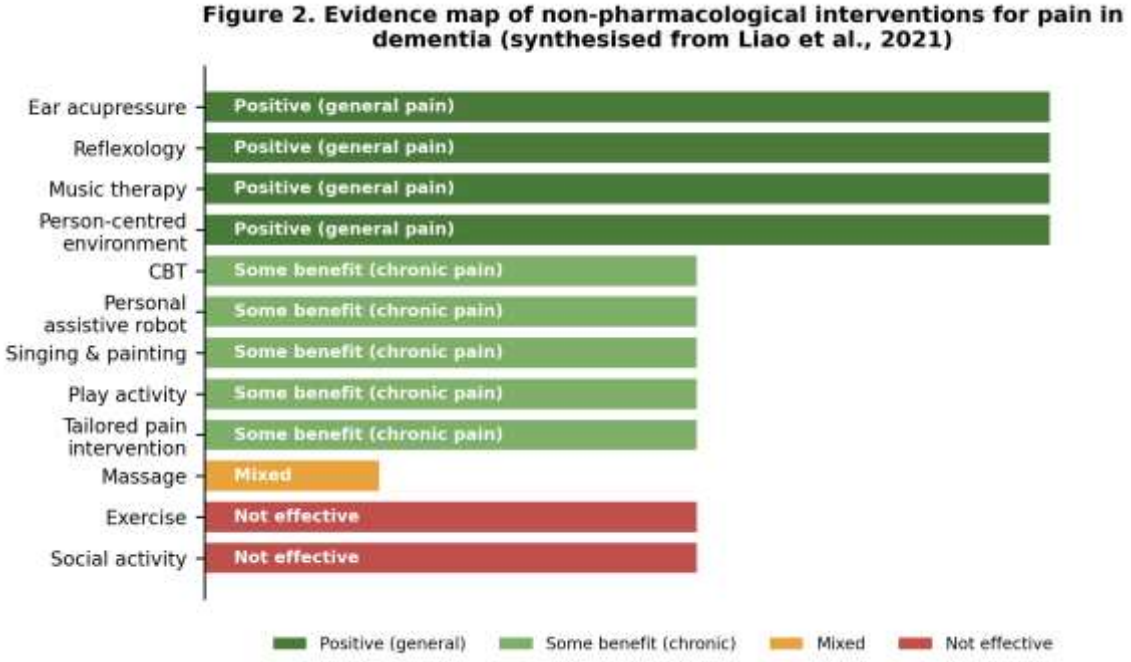

Figure 2. Non-pharmacological interventions and their reported effect on pain in people with dementia, with the number of studies evaluating each (synthesised from [1]). Most interventions were evaluated only once.

3.3 Quality and level of evidence

Quality appraisal revealed a fragile evidence base (Table 2). Seven studies were level I (randomised controlled trials) and four were level II (quasi-experimental), but only three carried an overall low risk of bias [25, 26, 27]. Blinding of participants and researchers was rated high risk in most studies because the interventions cannot be fully masked; five studies had high risk of incomplete outcome data; and several had high risk in selective reporting. Critically, only one intervention (massage) was evaluated in more than one study, so replication is almost entirely absent.

Table 2. Quality appraisal and level of evidence of the included studies (from [1])

Study (year)	Level / quality	Blinding	Incomplete data	Overall interpretation
Pongan (2017) [25]	I / A	Low	Low	Low risk of bias
Pu (2020) [26]	I / A	High	Low	Low risk of bias
Rodríguez-Mansilla (2015) [27]	I / B	Low	Low	Low risk of bias
Maltais (2018) [22]	I / B	High	High	Mixed risk of bias
Hodgson (2008) [20]	I / C	High	Low	High risk of bias
Kapoor (2017) [21]	I / C	High	Low	High risk of bias
Tse (2018) [28]	I / B	High	High	High risk of bias
Cipher (2007) [18]	II / A	High	High	High risk of bias
Ellis (2019) [19]	II / B	High	High	High risk of bias
Park (2010) [23]	II / A	High	Low	High risk of bias
Park (2015) [24]	II / C	High	High	High risk of bias

3.4 Contextual synthesis: environmental interventions in HC1 and HC2 (Ibadan)

The Nigerian fieldwork provides the tropical, low-resource evidence that the global literature lacks [12]. In both facilities, environmental conditions frequently fell outside recommended ranges and were associated with the same behavioural outcomes the non-pharmacological interventions target. Noise was a salient example: measured A-weighted sound levels exceeded the WHO 35 dB(A) guideline throughout, peaking at 53.03 dB(A) in HC1 and 67.40 dB(A) in the government facility HC2, and location-specific noise correlated with psychological-health disturbance (agitation and anxiety). Elevated temperature (a corridor peak of 31.4 °C and a lounge peak of 34.13 °C in HC1) and inadequate daylighting in incident-prone bathrooms were similarly linked to agitation and fall risk. In regression modelling, environmental factors including noise significantly predicted agitation, wandering, and anxiety.

These observations connect directly to the reviewed interventions. The person-centred environment programme [24] and person-centred music therapy [23] operate by modifying exactly the sensory dimensions—auditory, visual, thermal, tactile—that were found deficient in HC1 and HC2. In other words, the most transferable non-pharmacological interventions for this setting are not those requiring specialised equipment or intact cognition (cognitive-behavioural therapy, play activity), but those that reshape the building's sensory environment: acoustic control, daylighting, thermal regulation, and personalisation of space. This reframes the indoor built environment itself as a deliverable, non-pharmacological intervention—one that, unlike a robot or a trained therapist, benefits every occupant continuously and is well suited to a low-resource context [12].

Figure 3. Measured indoor environmental parameters against guidelines (Odugboye, 2025)

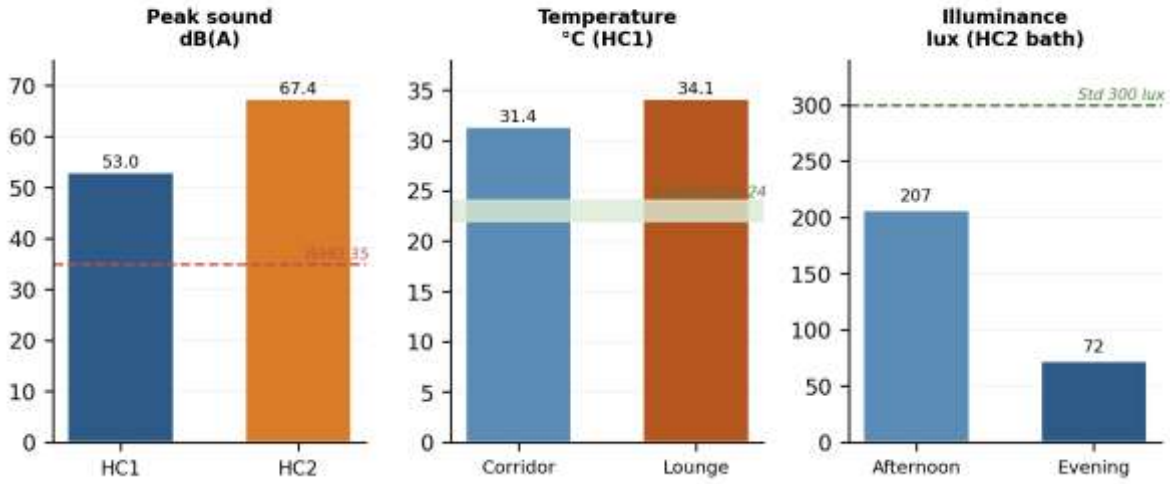

Figure 3. Measured indoor environmental parameters against recommended guidelines in the two Ibadan facilities [12]: peak A-weighted sound level, indoor temperature (HC1), and bathroom illuminance (HC2). Each measured value falls on the adverse side of its guideline.

4. Discussion

This review set out to synthesise non-pharmacological interventions for people with dementia and to test their relevance to healthcare buildings in a tropical, low-resource setting. Three points structure the interpretation. First, the global evidence is genuinely promising in direction but fragile in strength. A majority of interventions reduced pain or BPSD, and the pattern is coherent—person-centred, preference-based, and environmentally mediated approaches perform best—but only one intervention was replicated, most studies were small and homogeneous (predominantly female, Caucasian, long-term-care), baseline pain was often too mild to detect change, and assessment tools were heterogeneous [1]. These are not incidental weaknesses; they are the reason strong recommendations cannot yet be made, and honest synthesis must foreground them rather than overstate efficacy.

Second, the direction of the wider 2020–2025 literature reinforces, rather than contradicts, this cautious reading. Umbrella and network syntheses find non-pharmacological interventions effective for BPSD and often superior to pharmacological options on the risk–benefit balance [13, 14, 15], and the seminal Husebo et al. [7] trial anchors the mechanism: treating a modifiable underlying cause reduces agitation. Environmental modification is such a cause. Yet the same reviews repeatedly flag inconsistent implementation, staff-training deficits, and a near-total absence of evidence from tropical and low-resource settings—the precise conditions under which most of the world's dementia burden will fall [3]. The contribution of this review is to occupy that gap with primary Nigerian evidence rather than extrapolation.

Third, integrating the fieldwork recasts building design as a non-pharmacological modality. The interventions most transferable to HC1 and HC2 are environmental—acoustic control, daylighting, thermal regulation, and sensory personalisation—because they require neither intact cognition nor specialised personnel and act continuously on every occupant. This is consistent with Ulrich's supportive-design theory [9, 10] and with contemporary IEQ reviews [16], but it has rarely been operationalised for the Global South. The measured environmental deficits in the two facilities, and their association with agitation and wandering, provide a concrete, local rationale for prioritising environmental interventions where trained therapists and assistive technologies are scarce [12].

4.1 Implications for practice and policy

Several implications follow. Clinically, intervention choice should be matched to cognitive stage: cognitive-behavioural therapy, painting and singing, and play activity suit mild-to-moderate dementia with sufficient cognitive capacity, whereas reflexology, massage, the person-centred environment programme, and ambient environmental modification can benefit those with advanced dementia because they do not require active participation [1]. For tropical, low-resource facilities specifically, low-cost environmental measures—acoustically absorptive finishes and generator siting to control noise, daylighting and glare management, passive cooling, and personalisation of resident spaces—offer the widest reach per unit cost. At the policy level, the near-absence of environmental and non-pharmacological criteria in Nigerian dementia care and healthcare building regulation is a clear gap; embedding them, and investing in staff training to sustain implementation, would give these measures durable effect [12].

4.2 Limitations and future research

This review inherits the limitations of its evidentiary core: a small number of low-to-mixed-quality studies, minimal replication, homogeneous samples, and heterogeneous outcome measures. The contextual fieldwork, while filling the tropical-setting gap, is drawn from two facilities and is cross-sectional, so associations between environment and behaviour are not strictly causal. Future research should prioritise larger, gender- and ethnically diverse randomised trials with standardised, validated pain and BPSD instruments; direct replication of the most promising interventions; and, in tropical low- and middle-income settings, interventional studies that manipulate the sensory environment (noise, light, temperature) and measure behavioural outcomes with objective sensors rather than caregiver report alone. Cross-cultural comparison would establish whether the person-centred, environmentally mediated pattern observed here generalises across care systems.

5. Conclusion

Non-pharmacological interventions are a safe, cost-effective, and increasingly evidenced first-line approach to pain and behavioural symptoms in people living with dementia, and more than half of the interventions synthesised here—ear acupressure, music therapy, reflexology, tailored pain intervention, cognitive-behavioural therapy, a personal assistive robot, painting and singing, play activity, and a person-centred environment programme—reduced pain or distress in at least one study. The strongest and most transferable of these are person-centred and environmentally mediated. Yet the evidence base is thin, rarely replicated, and drawn almost entirely from high-income, temperate, long-term-care settings; tropical, low-resource contexts such as Nigeria are effectively absent. Grounding the synthesis in fieldwork from two Ibadan facilities shows that the same environmental factors these interventions target—noise, light, and thermal comfort—are deficient and behaviourally consequential in that setting, and that the indoor built environment can itself be treated as a non-pharmacological intervention. Embedding environmental and non-pharmacological interventions within dementia-care and healthcare building standards, sustaining them through staff training, and validating them through larger, more rigorous, culturally grounded trials would materially improve care for a rapidly growing and under-served population.

Declarations

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Conflicts of interest: The authors declare no competing interests.

Ethics: The contextual fieldwork received approval from the relevant institutional review boards; individuals living with dementia were not enrolled as direct respondents.

Data availability: Data are available from the corresponding author on reasonable request.

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