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Original Article

Dental Anxiety and Trust-Building in Technology-Assisted Oral Care: A Qualitative Descriptive Study

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ABSTRACT

Background: Dental anxiety remains an important barrier to preventive and timely oral healthcare. Although technology-assisted dentistry, including digital radiography, intraoral scanning, teledentistry, artificial intelligence-supported interpretation and virtual reality distraction, may improve communication, access and patient comfort, anxious patients may also experience these tools as unfamiliar, intrusive, costly or poorly explained. Qualitative inquiry is needed to understand how patients interpret digital dental tools in relation to fear, control, privacy, cost and trust. Objective: To explore how adults with dental anxiety perceive technology-assisted oral care, identify barriers and facilitators influencing acceptance, and examine how explanation, consent, professional accountability and relational care shape trust. Methods: This qualitative descriptive study used 12 anonymised participant accounts from adult dental patients who reported anxiety, fear, hesitation or discomfort related to dental care and technology-assisted tools. Accounts were analysed using reflexive thematic analysis, combining deductive coding informed by dental anxiety, consent, privacy and technology acceptance with inductive coding of participant meanings. Results: Six themes were identified: fear of pain, gagging and loss of control; explanation as the basis of trust; visualisation as reassurance and exposure; privacy, AI and data uncertainty; cost and access as trust signals; and relational care as the overarching trust-builder. Technology-assisted care was more acceptable when patients received clear explanations, stop signals, privacy clarification, cost transparency and visible clinician accountability. It became more anxiety-provoking when tools were unfamiliar, intrusive, financially unclear or perceived as replacing human care. Conclusion: Technology-assisted oral care should be implemented through a trust-first approach that combines digital competence with anxiety-sensitive communication, meaningful consent, patient control, privacy safeguards, cost transparency and non-judgemental relational care. Keywords: dental anxiety; digital dentistry; trust; teledentistry; artificial intelligence; technology-assisted oral care

EDITORIAL INFORMATION

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INTRODUCTION

Oral diseases remain a major public health concern because they affect nutrition, speech, appearance, self-confidence, social participation and overall quality of life, while also contributing to avoidable clinical and economic burdens when preventive care is delayed or missed [1,2]. Global evidence shows that untreated dental caries and other oral conditions remain highly prevalent, and delayed attendance continues to limit the effectiveness of prevention-oriented oral healthcare [3]. For many patients, late presentation is not explained only by limited access or lack of knowledge. It is also shaped by fear, previous painful experiences, embarrassment, perceived judgement, cost concerns and loss of control during

dental procedures [4-6]. Dental anxiety therefore represents both an emotional and behavioural barrier to timely oral care, particularly when patients anticipate pain, gagging, choking, diagnosis, shame or loss of agency in the dental chair [4,5].

Technology-assisted oral care has become increasingly prominent in contemporary dentistry through digital radiography, intraoral scanning, computer-assisted treatment planning, teledentistry, artificial intelligence-supported interpretation and virtual reality-based distraction. These tools may improve diagnostic communication, shorten procedural time, support remote triage, increase visual understanding and enhance patient comfort in selected clinical situations [7-14]. However, technology does not automatically produce reassurance. For anxious patients, a scanner, image, headset, remote consultation or algorithmic interpretation may be interpreted through earlier experiences of pain, vulnerability, cost, privacy concern or distrust. A device intended to improve efficiency may intensify anxiety if its purpose is not explained, if the patient cannot ask questions, if alternatives are not discussed, or if professional responsibility for decisions is unclear.

A qualitative approach is particularly appropriate because dental anxiety and technology acceptance are not determined by technical performance alone. They are shaped by meanings, expectations, bodily sensations, relational trust, consent, perceived control, privacy, affordability and the communication style of dental professionals. Quantitative measures can estimate anxiety levels, satisfaction or service use, but they are less able to explain why one patient experiences a digital tool as reassuring while another experiences it as intrusive or threatening. Qualitative inquiry allows closer examination of how patients interpret AI-supported interpretation, intraoral images, teledentistry, virtual reality and other digital tools in relation to trust, vulnerability, consent and control.

This study was guided by a qualitative SPIDER/PICo-informed framing. The sample of interest comprised adult dental patients with anxiety, fear or hesitation toward oral care; the phenomenon of interest was technology-assisted dentistry and trust-building; the context was patient experience of digitally supported oral care; and the evaluation focused on perceptions, barriers, facilitators and meanings generated through qualitative analysis. This framing was used to examine not whether technology objectively reduces dental anxiety, but how anxious patients understand and respond to technology-assisted oral care in clinical and communication contexts.

This study aimed to explore how adults with dental anxiety interpret technology-assisted oral care and how these interpretations shape trust in dental services. Specifically, it examined patients' perceptions of digital dental tools, anxiety-related barriers and facilitators associated with their use, the role of explanation, consent, privacy, cost and professional accountability, and the relational conditions under which technology-assisted oral care becomes more acceptable, ethical and patient-centred.

MATERIAL AND METHODS

This study used a qualitative descriptive design with an interpretative orientation to explore how adults with dental anxiety understood, accepted, questioned or resisted technology-assisted oral care. A qualitative design was selected because the study focused on meanings, perceptions, trust, fear, consent, control and service experience rather than the measurement of intervention effects or statistical associations. The study was informed by qualitative reporting principles, including the Standards for Reporting Qualitative Research and the Consolidated Criteria for Reporting Qualitative Research, to strengthen transparency in design, sampling, data collection, analysis and interpretation [28,29].

Participants were adult dental patients who reported anxiety, fear, hesitation or discomfort in relation to dental care and who had direct or anticipated experience of at least one technology-assisted oral care modality, including intraoral scanning, digital radiography, visual treatment planning, teledentistry, artificial intelligence-supported interpretation or virtual reality distraction. Participants were eligible if they were aged 18 years or older, able to provide informed consent, and able to describe their experience or expectations of technology-assisted dental care. Patients were excluded if they were unable to provide consent, were experiencing acute distress that made participation inappropriate, or could not complete

the qualitative account procedure in the study language. The final dataset consisted of 12 anonymised participant accounts labelled P01 to P12. The sample was purposive rather than statistically selected, with the aim of obtaining information-rich accounts reflecting variation in technology exposure, primary anxiety concern and trust-building need. The sampling logic was therefore based on relevance to the phenomenon of interest, diversity of patient experience and adequacy of information for thematic interpretation rather than numerical representativeness.

Participants were recruited through the Department of Clinical Dentistry, Universitas Prima Indonesia, from adult dental patients with relevant experiences or concerns regarding technology-assisted oral care. Recruitment was conducted within the dental academic and clinical setting by members of the research team. Potential participants were approached after identification as eligible adult patients with dental anxiety, hesitation or discomfort related to dental treatment and digital dental tools. The study purpose, voluntary nature of participation, confidentiality protections and right to withdraw were explained before participation. Participation was not linked to clinical treatment decisions, and refusal to participate did not affect access to care. Non-participation and refusals were not included in the analytic dataset.

Data were collected through structured anonymised qualitative participant accounts using open-ended prompts developed from the study objectives, prior literature on dental anxiety and technology acceptance, and discussion within the research team. The prompts explored previous dental experiences, fears related to pain, gagging, diagnosis and loss of control, experiences or expectations regarding digital dental tools, perceptions of teledentistry, AI-supported interpretation and visual imaging, consent and privacy concerns, cost-related concerns, and features of communication that increased or decreased trust. The account format allowed participants to describe experiences in their own words while ensuring that all accounts addressed the core domains of anxiety, technology exposure, consent, privacy, cost and trust. Data were collected in a private and non-judgemental setting to minimise embarrassment and encourage honest reporting of anxiety-related experiences.

All data were anonymised before analysis. Identifying information was removed during data preparation, and participants were assigned codes from P01 to P12. The anonymised accounts were organised into an account matrix documenting technology exposure, primary trust source, primary anxiety concern and trust-building need. Data were stored securely and were accessible only to the research team. Direct extracts selected for reporting were anonymised and labelled by participant code and relevant technology context, such as “P03, intraoral scanner” or “P08, AI-supported imaging,” to preserve confidentiality while maintaining analytic transparency.

The research team consisted of authors from the Department of Clinical Dentistry, Universitas Prima Indonesia. The team had disciplinary familiarity with dental care, patient communication and technology-assisted oral health services. Because researchers’ professional backgrounds could shape interpretation of patient anxiety, trust and technology acceptance, reflexivity was addressed through team discussion during coding and theme development. The researchers considered how assumptions about the clinical benefits of digital dentistry could influence interpretation and therefore gave particular attention to patient concerns about pain, gagging, embarrassment, privacy, cost and loss of control. Reflexive discussion was used to ensure that technology was not interpreted only from a clinician-centred perspective, but also from the standpoint of anxious patients’ perceived vulnerability and need for trust.

Data were analysed using reflexive thematic analysis, following stages of familiarisation, initial coding, theme development, theme review, theme definition and analytic writing [26,27]. The analysis combined deductive and inductive coding. Deductive codes were informed by the study objectives and concepts of dental anxiety, perceived control, consent, technology acceptance, privacy, cost and trust, while inductive coding allowed additional meanings to emerge from participant accounts. Initial coding was conducted across all 12 accounts, and codes were organised into a coding matrix. Codes with conceptual similarity were grouped into candidate themes, which were then reviewed against the full dataset to ensure that they were internally coherent, distinct from each other and grounded in participant accounts. Coding decisions and theme definitions were discussed among the authors until interpretative agreement was reached.

Because the study used an interpretative qualitative approach, analytic consistency was pursued through discussion, comparison and refinement rather than statistical intercoder agreement.

The adequacy of the sample was assessed through the depth and relevance of the 12 accounts to the focused study aim. The accounts provided sufficient information power for the descriptive and interpretative purpose of the study because they represented varied technology contexts, including intraoral scanning, digital radiography, visual treatment planning, teledentistry, AI-supported interpretation, virtual reality distraction and digital communication. During analysis, later accounts were reviewed to determine whether they added new major themes or mainly elaborated existing concepts. No additional major thematic domains were identified after review of the full dataset, although the findings were interpreted as context-specific qualitative insights rather than statistically generalisable evidence.

Trustworthiness was strengthened through credibility, dependability, confirmability and transferability strategies. Credibility was supported by close reading of participant accounts, systematic comparison across cases and use of representative participant evidence in theme development. Dependability was supported by documenting coding steps, coding matrices, theme development and analytic decisions. Confirmability was enhanced through reflexive team discussion and preservation of an analytic trail linking accounts, codes, themes and supporting extracts. Transferability was supported by describing participant technology exposure, anxiety-related concerns and trust-building needs, while avoiding claims of statistical generalisability. Triangulation was addressed analytically by comparing accounts across different technology contexts, including intraoral scanning, digital imaging, teledentistry, AI-supported interpretation, virtual reality distraction and digital reminders or education. Formal member checking was not conducted, which is acknowledged as a limitation.

The study obtained ethical approval from the Department of Clinical Dentistry, Universitas Prima Indonesia. Written informed consent was obtained from all participants before participation. Participants were informed that they could decline to answer any question or withdraw without consequences for their care. Given the sensitive nature of dental anxiety, distress, shame and previous negative clinical experiences, data collection was conducted using non-judgemental language, and participants were not pressured to describe traumatic experiences in detail. Confidentiality was maintained through de-identification, secure data storage and anonymised reporting. No identifiable clinical images, dental records or personal data were included in the manuscript.

FINDINGS

The analysis generated six interrelated themes describing how adults with dental anxiety interpreted technology-assisted oral care. These themes were: fear of pain, gagging and loss of control; explanation as the basis of trust; visualisation as reassurance and exposure; privacy, artificial intelligence and data uncertainty; cost and access as trust signals; and relational care as the overarching trust-builder. Across the 12 anonymised participant accounts, technology was not interpreted as inherently reassuring or threatening. Instead, participants' responses depended on how the technology was introduced, whether bodily control was preserved, whether costs and data use were explained, and whether the dental team communicated in a respectful and non-judgemental manner.

Table 1. Theme Matrix Across Participant Accounts and Technology Contexts

Theme	Supporting participant accounts	Technology contexts represented	Qualitative magnitude	Verbatim account/profile extracts
Fear of pain, gagging and loss of control	P01, P03, P04, P06	Intraoral scanner, digital impressions, VR distraction	Frequent across anxiety-related accounts and present across several device-based contexts	"Previous painful extraction and loss of control"; "Gagging, choking and embarrassment"; "Distrust of unfamiliar device"; "Fear of losing awareness during procedure"
Explanation as the basis of trust	P01, P03, P04, P07, P08, P12	Intraoral scanner, digital impressions, teledentistry, AI-supported X-ray reading, general technology-assisted care	Frequent and cross-cutting across multiple technology contexts	"Clear stop signal and pacing"; "Gentle explanation and reassurance"; "Simple demonstration before use"; "Clear pathway to face-to-face review"; "Dentist confirmation of responsibility"; "Respectful, non-judgemental communication"

Theme	Supporting participant accounts	Technology contexts represented	Qualitative magnitude	Verbatim account/profile extracts
Visualisation as reassurance and exposure	P05, P11	Visual treatment planning, digital information and education	Moderate; concentrated in accounts involving visual information and digital education	"Embarrassment when viewing oral images"; "Non-judgemental image explanation"; "Wanted reliable online guidance"; "Official and consistent information"
Privacy, AI and data uncertainty	P08, P09	AI-supported X-ray reading, digital reminders and education	Moderate; concentrated in accounts involving AI, data use and digital communication	"Uncertainty about machine decision-making"; "Dentist confirmation of responsibility"; "Privacy and data storage concern"; "Plain explanation of data use"
Cost and access as trust signals	P02, P07, P10	Digital radiography, teledentistry triage, technology-assisted treatment	Moderate; present where technology was linked to affordability, access or care pathway concerns	"Fear of diagnosis and treatment cost"; "Cost explanation before imaging"; "Worry that remote care missed severity"; "Clear pathway to face-to-face review"; "Concern that technology increased fees"; "Transparent costs and alternatives"
Relational care as the overarching trust-builder	P01, P03, P05, P06, P12	Intraoral scanner, visual treatment planning, VR distraction, general dental care	Frequent and cross-cutting across fear, embarrassment, control and previous disrespectful care	"Clear stop signal and pacing"; "Gentle explanation and reassurance"; "Non-judgemental image explanation"; "Option to remove headset and pause"; "Past disrespectful dental care"; "Respectful, non-judgemental communication"

Fear of pain, gagging and loss of control was a frequent theme across accounts involving intraoral scanning, digital impressions and VR distraction. Participants did not evaluate technology only as a modern or efficient clinical tool. They interpreted it through bodily vulnerability and previous dental experiences, including "Previous painful extraction and loss of control," "Gagging, choking and embarrassment," "Distrust of unfamiliar device," and "Fear of losing awareness during procedure." These account extracts show that anxiety was not limited to pain alone; it also involved gagging, choking, unfamiliarity, loss of awareness and uncertainty about whether the procedure could be stopped. Technology-assisted care appeared more acceptable when participants were given control mechanisms such as "Clear stop signal and pacing" or an "Option to remove headset and pause."

Explanation as the basis of trust was one of the strongest cross-cutting themes. Participants' trust-building needs repeatedly centred on clear, gentle and specific communication before technology was used. Relevant account extracts included "Gentle explanation and reassurance," "Simple demonstration before use," "Clear pathway to face-to-face review," "Dentist confirmation of responsibility," and "Respectful, non-judgemental communication." These findings suggest that explanation was not merely supplementary information; it was a condition for trust. Participants were more likely to accept digital tools when clinicians explained the purpose of the technology, demonstrated unfamiliar devices, clarified what would happen next and remained visibly responsible for care decisions.

Visualisation as reassurance and exposure showed a more ambivalent pattern. Visual treatment planning and digital information could support understanding, but they could also expose patients to embarrassment. This was evident in the account extract "Embarrassment when viewing oral images," paired with the trust-building need for "Non-judgemental image explanation." Another participant account identified the need for "Official and consistent information" in response to wanting "reliable online guidance." These accounts indicate that visual and digital information can reassure patients when it is presented respectfully, but may intensify shame if oral images are used harshly or without sensitivity.

Privacy, AI and data uncertainty emerged mainly in accounts involving AI-supported X-ray reading and digital reminders or education. Participants did not necessarily reject digital or AI-supported technologies, but they wanted clarity about data use and human responsibility. The relevant account extracts included "Uncertainty about machine decision-making," "Dentist confirmation of responsibility," "Privacy and data storage concern," and "Plain explanation of data use." These findings indicate that AI and digital systems were more acceptable when patients understood that the dentist remained accountable, that data use was explained plainly and that technology supported rather than replaced professional judgement.

Cost and access as trust signals appeared in accounts where digital radiography, teledentistry or technology-assisted treatment raised concerns about affordability, seriousness of symptoms or care pathways. Participants described or were characterised by "Fear of diagnosis and treatment cost," "Worry that remote care missed severity," and "Concern that technology increased fees." The corresponding trust-

building needs were "Cost explanation before imaging," "Clear pathway to face-to-face review," and "Transparent costs and alternatives." These accounts suggest that cost clarity and access pathways were part of trust-building. Technology could signal modern and accessible care, but it could also be interpreted as added expense or insufficient attention if cost and follow-up options were not explained.

Relational care was the overarching trust-builder because it shaped how participants interpreted all technology-assisted encounters. The strongest relational extracts included "Past disrespectful dental care," "Respectful, non-judgemental communication," "Gentle explanation and reassurance," "Non-judgemental image explanation," and "Clear stop signal and pacing." These accounts suggest that technology became acceptable when embedded in respectful, responsive and patient-controlled care. The decisive issue was not only the device itself, but whether the professional relationship made the patient feel safe, heard and able to participate in decisions.

Table 2. Verbatim Account Extracts Mapped to Themes and Subthemes

Theme	Subtheme	Participant account	Verbatim account/profile extract	Interpretation
Fear of pain, gagging and loss of control	Pain anticipation and previous trauma	P01	"Previous painful extraction and loss of control"	Previous painful care shaped the need for control before accepting intraoral scanning.
Fear of pain, gagging and loss of control	Gagging and choking	P03	"Gagging, choking and embarrassment"	The mouth-based nature of dental technology was linked to bodily vulnerability.
Fear of pain, gagging and loss of control	Fear of losing awareness	P06	"Fear of losing awareness during procedure"	VR distraction was acceptable only when the patient could remain able to pause or remove the device.
Explanation as the basis of trust	Stop signal and pacing	P01	"Clear stop signal and pacing"	Procedural control helped transform technology from imposed intervention to negotiated care.
Explanation as the basis of trust	Gentle explanation	P03	"Gentle explanation and reassurance"	Explanation reduced anxiety by preparing the patient for sensations and procedure flow.
Explanation as the basis of trust	Demonstration before use	P04	"Simple demonstration before use"	Unfamiliar devices required demonstration before acceptance.
Explanation as the basis of trust	Continuity after remote care	P07	"Clear pathway to face-to-face review"	Teledentistry required a clear escalation route to maintain trust.
Explanation as the basis of trust	Human responsibility	P08	"Dentist confirmation of responsibility"	AI-supported interpretation was more acceptable when professional accountability remained visible.
Visualisation as reassurance and exposure	Embarrassment from images	P05	"Embarrassment when viewing oral images"	Visual evidence could increase shame if not presented sensitively.
Visualisation as reassurance and exposure	Non-judgemental explanation	P05	"Non-judgemental image explanation"	Visual tools were more acceptable when images were framed as aids to understanding rather than judgement.
Visualisation as reassurance and exposure	Reliable digital information	P11	"Wanted reliable online guidance"	Digital information was valued when it was dependable and professionally consistent.
Visualisation as reassurance and exposure	Consistency of information	P11	"Official and consistent information"	Trust in digital education depended on credibility and consistency.
Privacy, AI and data uncertainty	Machine decision-making	P08	"Uncertainty about machine decision-making"	AI raised concern when responsibility for interpretation seemed unclear.
Privacy, AI and data uncertainty	Human accountability	P08	"Dentist confirmation of responsibility"	Human oversight helped reduce uncertainty about AI-supported X-ray reading.
Privacy, AI and data uncertainty	Data storage	P09	"Privacy and data storage concern"	Digital communication raised concerns about how personal dental information was stored.
Privacy, AI and data uncertainty	Plain-language data explanation	P09	"Plain explanation of data use"	Trust depended on clear explanation of what information was collected and how it was used.
Cost and access as trust signals	Diagnosis and treatment cost	P02	"Fear of diagnosis and treatment cost"	Digital radiography could trigger financial anxiety when cost implications were unclear.
Cost and access as trust signals	Cost explanation before imaging	P02	"Cost explanation before imaging"	Cost transparency was needed before accepting imaging.
Cost and access as trust signals	Remote care uncertainty	P07	"Worry that remote care missed severity"	Teledentistry could improve access but created concern if clinical seriousness was uncertain.
Cost and access as trust signals	Technology as added fee	P10	"Concern that technology increased fees"	Technology could be interpreted as upselling when costs were not transparent.
Cost and access as trust signals	Alternatives	P10	"Transparent costs and alternatives"	Trust required explanation of financial implications and lower-cost options.

Theme	Subtheme	Participant account	Verbatim account/profile extract	Interpretation
Relational care as overarching trust-builder	Prior disrespect	P12	"Past disrespectful dental care"	Previous disrespect shaped the need for relational repair before trust could be rebuilt.
Relational care as overarching trust-builder	Respectful communication	P12	"Respectful, non-judgemental communication"	Respectful interaction was central to rebuilding trust.
Relational care as overarching trust-builder	Patient control	P01	"Clear stop signal and pacing"	Control during procedures supported safety and trust.
Relational care as overarching trust-builder	Reassurance	P03	"Gentle explanation and reassurance"	Gentle communication helped technology feel less threatening.
Relational care as overarching trust-builder	Image-related sensitivity	P05	"Non-judgemental image explanation"	Relational sensitivity shaped whether visual tools reassured or embarrassed the patient.
Relational care as overarching trust-builder	Optionality during distraction	P06	"Option to remove headset and pause"	VR distraction required patient control to remain acceptable.

Taken together, the findings support a trust-first interpretation of technology-assisted oral care. In accounts where technology was accepted, the acceptance was linked to explanation, pacing, stop signals, privacy clarification, cost transparency, professional accountability and non-judgemental communication. In accounts where technology was delayed, questioned or perceived as threatening, the concern was not technology alone but its interaction with fear of pain, gagging, embarrassment, machine decision-making, data storage, uncertain cost or previous disrespectful care. The strongest overall pattern was that technology became more acceptable when it was introduced as part of respectful, consent-based and patient-controlled care.

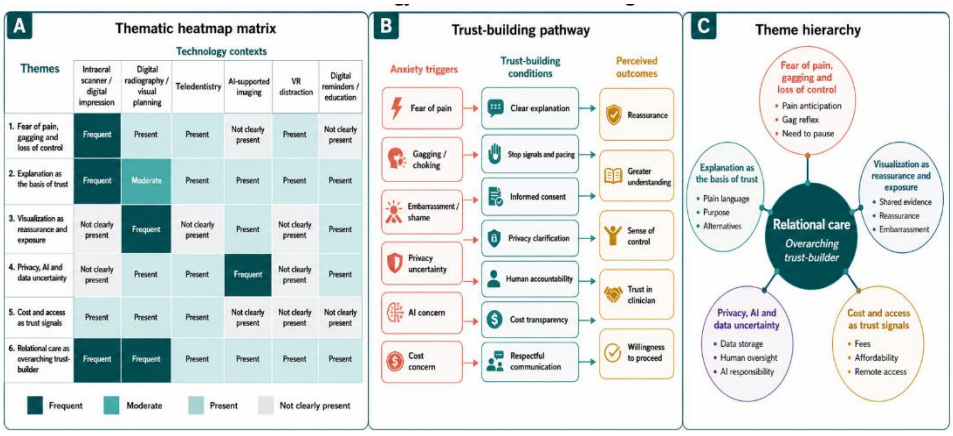

Figure 1 Trust First Model of Technology Assisted Oral Care among Anxious Dental Patients

This study used a qualitative descriptive design with an interpretative orientation to explore how adults with dental anxiety understood, accepted, questioned or resisted technology-assisted oral care. A qualitative design was selected because the study focused on meanings, perceptions, trust, fear, consent, control and service experience rather than the measurement of intervention effects or statistical associations. The study was informed by qualitative reporting principles, including the Standards for Reporting Qualitative Research and the Consolidated Criteria for Reporting Qualitative Research, to strengthen transparency in design, sampling, data collection, analysis and interpretation [28,29].

Participants were adult dental patients who reported anxiety, fear, hesitation or discomfort in relation to dental care and who had direct or anticipated experience of at least one technology-assisted oral care modality, including intraoral scanning, digital radiography, visual treatment planning, teledentistry, artificial intelligence-supported interpretation or virtual reality distraction. Participants were eligible if they were aged 18 years or older, able to provide informed consent, and able to describe their experience or expectations of technology-assisted dental care. Patients were excluded if they were unable to provide consent, were experiencing acute distress that made participation inappropriate, or could not complete the qualitative account procedure in the study language. The final dataset consisted of 12 anonymised participant accounts labelled P01 to P12. The sample was purposive rather than statistically selected, with the aim of obtaining information-rich accounts reflecting variation in technology exposure, primary anxiety

concern and trust-building need. The sampling logic was therefore based on relevance to the phenomenon of interest, diversity of patient experience and adequacy of information for thematic interpretation rather than numerical representativeness.

Participants were recruited through the Department of Clinical Dentistry, Universitas Prima Indonesia, from adult dental patients with relevant experiences or concerns regarding technology-assisted oral care. Recruitment was conducted within the dental academic and clinical setting by members of the research team. Potential participants were approached after identification as eligible adult patients with dental anxiety, hesitation or discomfort related to dental treatment and digital dental tools. The study purpose, voluntary nature of participation, confidentiality protections and right to withdraw were explained before participation. Participation was not linked to clinical treatment decisions, and refusal to participate did not affect access to care. Non-participation and refusals were not included in the analytic dataset.

Data were collected through structured anonymised qualitative participant accounts using open-ended prompts developed from the study objectives, prior literature on dental anxiety and technology acceptance, and discussion within the research team. The prompts explored previous dental experiences, fears related to pain, gagging, diagnosis and loss of control, experiences or expectations regarding digital dental tools, perceptions of teledentistry, AI-supported interpretation and visual imaging, consent and privacy concerns, cost-related concerns, and features of communication that increased or decreased trust. The account format allowed participants to describe experiences in their own words while ensuring that all accounts addressed the core domains of anxiety, technology exposure, consent, privacy, cost and trust. Data were collected in a private and non-judgemental setting to minimise embarrassment and encourage honest reporting of anxiety-related experiences.

All data were anonymised before analysis. Identifying information was removed during data preparation, and participants were assigned codes from P01 to P12. The anonymised accounts were organised into an account matrix documenting technology exposure, primary trust source, primary anxiety concern and trust-building need. Data were stored securely and were accessible only to the research team. Direct extracts selected for reporting were anonymised and labelled by participant code and relevant technology context, such as “P03, intraoral scanner” or “P08, AI-supported imaging,” to preserve confidentiality while maintaining analytic transparency.

The research team consisted of authors from the Department of Clinical Dentistry, Universitas Prima Indonesia. The team had disciplinary familiarity with dental care, patient communication and technology-assisted oral health services. Because researchers’ professional backgrounds could shape interpretation of patient anxiety, trust and technology acceptance, reflexivity was addressed through team discussion during coding and theme development. The researchers considered how assumptions about the clinical benefits of digital dentistry could influence interpretation and therefore gave particular attention to patient concerns about pain, gagging, embarrassment, privacy, cost and loss of control. Reflexive discussion was used to ensure that technology was not interpreted only from a clinician-centred perspective, but also from the standpoint of anxious patients’ perceived vulnerability and need for trust.

Data were analysed using reflexive thematic analysis, following stages of familiarisation, initial coding, theme development, theme review, theme definition and analytic writing [26,27]. The analysis combined deductive and inductive coding. Deductive codes were informed by the study objectives and concepts of dental anxiety, perceived control, consent, technology acceptance, privacy, cost and trust, while inductive coding allowed additional meanings to emerge from participant accounts. Initial coding was conducted across all 12 accounts, and codes were organised into a coding matrix. Codes with conceptual similarity were grouped into candidate themes, which were then reviewed against the full dataset to ensure that they were internally coherent, distinct from each other and grounded in participant accounts. Coding decisions and theme definitions were discussed among the authors until interpretative agreement was reached. Because the study used an interpretative qualitative approach, analytic consistency was pursued through discussion, comparison and refinement rather than statistical intercoder agreement.

The adequacy of the sample was assessed through the depth and relevance of the 12 accounts to the focused study aim. The accounts provided sufficient information power for the descriptive and interpretative purpose of the study because they represented varied technology contexts, including intraoral scanning, digital radiography, visual treatment planning, teledentistry, AI-supported interpretation, virtual reality distraction and digital communication. During analysis, later accounts were reviewed to determine whether they added new major themes or mainly elaborated existing concepts. No additional major thematic domains were identified after review of the full dataset, although the findings were interpreted as context-specific qualitative insights rather than statistically generalisable evidence.

Trustworthiness was strengthened through credibility, dependability, confirmability and transferability strategies. Credibility was supported by close reading of participant accounts, systematic comparison across cases and use of representative participant evidence in theme development. Dependability was supported by documenting coding steps, coding matrices, theme development and analytic decisions. Confirmability was enhanced through reflexive team discussion and preservation of an analytic trail linking accounts, codes, themes and supporting extracts. Transferability was supported by describing participant technology exposure, anxiety-related concerns and trust-building needs, while avoiding claims of statistical generalisability. Triangulation was addressed analytically by comparing accounts across different technology contexts, including intraoral scanning, digital imaging, teledentistry, AI-supported interpretation, virtual reality distraction and digital reminders or education. Formal member checking was not conducted, which is acknowledged as a limitation.

The study obtained ethical approval from the Department of Clinical Dentistry, Universitas Prima Indonesia. Written informed consent was obtained from all participants before participation. Participants were informed that they could decline to answer any question or withdraw without consequences for their care. Given the sensitive nature of dental anxiety, distress, shame and previous negative clinical experiences, data collection was conducted using non-judgemental language, and participants were not pressured to describe traumatic experiences in detail. Confidentiality was maintained through de-identification, secure data storage and anonymised reporting. No identifiable clinical images, dental records or personal data were included in the manuscript.

CONCLUSION

Technology-assisted oral care was perceived as most acceptable when digital tools were embedded within trust-building communication, meaningful consent, patient control and visible professional responsibility. The participant accounts suggest that intraoral scanning, digital imaging, teledentistry, AI-supported interpretation, virtual reality distraction and digital reminders can support reassurance and understanding when clinicians explain their purpose, protect privacy, clarify costs, offer stop signals and use non-judgemental language. However, the same tools may intensify anxiety when they are unfamiliar, intrusive, poorly explained, financially unclear or perceived as replacing human care. These findings should not be interpreted as population-level evidence of increased uptake or treatment effectiveness; rather, they provide qualitative insight into the mechanisms through which technology-assisted dental care may become acceptable to anxious patients. Dental services seeking to implement digital tools should combine technical innovation with anxiety-sensitive communication, staff training, clear consent procedures, privacy safeguards, cost transparency and relationally respectful care.

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