

Why you should read this article:

- To understand why achieving optimal oral health remains a challenge for people with intellectual disabilities
- To improve your knowledge of the common barriers that mean oral health is often deprioritised in the intellectual disability sector
- To recognise which strategies may be most effective in improving caregivers' knowledge of oral health

Effectiveness of oral health education for paid caregivers of adults with intellectual disabilities: a systematic review

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Abstract

It has been identified that people with intellectual disabilities tend to have disproportionately poor oral health. This article details a systematic review that aimed to evaluate the effectiveness of oral health educational interventions for paid caregivers of adults with intellectual disabilities. Seven studies were included in the review, involving a total of 322 caregivers. The review found that oral health educational interventions improved caregivers' knowledge in the short term, but that their knowledge retention commonly declined within three months. Caregivers' behavioural and attitudinal outcomes were inconsistent, with temporary improvements often reverting to baseline. Clinical outcomes were limited and inconsistent, with only one study showing a notable improvement in plaque scores, and another study finding no meaningful change in gingival inflammation. Future research should prioritise randomised controlled trials with longer follow-up periods, standardised outcome measures, and theory-informed designs that incorporate behavioural change frameworks.

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Keywords

carers, education, learning disability, literature review, oral health, oral hygiene, patient outcomes, support staff

Background

Oral care is one of the most frequently overlooked components of comprehensive healthcare (Gallione et al 2024), and failure to provide this care can affect patients' physical, psychological and social well-being. Oral diseases – including dental caries, severe periodontal disease, tooth loss and oral cancers – remain among the most

common global health issues (World Health Organization 2022). Achieving optimal oral health remains a significant challenge for people with intellectual disabilities who depend on others for daily support and care. Moreover, this population faces disproportionate risks due to inconsistent caregiver training and limited access to preventive care (Ningrum et al 2023).

This disparity is pronounced among residents of care facilities where, despite the presence of caregivers, oral health is often deprioritised due to competing care demands, time pressures and inadequate training. Many oral health issues can be prevented through evidence-based oral care. However, in the intellectual disability sector, this component of care is often deprioritised, with systemic barriers including staff knowledge gaps and communication difficulties (Mac Giolla Phadraig et al 2014). Consequently, in Ireland 19% of adults with intellectual disabilities are edentulous (having no natural teeth) and 72% of those do not have dentures; by comparison, 13% of the general population are edentulous and 5% of those do not have dentures (McCarron et al 2023). Furthermore, these figures are significantly higher among those aged 65 years and over. This highlights an urgent need for targeted policy and service reform to improve oral health among people with learning disabilities.

The Intellectual Disability Supplement to the Irish Longitudinal Study on Ageing (IDS-TILDA) highlights the complex barriers to oral care for adults with intellectual disabilities, including communication difficulties, sensory issues and inconsistent caregiving (McCarron et al 2023). In recent decades, life expectancy among adults with intellectual disabilities has risen exponentially, meaning that this population is increasingly experiencing age-related conditions including oral health complications (McCarron et al 2023). Caregivers have a central role in improving oral health outcomes for this population, since they frequently perform and support the completion of daily oral hygiene tasks (Gonzalez et al 2013, Waldron et al 2019). However, little research is available evaluating the effectiveness of oral health education for paid caregivers, despite them forming a core component of the workforce in residential and supported living services. Therefore, the authors decided to undertake a systematic review to address this important gap.

Given the rising life expectancy among adults with intellectual disabilities, effective and sustainable oral care is essential to optimise the nutritional intake, systemic health and quality of life of this population, as well as to reduce the burden on the healthcare system. A Cochrane review by Waldron et al (2019) examined oral hygiene interventions for people with intellectual disabilities, but did not focus specifically on the role of paid caregivers. The review detailed in this article addresses that gap by evaluating educational interventions specifically targeting paid caregivers.

For consistency, this article uses the term 'paid caregivers' to refer to all formal, remunerated care workers, including healthcare professionals, such as learning disability nurses, as well as those described in primary studies as 'care staff' or 'care providers.'

Aim

To evaluate the effectiveness of oral health educational interventions for paid caregivers of adults with intellectual disabilities, and to thereby support policy development to enhance oral health among the intellectual disability population.

The primary objective was to assess changes in caregivers' oral health knowledge, skills, behaviour and attitudes following educational interventions. Secondary objectives included evaluating clinical outcomes in adults with intellectual disabilities, specifically in terms of plaque and gingival inflammation.

Method

This systematic review followed Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Page et al 2021). The PICOS (population, intervention, comparison, outcomes and study design) framework (Table 1) was used to guide study selection and the development of the search strategy.

Searches were conducted in March 2024 across the Cumulative Index to Nursing and Allied Health Literature (CINAHL),

Key points

- As life expectancy in people with learning disabilities continues to rise, there is an increasing need for effective oral health strategies for this population
- Achieving optimal oral health remains a significant challenge for people with intellectual disabilities who depend on others for daily support and care
- Caregivers have a central role in improving oral health outcomes for this population since they frequently support the completion of daily oral hygiene tasks
- Protected time for oral care delivery should be built into daily care routines, recognising that competing demands often result in oral health being deprioritised

MEDLINE, Embase, Web of Science, the Cochrane Library and Google Scholar database, using MeSH and Emtree terms with Boolean operators. Grey literature searches were undertaken to identify unpublished primary research studies, such as dissertations and reports. However, conference abstracts were excluded due to insufficient methodological detail. The search was updated in January 2026 with no additional studies identified.

The population of interest was adults with intellectual disabilities aged 18 years or older. The review included only English-language publications. The final search strategy encompassed a broad range of terms, including variations in nomenclature for intellectual disability, oral health terminology and descriptors of educational interventions.

The inclusion criteria were primary quantitative research studies, such as randomised controlled trials (RCTs), quasi-experimental designs and cross-sectional designs. The exclusion criteria were commentaries, editorials, protocols, qualitative studies, non-English-language studies, and studies that did not focus on the intellectual disability population.

The first author (SJC) conducted the initial screening of all retrieved studies. The second author (BM) independently reviewed a random sample of 20% of

the studies while remaining blinded to the first author’s decisions. Discrepancies were resolved through discussion until consensus was reached. Data extraction was conducted independently by the first and second authors, then cross-checked to ensure consistency.

Search results and article characteristics

The search yielded 698 articles. After removing 180 duplicates, 518 articles were screened by title and abstract. Of these, 494 articles were excluded as irrelevant, leaving 24 articles that were read in full to determine whether they met the inclusion criteria. A total of 17 studies were excluded, for the following reasons: an educational intervention was not included as the focus or comparator ($n=11$); inappropriate study design ($n=3$); or incorrect population groups ($n=3$).

Seven studies were included in the final review (Glassman and Miller 2006, Fickert and Ross 2012, Gonzalez et al 2013, Mac Giolla Phadraig et al 2015, Selbera et al 2021, Nowghani et al 2024, Rojo et al 2024). Three of these seven studies (Glassman and Miller 2006, Gonzalez et al 2013, Mac Giolla Phadraig et al 2015) had previously been included in a Cochrane review by Waldron et al (2019). These were retained because they were relevant to the present review objectives and enabled comparison between earlier and more recent research. Key data from the included studies were extracted and synthesised to address the review aims and objectives.

Quality assessment

The JBI critical appraisal checklists (Aromataris et al 2024) were used to assess the methodological quality of the included studies (Tables 2, 3 and 4). Each item was scored as ‘yes’, ‘no’, ‘unclear’ or ‘not applicable’; a higher proportion of ‘yes’ responses indicates higher methodological quality and lower risk of bias. None of the seven studies were excluded due to low methodological quality.

Table 1. PICOS (population, intervention, comparison, outcomes, study design) framework	
PICOS element	Criteria
Population	Adults with intellectual disabilities (aged 18 years and over) receiving care from paid caregivers in home or residential settings
Intervention	Structured oral hygiene educational programmes, including educational activities, practical training and communication skills development
Comparison	Pre-post educational programme assessment or control group comparison (where available)
Outcomes	Primary outcomes: caregivers’ knowledge, skills, behaviour and attitude changes Secondary outcomes: plaque and gingival inflammation
Study design	Quantitative studies, including randomised controlled trials (RCTs), quasi-experimental studies and cross-sectional studies

Findings

Table 5 presents a summary of the characteristics of included studies.

The findings are presented in this article according to the primary outcomes (caregivers' knowledge and skills; caregivers' behaviour and attitudes) and the secondary clinical outcomes (plaque; gingival inflammation), as specified in Table 1. Due to the considerable variation in outcome measurement approaches, intervention types and study designs, the findings were synthesised narratively.

Caregivers' knowledge and skills outcomes

Three studies examined the impact of educational interventions on caregivers'

knowledge among a total of 91 participants (Fickert and Ross 2012, Gonzalez et al 2013, Selbera et al 2021). The literature suggests that educational interventions improved caregivers' knowledge in the short term, with notable differences in sustainability across the studies.

Fickert and Ross (2012) reported substantial improvement from pre-test to post-test among 29 caregivers; however, this diminished at three-month follow-up, suggesting that initial knowledge gains may weaken over time. Selbera et al (2021) observed modest immediate improvement among 47 newly hired caregivers, with more substantial gains evident at four-week follow-up. This delayed improvement pattern may reflect ongoing learning

Table 2. JBI critical appraisal checklist for quasi-experimental studies

Article	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Number of criteria met	Quality
Fickert and Ross (2012)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	8	High
Selbera et al (2021)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	8	High
Glassman and Miller (2006)	Unclear	Yes	Yes	No	Yes	Yes	Yes	Unclear	Yes	6	Moderate
Percentage of these studies meeting each criterion	67	100	100	0	100	100	100	67	100		

Table 3. JBI critical appraisal tool for randomised control trials

Article	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Number of criteria met	Quality
Gonzalez et al (2013)	Yes	Yes	Yes	Yes	Yes	U*	Yes	Yes	Yes	U*	Yes	Yes	Yes	11	Moderate to high
Mac Giolla Phadraig et al (2015)	Yes	Yes	Yes	Yes	U*	U*	No	Yes	Yes	Yes	Yes	Yes	Yes	10	Moderate
Percentage of these studies meeting each criterion	100	100	100	50	50	0	50	100	100	50	100	100	100		
*U=unclear															

Table 4. JBI checklist for cross-sectional studies

Article	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Number of criteria met	Quality
Nowghani et al (2024)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	7	High
Rojo et al (2024)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7	High
Percentage of these studies meeting each criterion	50	100	100	100	100	50	100	100		

and knowledge integration during these caregivers' initial weeks of practice.

Gonzalez et al's (2013) RCT compared two educational interventions. The experimental group ($n=14$) received

90-minute lectures with hands-on training and showed notable improvement in knowledge, whereas the control group ($n=10$) received only group discussion and showed minimal improvement.

Table 5. Summary characteristics of included studies

Reference	Setting	Design	Number of participants	Intervention	Key outcomes	Duration and follow-up
Fickert and Ross (2012)	US Intermediate care	Quasi-experimental, one group pre-test-post-test	60 caregivers (29 caregivers at follow-up)	Overcoming Obstacles to Dental Health: two three-hour sessions delivered by a dental hygienist, with demonstrations of toothbrushing, flossing and suctioning	» There was a significant improvement in oral hygiene skills and compliance from pre-test to post-test ($P<0.001$) » These gains reduced but were maintained at three months ($P=0.057$)	» Two three-hour sessions » Assessed pre-test, post-test and at three months
Glassman and Miller (2006)	US Residential	Multiple baseline	10 caregivers	Knowledge training followed by a coaching phase, targeting caregivers' behaviours and clients' oral hygiene	» Caregiver presence rose from 33% to 100% » Brushing duration extended from 20.5-73.8 seconds to 57.9-215.4 seconds » Plaque scores improved by 19-73%	» The duration of the coaching phase was not specified » Continuous measurement across baseline and coaching phases
Gonzalez et al (2013)	US Long-term care	Randomised controlled trial (RCT)	30 caregivers (14 assigned to the experimental group, 10 assigned to the control group)	Experimental group: 90-minute lecture with hands-on training. Control group: 30-minute facilitated group discussion	» Caregivers' knowledge improved significantly in the experimental group ($P=0.01$), but not in the control group ($P=0.14$)	» 90-minute session » Immediate post-test
Mac Giolla Phadraig et al (2015)	Ireland Residential	Cluster pre-test post-test RCT	76 caregivers from 50 residential units	Experimental group: one-day multi-tiered oral health education with ongoing support. Control group: no training	» There was modest improvement in plaque scores in the experimental group, but no significant differences between the experimental and control groups ($P>0.05$) » No meaningful change in gingival inflammation was identified (measured using the Modified Gingival Index)	» One-day intervention » Outcomes assessed at baseline and 6-9 months
Nowghani et al (2024)	Ireland University	Analytical, cross-sectional, one-group pre-test post-test	48 caregivers	Keep My Teeth multidisciplinary modular training, comprising four in-person sessions with online components	» Perceived barriers, behaviours, self-efficacy and intentions were examined » There were significant improvements in time pressure ($P<0.01$), demotivation ($P<0.01$), adherence ($P<0.001$) and attitudes ($P<0.05$)	» Training delivered over four months » Post-test data were collected immediately after the intervention
Rojo et al (2024)	New Zealand Residential	Analytical cross-sectional, longitudinal mixed-methods	67 caregivers	90-minute training session delivered by a dentist and speech therapist, with 60-minute follow-up sessions at one week and one, two and three months	» Outcome measures included an oral examination (plaque, gingival signs, tongue coating), oral care practices and behaviour scores » Median plaque scores improved from 2.45 to 1.95 over three months ($P<0.05$)	» Baseline session plus four follow-up sessions » Outcomes assessed at baseline and three months
Selbera et al (2021)	US Intermediate care	Quasi-experimental with a one-group repeated measures design and pre-intervention and post-intervention questionnaires	47 caregivers (33 at follow-up)	'Train the Trainer' oral health toolkit: two-hour education programme delivered by a dental hygienist	» Caregivers' knowledge improved at four weeks ($P=0.004$) » Caregivers' behaviours showed temporary improvement returning to baseline ($P=0.04$) » No significant change in caregivers' attitudes was identified ($P>0.05$)	» Two-hour session » Assessed pre-intervention, post-intervention and at four weeks

This suggests that practical components of education may be more effective in enhancing caregivers' knowledge acquisition compared with discussion-only approaches.

Caregivers' behaviour and attitude outcomes

Four studies involving a total of 121 paid caregivers examined the effects of educational interventions on caregivers' behaviour and attitudes (Glassman and Miller 2006, Fickert and Ross 2012, Selbera et al 2021, Nowghani et al 2024). The studies present mixed findings about behavioural and attitudinal changes among caregivers following educational interventions.

Selbera et al (2021) observed temporary behavioural improvements among caregivers immediately post-intervention, which returned to baseline at four weeks. Additionally, the study found no notable changes in caregivers' attitudes at any time point. Fickert and Ross (2012) reported improvements in caregivers' toothbrushing, suctioning and dental flossing skills at the three-month follow-up, although the clinical significance of these changes was unclear. In contrast, Nowghani et al (2024) demonstrated improvements among caregivers across multiple behavioural dimensions, including time-pressure management, reduced demotivation, improved adherence and more positive attitudes. These findings suggest potentially broader effects on caregivers' approaches to oral care beyond specific technical skills. Glassman and Miller (2006) reported increased caregiver presence during oral care activities (from 33% at baseline to 100% following the intervention) and extended brushing duration (from 20.5-73.8 seconds to 57.9-215.4 seconds), indicating meaningful changes in practice.

Plaque outcomes

Three studies involving a total of 110 paid caregivers examined the impact of educational interventions on plaque levels

in adults with intellectual disabilities (Glassman and Miller 2006, Mac Giolla Phadraig et al 2015, Rojo et al 2024). All three studies used variants of the Plaque Index (Silness and Loe 1964), in which lower scores indicate less plaque accumulation; the studies used either a three-point or four-point scale, reflecting different modifications of the original Plaque Index.

Mac Giolla Phadraig et al (2015) observed a modest improvement in plaque scores in the experimental group, compared with minimal change in the control group, although the difference between the groups was not substantial. The experimental group had higher baseline plaque scores than the control group, which may have influenced the comparative outcomes. Rojo et al (2024) reported a more notable reduction in plaque, with median scores on a three-point scale improving from 2.45 to 1.95 over three months, suggesting effective translation of the educational intervention into clinical practice. Glassman and Miller (2006) reported baseline plaque scores ranging from 1.0-2.1 on a four-point scale, which improved to 0.3-1.6 during the coaching phase, representing a 19-73% improvement; however, the small sample size limited the generalisability of these findings.

Although some improvements in plaque scores were reported, the magnitude and consistency of these gains varied markedly across the studies. These differences may reflect variations in intervention design, delivery format, support mechanisms and the intensity of caregivers' engagement with care recipients. The findings suggest that achieving consistent clinical improvements requires more than knowledge transfer alone.

Gingival inflammation outcomes

Only one study measured gingival inflammation (Mac Giolla Phadraig et al 2015). It used the Modified Gingival Index (Lobene et al 1986), in which lower scores indicate less inflammation, over

a 6-9-month period. The experimental group showed no meaningful change in gingival inflammation from baseline to follow-up, whereas the control group showed a slight increase. No notable differences were observed between the groups (Mac Giolla Phadraig et al 2015).

The limited evidence from this single study suggests that educational interventions may not substantially reduce gingival inflammation in adults with intellectual disabilities within the time frames studied. This finding aligns with the understanding that sustained, consistent daily oral care is required to reduce gingival inflammation, and habit formation typically requires weeks of consistent repetition before becoming automatic (Lally et al 2010). Therefore, brief or one-off educational interventions are unlikely to achieve this consistency, particularly in care contexts marked by high staff turnover and competing demands (Waldron et al 2019). However, broader conclusions about the effects of educational interventions on gingival inflammation cannot be drawn without additional research examining this outcome over longer follow-up periods.

Discussion

This review revealed mixed outcomes resulting from oral health educational interventions for paid caregivers of adults with learning disabilities. Several studies showed short-term improvements in caregivers' knowledge and skills following such interventions, but the sustainability of these gains varied considerably. There were similar patterns of short-term improvement, with inconsistent long-term maintenance, in terms of behaviour and attitude outcomes. Clinical outcomes in terms of plaque and gingival inflammation were mixed, with only one study reporting a notable improvement in plaque scores (Rojo et al 2024). A single study measuring gingival inflammation found no meaningful improvement (Mac Giolla Phadraig et al 2015), highlighting the gap between knowledge acquisition and

clinical outcomes. The heterogeneity of interventions, study designs and outcome measures across the included studies further complicates the ability to draw definitive conclusions about optimal oral health educational interventions.

A knowledge-action gap emerged as a central issue; while caregivers consistently acquired new knowledge, this rarely translated into sustained behavioural change or meaningful clinical improvements. Some interventions demonstrated short-term benefits, but most of these improvements were modest and inconsistent. Knowledge gains varied across studies, with initial post-intervention increases often diminishing at follow-up. This pattern underscores a fundamental challenge: knowledge acquisition alone does not always result in consistent implementation in daily practice. Changes in caregivers' behaviours and attitudes were similarly inconsistent, reflecting broader issues (Waldron et al 2019).

Several factors may explain why educational interventions fail to generate sustained improvements. Studies consistently show that caregivers' knowledge and behavioural gains decline within weeks to months of initial training, suggesting that single-session interventions without ongoing support are insufficient to embed new practices into daily routines. Research in healthcare education demonstrates that knowledge and skills decline over time, therefore refresher sessions are essential to maintain performance levels (Martinengo et al 2024).

Although not examined in the included studies, organisational factors – including workplace culture, leadership support and resource allocation – may also influence whether trained caregivers can consistently implement oral health practices (Chadwick et al 2018). Moreover, the care sector experiences high turnover, with reports indicating that turnover rates exceed 28% annually among care workers and support workers (Skills for Care 2025). This high turnover has implications for

oral health education, as the knowledge and skills gained through training are lost when trained staff leave, necessitating continuous reinvestment in education and making consistent, embedded training more important than one-off interventions.

Competing caregiving demands may further limit the effectiveness of oral health education. Paid caregivers are responsible for multiple components of daily care, including medicines administration, personal hygiene, mealtime support, mobility and transfers, and responding to behaviours that challenge or to acute health events. Oral health may be deprioritised in favour of these tasks, which are often perceived as more time-sensitive or as carrying more immediate clinical risk. This contextual factor was acknowledged in some of the included studies (Nowghani et al 2024) and may partly explain why knowledge gains fail to translate into sustained behavioural change. Caregivers who feel uncertain about their ability to provide effective oral care, particularly when faced with individuals who have complex needs or resistant behaviours, may be less likely to implement learned techniques. Self-efficacy changes measured by Selbera et al (2021) were modest, suggesting that brief educational interventions may be insufficient to build lasting confidence.

Improvements in plaque scores were reported in all three studies measuring this outcome, although the magnitude and statistical significance varied; only one study demonstrated a clearly significant reduction at three months (Rojo et al 2024), while the other two reported modest or non-significant changes (Glassman and Miller 2006, Mac Giolla Phadraig et al 2015). This mixed picture is consistent with findings in other populations, such as adolescents, in whom early gains in oral health often regress over time (Xiang et al 2020). No meaningful change in gingival inflammation was identified, reinforcing the gap between knowledge and clinical outcomes noted in the health promotion literature (Newton and Asimakopoulou 2018).

This lack of improvement in gingival inflammation may reflect several factors, including that: gingival inflammation is harder to change in the short term than plaque accumulation; the intensity of educational interventions for caregivers may have been insufficient to produce habitual behaviour change; and clinical improvements require consistent, daily caregiver engagement rather than one-off skill acquisition. These inconsistencies suggest that many interventions lack robust theoretical underpinnings, which may explain why improvements in knowledge fail to produce sustained behavioural or clinical impact.

Research on habit formation indicates that new behaviours typically require several weeks of consistent repetition before becoming automatic and are more likely to persist when performed in stable contexts with consistent cues (Lally et al 2010). Therefore, single-session educational interventions may be inherently limited in their capacity to establish habitual oral care practices.

The evidence from this review indicates that hands-on, coaching-based interventions consistently outperform purely didactic approaches. For example, Gonzalez et al (2013) found that lectures combined with hands-on training produced significant knowledge gains while discussion alone did not, and Glassman and Miller (2006) demonstrated meaningful behavioural change only occurred following coaching. Multi-session training also appears more effective than one-off sessions, with Rojo et al (2024) reporting sustained improvements in plaque scores across repeated training over three months, while Selbera et al (2021) found that single-session interventions produced gains that returned to baseline within weeks. This is consistent with broader evidence that spaced, repeated education results in better retention (Martinengo et al 2024).

In the 'train-the-trainer' model, a small group of staff are first trained as expert facilitators by external trainers, then these facilitators cascade the training to their

colleagues in the organisation, with the aim of building local capacity and reducing reliance on external expertise. Selbera et al (2021) used this approach in their oral health toolkit. While promising in theory, cascade approaches can result in training dilution as content is passed through successive layers. As a result, second-tier and third-tier trainers may have less expertise, less confidence and less time to deliver the original material in full, leading to a gradual loss of fidelity (Gask et al 2019). Maintaining fidelity requires ongoing supervision of trainers, leadership support and minimising the number of cascade layers – none of which were systematically reported in the included studies.

Behavioural change frameworks

Behavioural change frameworks offer potential solutions to the challenge of translating oral health education into sustained changes in caregivers' daily oral care practice. For example, the COM-B model (Michie et al 2011) proposes that for any behaviour to occur, a person needs capability (the physical and psychological skills required), opportunity (the time, resources and social context that enable the behaviour) and motivation (reflective decision-making and habitual processes). Applied to the included studies, most interventions focused primarily on building caregivers' capability through knowledge transfer, with limited attention to opportunity (such as protected time and resources) or motivation (such as reinforcement and supervision). This may help to explain why temporary improvements in caregivers' knowledge and behaviour regressed within weeks (Selbera et al 2021), as gains in their capability might have been undermined by gaps in opportunity and motivation.

The Health Belief Model (Rosenstock 1974) may also help to explain declining retention. This model proposes that sustained health behaviour requires perceived susceptibility to a health threat, perceived severity of that threat, perceived

benefits of action and few perceived barriers. Interventions in the included studies rarely addressed susceptibility or severity, leaving caregivers without the perceptual grounding needed to convert knowledge gains into lasting motivation.

The Theoretical Domains Framework (Cane et al 2012) synthesises 33 behaviour-change theories into 14 domains spanning capability (for example knowledge and skills), motivation (for example reinforcement and beliefs about capabilities and consequences) and opportunity (for example social influences and the environmental context and resources). This provides a systematic basis for identifying barriers to behaviour change and targeting interventions.

While these behavioural theories can illuminate why individual caregivers often find it challenging to maintain new practices, achieving sustained change ultimately requires system-level support that addresses the organisational context.

Limitations

One limitation of this systematic review was that excluding non-English-language studies may have omitted relevant research. Additionally, although grey literature was searched, publication bias – the tendency to publish positive results while suppressing null or negative findings – may have affected the evidence base, potentially overestimating the effectiveness of the interventions studied.

Sample sizes were small, with some studies including fewer than 15 participants, limiting the statistical power and generalisability of the findings. Several studies employed convenience sampling and did not use control groups. Most studies lacked blinded assessment, introducing potential observer bias. Furthermore, social desirability bias may have affected self-reported outcomes, as caregivers may have over-reported positive behaviours. The heterogeneity of study designs, outcome measures and follow-up periods limits comparability across studies and the ability to synthesise findings or

draw definitive conclusions about the effectiveness of interventions.

Excluding qualitative studies is a notable limitation, since this type of research can explain why interventions are effective or ineffective and identify barriers, such as time pressure and organisational culture. Qualitative studies can also reveal caregiver perspectives, which are essential for designing interventions that are acceptable, feasible and likely to be sustained in real-world care settings. In terms of their geographical spread, the included studies were primarily from the Global North, which limits the applicability of their findings to other healthcare systems.

Implications for practice

The findings of this systematic review suggest several considerations for healthcare professionals and organisations seeking to improve oral health outcomes for adults with intellectual disabilities. These include that:

- » Single-session training is unlikely to produce sustained behaviour change, so healthcare organisations should schedule refresher training at regular intervals, ideally every 3-6 months, to reinforce caregivers' knowledge and skills.
- » Protected time for oral care delivery should be built into daily care routines, recognising that competing demands often result in oral health being deprioritised.
- » Organisational support structures – including leadership commitment, supervision and competency assessment – are essential to create an environment in which trained caregivers can consistently implement best practice.
- » Embedding oral health in existing care frameworks and documentation systems, rather than treating it as a standalone task, may help to integrate oral care into routine practice. Without such system-level support, even well-designed educational interventions are unlikely to achieve lasting improvements.

Moreover, future research should prioritise RCTs with larger samples and follow-up periods of 6-12 months. Mixed-methods

designs would illuminate barriers to implementation and organisational factors affecting sustainability. Theory-informed educational intervention design is essential, since current educational interventions rarely employ behavioural theories. Frameworks such as the COM-B model (Michie et al 2011) and the Theoretical Domains Framework (Cane et al 2012) can offer practical structures that may be beneficial.

Conclusion

The findings of this systematic review highlight a persistent challenge: although oral health educational interventions for paid caregivers are widely used, their impact remains limited. Knowledge gains among caregivers were commonly identified; however, there is limited evidence linking educational interventions to meaningful changes in their behaviour or improved oral health outcomes. The disconnect between learning and practice is evident in the lack of improvement in gingival inflammation and the mixed outcomes in terms of plaque reduction. Therefore, providing information on oral health interventions to paid caregivers may be insufficient in isolation. Oral health education should be theory-driven, use standardised outcome measures and include ongoing support.

As life expectancy in people with learning disabilities continues to rise, there is an increasing need for effective oral health strategies for this population, and embedding these in broader care frameworks may offer a more sustainable approach. Bridging the gap between education and action is essential. Future research should examine the factors influencing caregivers' knowledge, attitudes and practices regarding oral health. Achieving sustained improvements in oral health for adults with intellectual disabilities requires a shift from individual-level education to system-level change, addressing organisational culture, resourcing, ongoing support structures and policy frameworks.

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