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e-Oral health interventions for older patients in an outreach primary dental care centre: A pilot trial nested acceptability study

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Abstract

Objective: To compare the acceptability and perceived helpfulness of an e-Oral Health intervention in form of text messages versus standard dental leaflets provided after a dental visit to patients aged 65 years and over.

Background: Oral health care needs for older people are increasing. Remote interventions using e-Health can ensure oral care is provided despite physical hindrances or situations where dental appointments are limited such as has happened more widely during the COVID-19 pandemic.

Materials and methods: Mixed-method nested study within a pilot trial. Dental patients ($n = 150$) at an outreach primary dental care centre, ≥ 65 years old, were recruited and randomly allocated to e-Oral health text messages or leaflet intervention arms. Post-intervention (6 months), participants responded to open and closed-ended two-way survey phone texts. Survey questions investigated: (a) whether they would recommend the intervention, (b) intervention helpfulness and (c) OPEN feedback. Average helpfulness scores (*Scale:1= Very Helpful to 5= Not Helpful at All*) were compared for each arm using Independent Sample t-test. Percentage of participants providing positive recommendations in each arm were compared using chi-squared tests. Qualitative findings were analysed using thematic analysis.

Results: $N = 68$ (45%) responded. Mean helpfulness scores in text group $M = 2.2$, $SD=1.1$ and leaflet group $M = 2.3$, $SD=1.9$, $P = .29$. Amongst the text arm respondents, 89% compared with 68.2% in leaflet arm; $P = .005$ would recommend the intervention. Four qualitative themes were outlined: intervention approach, content, behavioural impact and recommendations.

Conclusion: e-Oral Health text interventions are acceptable and helpful to older people, but these messages need to be tailored.

KEYWORDS

dental access, e-health, inequalities, older people's oral health

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1 | INTRODUCTION

Over the last 60 years in the UK, life expectancy has been increasing and people have been retaining their natural teeth for longer.¹⁻³ The UK Office for National Statistics (ONS) indicates that in the next 50 years, there will be a 74% increase to the current 11.8 million adults aged over 65.⁴ Evidence suggests that this will result in an increased demand for healthcare, including dental care for an older cohort.⁵⁻⁷

Ensuring that this demand for dental care is met, and older people's oral health is maintained, is a significant part of supporting healthy ageing and well-being. Good oral health enables eating and allows individuals to sustain a nutritious varied diet.⁸ It guarantees that older people remain pain-free and avoid the need for complex dental care, which may be challenging to undergo for this older cohort, who may also have co-morbidities.⁹

The limited data suggests that access to dental care for older people in England is inadequate.^{9,10} A Public Health England survey of older people in supported housing revealed that 9% were experiencing oral-related pain or had associated difficulty eating, 34.6% had not attended the dentist in two years, and 25.5% of those non-attendees were afraid or had difficulty getting to and from the dentist.¹¹ This situation has been exacerbated at times where dental appointments are limited; such as reduced domiciliary care for those unable to leave residences or as has happened more widely during the COVID-19 pandemic.

Face-to-face delivery of advice and support on how to maintain good health, including oral health is one of the more effective and preferred ways to provide health messages.¹² However, where this is not possible or not properly delivered, it may be necessary to consider other ways to ensure patients who are older do not miss out.^{13,14} Older patients may need support to promote daily oral care such as tooth-brushing and denture cleaning, which are activities that may be hampered by reduced memory or dexterity.⁹ In addition, motivation and training on oral care are required to help individuals and their carers to develop a routine to maintain their oral health. This should be available to everyone across all socioeconomic groups and ethnicities to reduce inequalities.¹⁵

Remote care in the form of telemedicine or electronic health (e-Health), including using technology such as text messages, has been successfully used to deliver motivational behavioural therapy, particularly in environments with a limited health workforce.¹⁶ With over 7 billion mobile phone connections globally, the potential for mobile text message health interventions is substantial.¹⁷ According to UK communications regulator, 'Ofcom', there were just over 83 million mobile phone subscriptions in the UK in 2013, with 93% of ownership by adults rising to 95% in 2016-2017.¹⁸ UK ONS survey results from 2016-2017 show that 91% of those aged 65-74 and 71% of those aged 75 and over-owned one to two mobile phones.¹⁸ Text messages or short messaging service (SMS), for text messaging interventions (TMI), offer a simple, low cost, and readily accessible

TABLE 1 Eligibility criteria for patient inclusion within the study

Inclusion Criteria
<ul style="list-style-type: none"> • Patient must have a scheduled course of care at UPDA. • Must be willing and able to give informed written consent and participate responsibly in the study. • Must be 65 years or older at the time of consent. • Must be dentate. • Must be fluent in spoken and written English.

method to deliver information to patients from a broad spectrum of society.¹⁹⁻²¹

Research on e-Health interventions delivered via text message has been primarily focussed on two main areas: behavioural change interventions and health reminders.²² Studies have shown that text interventions have improved several health behaviours including smoking, diet, exercise, alcohol, sexual health, self-efficacy with medication for chronic conditions, and self-care behaviours.^{20,23} Dental research in younger adults suggests that text interventions have influenced health attitudes and behaviours by increasing the knowledge of the participants and contributing to their well-being.²⁴⁻²⁶ This area of research has not, previously, included older people.

This paper reports on a nested study within a 12-month pilot trial. It investigated the acceptability of dental health text messages vs standard leaflet interventions to improve oral health behaviours of patients aged 65 years and over following a routine primary dental care visit.

2 | METHODS

This was a mixed-method, single-centre, pilot trial study undertaken at the University of Portsmouth Dental Academy (UPDA). UPDA is a National Health Service (NHS) primary dental care service and outreach training centre for dental and dental care professional students in the South of England. The nested study was conducted post-intervention, that is, 6-months into the overall study. The study design involved an open and closed-ended survey delivered by two-way text messaging.

The study was approved by the Northampton NHES REC Reference Number: 19/EM/0092, and the trial is registered at ISRCTN17331229 [<https://doi.org/10.1186/ISRCTN17331229>].

2.1 | Sampling and recruitment

Recruitment was carried out at the dental clinic at UPDA from May to November 2019 (7 months). Sample size calculation was powered at 90% suggesting that 202 subjects were needed for the main trial outcome at 12 months. All patients were identified through the electronic record appointment system, and eligible participants were

invited to participate before their dental appointment if they met inclusion criteria (Table 1).

Patients who met the inclusion criteria were sent Patient Information Packets (PIPs), via post or email, detailing the study at least 24 hour before arrival to their next appointment at the dental clinic. There were no restrictions on enrolment if participants met the criteria in Table 1. No changes occurred in eligibility criteria or outcomes after the trial commencement. A research nurse audited patient records to exclude patients who would not be able to give informed consent for the duration of the study. Patients were made aware that they could rescind their consent at any time, and no payments, reimbursements or rewards were offered to any patients at any time.

2.2 | Procedure

Patients who had consented were then randomly allocated into one of two study arms, either the text message intervention (TMI) arm or the control leaflet arm (Figure 1). Participants were asked to complete two initial Quality of Life (QoL) surveys including the Oral Health Impact Profile-14 (OHIP-14) (Figure S1 see Supplementary Information of OHIP), as well as undergo a routine dental examination. Clinical information extracted from the patient electronic management system from the dental examination formed the basis of the Baseline Clinical Outcomes. The research staff at the clinic randomised participants. Each consented participant had a number drawn randomly and those labelled with an odd participant number were allocated to the TMI arm, and each participant labelled with an even participant number were allocated to the leaflet arm.

Participants were not blinded to the randomisation arm due to the nature of the intervention. After randomisation, participants were grouped according to the week of recruitment. Following this, the two-arm intervention study was delivered. The intervention arm received texts while the other arm received a leaflet in the post. At the 6-month mark of the study, all 150 trial participants were contacted to complete the nested acceptability study survey delivered via a two-way text (Figure S2 supplementary information). Participants were asked to give their personal perceptions and recommendations of the intervention they received.

2.3 | Text message intervention arm

The Text Message Intervention (TMI) arm underwent a ten-week long intervention period where three text messages were sent per week, a total of thirty text messages per participant (Figure S2). This sequence was informed by a previous study on oral health in younger adults.²⁵ The content of the text messages was based on guidelines from the NHS Department of Health, Delivering Better Oral Health Evidence-Based Toolkit, and NHS Mouth Care Matters.²⁷ The 30 texts were based around the themes of: toothbrushing behaviours, flossing, fluoride and mouth-rinse use, denture cleaning and dry

mouth. The texts were sent to a Dental Public Health England consultant for further review and editing.

2.4 | Leaflet arm

The other arm received a leaflet in the post providing the same information contained within the thirty text messages. The leaflet was formatted in a similar way to other information leaflets available for patients to pick at the dental clinic waiting area. The content of the leaflet, similar to the texts, was also further assessed by a Dental Public Health England consultant and put through readability scoring to ensure it was clear and understandable.

2.5 | Outcomes

For this nested acceptability study two quantitative outcomes were assessed; 'the average score of the perceived helpfulness of the intervention based on a scale score' and 'the proportion of participants who would recommend the interventions in each arm'. The qualitative data from the open-ended responses which outlined views on the interventions and any recommendations, were analysed for relevant themes. 'Helpfulness' was assessed via a Likert scale of 1 to 5; where, 1 = *Extremely Helpful*, 2 = *Very Helpful*, 3 = *Somewhat Helpful*, 4 = *Not So Helpful*, and 5 = *Not Helpful at All*. Whereas a binary response of 'YES' or 'NO' was used to assess the proportion of participants who would recommend their interventions.

The primary outcomes for the main trial will be assessed after 12 months from scores of the oral health-related QoL short-form surveys, the OHIP-14 and GHQ-12 and clinical outcomes detailed in the trial protocol available in ISRCTN17331229 [<https://doi.org/10.1186/ISRCTN17331229>].

2.6 | Data management and analysis

Following the return of responses to the nested study, the baseline demographic characteristics of all the recruited study participants were analysed descriptively in comparison to the respondents of the 6-month survey. This was to establish representativeness of the study respondents.

The data were also compared for statistical differences in allocation to each arm by social demography. The analysis involved chi-squared test (categorical variables) and an independent T-test (continuous variables). This was to ensure that random assignment established comparability across the two groups in both the main sample and the 6-month sample. In addition, we compared individuals who participated in the nested study, and those who did not respond to this phase of the study, to assess potentially biased representation.

Finally, we analysed responses to the nested acceptability survey. We computed mean scores of the helpfulness of the

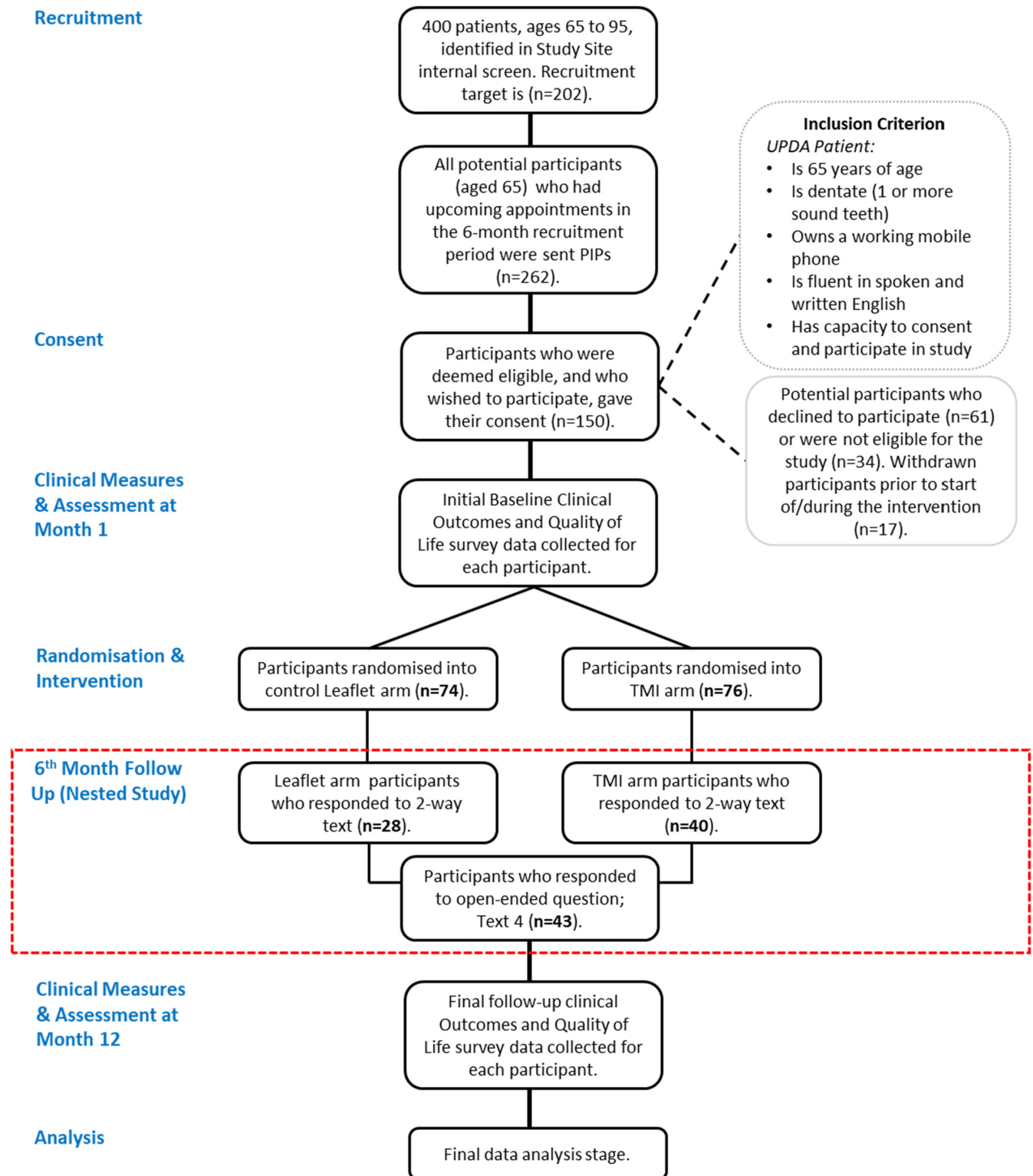


FIGURE 1 Flow Diagram outlining the study structure, including the number of participants at each stage, with special notice to the '6th Month Follow Up (Nested Study)', which encompasses the focus of this Acceptability Study

intervention and the proportion of participants recommending the intervention within each intervention arm. We conducted logistic regression models predicting helpfulness as a binary measure – where a score of '3' and above being 'Not Helpful',

and below as being 'Helpful', and the same for choosing to recommend 'YES or NO'. Statistical significance was tested using a two-sided P -value $< .05$. Qualitative data were analysed using thematic analysis.²⁸

3 | RESULTS

3.1 | Quantitative results

The total sample of participants who experienced the intervention was $n = 150$ adults (43% female; Mean Age = 71.6, Standard Deviation SD = 5.5), Figure 1. There were $n = 262$ patients who were approached to participate; $n = 61$ declined to participate, $n = 34$ were deemed not eligible for the study, and the remainder, $n = 167$, gave consent to participate. Of these, $n = 17$ were withdrawn before the start of the intervention, as they were found to have inaccurately agreed to possess a mobile phone, had no teeth by the time the intervention was to begin and were unable to continue due to personal reasons such as bereavement. This left $n = 150$ and the intervention arms randomly allocated as follows: TMI arm ($n = 76$), and leaflet arm ($n = 74$). Of the $n = 150$ participants who completed the intervention period, $n = 68$ responded to the nested study at the 6-month assessment period.

Table 2 displays the characteristics of participants within the leaflet and text groups. Although only 45% responded to the nested study survey, there was a non-biased distribution of respondents between the leaflet and the text group. There were no statistically significant differences between the two arms at baseline and during the nested study. This was assessed by looking at the proportion of participants in both samples by deprivation categories, sex and baseline clinical disease risk scoring category (red, amber and green).

The findings displayed in Table 3 show that the text arm had a lower mean helpfulness score of 2.3 (s.d 1.1), which indicates a positive response. This was, however, not statistically different from the leaflet group mean helpfulness score of 2.5 (s.d 1.3). The proportion of participants in the text arm who would recommend the

intervention (89%) was higher than those in the leaflet arm (68.2%); P value = .049. Thus, indicating a statistically significant difference for this measure.

3.2 | Qualitative results

Thematic analysis was undertaken on the qualitative data from the open-ended question, Text 4, in the two-way text survey (Figure S2). This was reviewed by two researchers CC and KW who reviewed the feedback independently and then discussed and agreed on the themes. JJ subsequently reviewed the themes and associated quotes independently for further validation. Four themes were identified from the responses from the participants, from either the TMI arm or the leaflet arm of the study (Table 4). A total of 43 out of the 68 who responded to the whole survey responded to the open-ended survey question (TMI Arm participants: $n = 26$, Leaflet Arm participants: $n = 17$). Participants will be referred to as 'Participant x' or 'Px'; where 'x' represents a numerical value of 1 to 43.

3.2.1 | Theme 1: Intervention Approach – e-Health versus Leaflet intervention

Half of the TMI participants (13/26) who responded to Text 4 from the two-way text found the use of texts to be an efficient way to provide advice and as reminders.

P7 (Texts): "I would recommend this particular method to improve self-care. It's a great reminder to do my routine and keep going."

TABLE 2 Characteristics of study participants at baseline compared to nested study at 6-months, grouped by intervention arms

		Baseline, $n = 150$		Nested study, $n = 68$ (6 mo)	
Participant characteristics		Leaflet	Texts	Leaflet	Texts
No of participants (%)					
Total n		74 (100)	76 (100)	28 (100)	40 (100)
Deprivation by Index of multiple deprivation quintile	1	8 (10.8)	10 (13.2)	2 (7.1)	5 (12.5)
	2	25 (33.8)	21 (27.6)	7 (25)	12 (30)
	3	20 (27)	16 (21.1)	10 (35.7)	8 (20)
	4	13 (17.6)	15 (19.7)	7 (25)	5 (12.5)
	5	8 (10.8)	14 (18.4)	2 (7.1)	10 (25)
Sex	Female	32 (43.2)	33 (43.4)	14 (51.9)	20 (50)
Dental disease risk rating	Red risk %	17 (23)	27 (35)	7 (25)	11 (27.5)
Mean (S. D)					
Age		71.9 (5.5)	71.6 (5.3)	70.7 (4.8)	71.3 (4.9)
OHIP score		11.9 (8.8)	10.2 (9.2)	10.4 (7)	10.2 (8)

Note: Leaflet versus Text arm comparability for deprivation quintiles, sex and risk rating analysed by: χ^2 test while for Age and OHIP score analysed using independent sample t-test. Significance tested at $P < .05$ *denotes $P < .05$.

TABLE 3 Comparison of average 'Helpfulness' Score and % of participants recommending the intervention between the two intervention arms

Nested study outcomes	Leaflet	Text	P-Value
Mean helpfulness scores Mean(s.d)	2.5 (1.3)	2.3 (1.1)	.28
Recommended the Intervention Number of Participants (%)	15 (68.2)	32 (89)	.05*

Note: n between the two outcomes differs as some participants did not answer all survey questions; n = 60 responded to helpfulness question and n = 59 to recommendation question. Helpfulness score analysed using Independent sample t-test; n (%) recommending the intervention analysed by χ^2 square test.

Abbreviations: n, number of participants; s.d, standard deviation.

* $P < .05$.

P13 (Texts): "Good to have the texts as gentle reminders to keep up regular brushing."

There were still some who preferred the use of a leaflet instead of texts.

P18 (Texts): "Think I would probably have preferred a leaflet, as an ongoing reference could be made."

P25 (Texts): "I think a leaflet would have been better. I do think I would recommend it. It probably wasn't the best way to remind me as I am elderly and not keen on technology. I think the leaflets would be better for people like me."

There was mixed feedback around the frequency of the texts.

P20 (Texts): "(The texts) were sometimes (sent) too frequently... but (it was) good to get prompts."

P11 (Texts): "I think it would be a good idea to issue a follow-up message sooner into the programme just to remind those who have lapsed (memories)."

P32 (Leaflet): "(The) leaflet was informative, but once read, soon forgotten. (I) expect texts would be more effective with on-going reminders."

3.2.2 | Theme 2: Content of health information

A total of 6/43 Participants felt that the information contained in both the texts and the leaflet interventions were simple and generic. For the majority of participants, this meant it was easy to understand, while a few felt this meant it was also less personal.

TABLE 4 Themes arising from the participant responses to the nested study at 6-months

Themes	Sub-Theme
<i>Theme 1: Intervention Approach</i>	<ul style="list-style-type: none"> • Benefits of Texts • Benefits of Leaflets • Preferences
<i>Theme 2: Content of Health Information</i>	<ul style="list-style-type: none"> • Complexity of Health Information • Target Group
<i>Theme 3: Behavioural Impact</i>	<ul style="list-style-type: none"> • Behavioural Changes • Influences of Behaviour
<i>Theme 4: Recommendations for Improvement</i>	<ul style="list-style-type: none"> • Positives • Drawbacks • Future Developments

The few who thought the messages were impersonal or too generic commented that;

P23 (Texts): "Advice was quite limited."

P35 (Leaflet): "Information was generic and did not address any individually relevant problems".

Others found the texts and leaflets helpful as both a source of information and a reminder.

P27 (Leaflet): "Helpful to be reminded."

P13 (Texts): "The texts were useful reminders of the instructions given during visits to the Dental Academy."

P28 (Leaflet): "Advice on proper use of a whole range of brushes, floss, interdental tools and so on has been invaluable."

Some participants stated that the content of the information they received did not differ from the advice received from their usual dental visits to the UPDA clinic, where most would also be reviewed by a hygienist as well. In this subset, there was a view that the greatest motivation for carrying out all the advised mouth care was the face-to-face interaction with, and feedback on their progress, from their clinician during their dental visits.

P28 (Leaflet): "I have found advice when visiting the Dental Academy has been most valuable in improving my oral health and hygiene."

P36 (Leaflet): "(The) leaflet was just reminding me about what I knew I was doing. So, it didn't really help me. This is because I have been well taught by the Dental Academy and see them 2 or 3 times a year."

One participant was “shocked” into action after having their care discontinued at a hygienist's visit, due to poor compliance. When they were re-enrolled into the programme, they reported that they were much more “disciplined”.

P32 (Leaflet): “For me, real motivation came after a bad set of scores - the hygienist said I was not prepared to continue with treatment. Being chucked off the programme shocked me. The loss of something I valued was a very good motivator. I got a second chance the following academic year and have maintained a disciplined cleaning routine.”

3.2.3 | Theme 3: Reported behavioural impact from the intervention

Not all the participants chose to mention if there was any behavioural impact to their normal routine, but those who did mention a positive impact (8/43) reported specific changes to their mouth care as a result of either the texts (6/43) or leaflets (2/43).

Those in the text group stated:

P2 (Texts): “I would recommend this method as it was a help to me, thank you. What I noticed most was that it spurred me on to brush my teeth twice a day, morning and evening... it has been a great use to me.”

P5 (Texts): “I like having texts, it helped to remind me that my teeth are important and that kept it at the forefront of my mind. Night brushing goes without saying, but brushing in the AM is difficult. Getting two grandchildren ready takes priority, but I am now trying to brush more regularly in the AM Thank you.”

While examples from the leaflet group included:

P27 (Leaflet): “Flossing with an interdental brush was my main benefit. I had learned a lot of the stuff already from the (Dental Academy), but it was helpful to be reminded. Thank you.”

P40 (Leaflet): “I floss a lot more than I used to. Didn't realise how important it is.”

3.2.4 | Theme 4: Participants' suggestions for improvement

Participants provided feedback about improvements to the frequency and content of the text-messaging service, including suggesting that it would be useful for individuals with learning disabilities.

P18 (Texts): “(I) would have liked more reminders over the months.”

P20 (Texts): “(I) liked most statements, sometimes (they were sent) too frequently. Better to space (them) out.”

P31 (Leaflet): “If (the intervention is) given after treatment (at the Dental Academy), also add on for homeless/outdoor pursuits, ‘If no facility water rinse and swallow after eating’.”

P34 (Leaflet): “I would have liked to have more interaction with those people (par)taking (in) the study.”

P35 (Leaflet): “The advice provided in the leaflet was in line with my normal dental care. I would only recommend this type of education for children or for those with learning disabilities. The information was generic and did not address any individually relevant problems. There are questions I would have liked to have asked relating to the complications caused by the wearing and fragility of teeth in my age group and also of the best treatments and preventative measures.”

P22 (Texts): “(The intervention method) would be really good for people with learning disabilities and autism.”

4 | DISCUSSION

This nested study examined the acceptability of e-Oral health text messaging versus a leaflet to deliver an oral health intervention for older patients. This study delivered on the call to include older patients in digital health studies by asking them what they want.²⁹ The study uncovered new findings that older people found texts and leaflets acceptable, helpful, and worth recommending as an additional aide to the advice given during routine dental care. There was a slight preference towards texts over leaflets when it came to recommend one intervention over the other. The qualitative findings triangulated the quantitative findings and indicated that participants preferred more individualised and tailored motivational content.

There were study limitations related to achieving the target sample size for both the main trial and the nested study. This was mainly due to early exit or refusal to participate for health reasons, which is consistent with other studies in older populations.³⁰ The COVID-19 pandemic also presented additional challenges, as the early period of the nested study coincided with the first peak of the pandemic, so some participants did not respond. However, we did get a representative balance in the response to the nested study in both intervention

arms, and we were able to attain a sample that could meet acceptable parameters for the analysis of our outcomes. Additionally, the use of a mixed-method allowed us to enhance the interpretation of significant findings in quantitative data from small sample sizes.³¹ Another challenge was establishing whether participants read the content of the interventions. A possible solution is for future interventions to incorporate a facility for "read receipts" for texts. Nevertheless, the use of mixed-method techniques also allowed us to investigate this to some extent, and the participants' open-ended qualitative survey responses included descriptions of the content. This suggested that they received and read texts and leaflets.

As far as study strengths, to our knowledge, this is the first study to use text message interventions to deliver oral health behaviour advice to older people living in the community. Most studies have focussed on younger adults, adolescents, and mothers.^{24-26,32} This is also the first study to utilise two-way texts to survey the views of an older cohort on e-oral health text messaging. This demonstrates the fidelity of this intervention and survey approach. Although the study was planned and started before the COVID-19 pandemic, it was timely, as it highlighted the potential of e-oral health interventions at a time when dental practitioners struggled to see patients face-to-face; evidenced by the fact that dental appointments dropped by 75% during the pandemic.³³ This study provides new insights for potential ways to better support older patients remotely. It provides evidence for the movement to improve digital literacy or alphabetization among older adults showing how this can improve their quality of life.

Although the findings can not be directly compared to other similar dental studies, as no dental studies have tested the use of texts to change oral health behaviour for this age group, related studies in general medicine on the use and acceptability of text messages to remind patients over 65 to take their medicine or attend their medical appointments, have found similar results to our study.^{20,34} This study therefore expands evidence for the potential use of these text messages as an effective behavioural change intervention for health overall.

The participants articulated their need for tailoring of the intervention messages to their individual need in order to improve the impact of the messages. Some even described specific questions they had concerning their own oral health. Our previous research has suggested that delivery of oral health messages to an individual should be preceded by an assessment of their needs using validated behavioural questions.¹² The responses of the participants in this study advocates the need for more research on the complexity of the intervention required, and the potential to co-develop these interventions with older patients to ensure they are tailored to their needs. Some participants even commented on the desire to meet other participants to discuss the intervention. Co-design is considered an ideal way to improve acceptability of e-Health for older patients.²⁹ Our findings support the phenomenological findings of Greenhalgh et al³⁵ (2013), which highlight that older patients represent a heterogeneous group with diverse

needs. We need to consider this in all areas of health research, including dentistry.

Improving access to care through e-Health and teledentistry, which includes use of texts, has been proposed as a possible solution for many aspects of dental care provision during the COVID-19 pandemic, but there has been little empirical evidence to support this approach to date.^{36,37} This study provides useful initial data in this field. Future research, which would require a larger sample, should explore the impact of these interventions versus a control arm of no intervention to advance understanding on the effectiveness of the interventions. In addition, more co-designed research involving both patients and dental practitioners is required. We should also continue to consider additional ways to extend dental care after dental visits.

5 | CONCLUSION

Our study indicates that e-Oral health interventions are acceptable to older patients. Extending preventive care following a routine dental visit using texts or leaflets which include oral health messages was found to be helpful and motivating. It is important to consider tailoring the messages to individual needs and co-designing interventions may help with this. e-Health interventions such as texts have a wide reach and could address disparities of dental health care irrespective of age, physical restrictions on dental attendance or socioeconomic standing. Further research on the development and impact of these interventions is required.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

AUTHOR CONTRIBUTIONS

KW designed study, analysed data, drafted paper, CC collected data, analysed qualitative data and contributed to drafting the paper, JJ analysed qualitative data and contributed to drafting the paper, CL facilitated data collection and contributed to drafting the paper.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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