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RESEARCH ARTICLE

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Oral health knowledge, attitudes and practices of dietitians in Australia: A national survey

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Abstract

Aim: Dietitians are a well-placed profession to be providing pre-emptive oral health promotion. Despite recommendations that oral health promotion should be routinely part of dietetic practice, there is limited data informing the current practices of clinical dietitians in this area across Australia. Hence, the aim of this study was to investigate the knowledge and practices of Australian dietitians and oral health promotion.

Methods: A cross-sectional survey was undertaken involving registered clinical dietitians in Australia using purposive and snowballing sampling (social media/dietetic organisations/public databases). Data were analysed using descriptive and inferential statistics.

Results: A total of 149 dietitians participated in the national survey. Overall, dietitians were knowledgeable about oral health risk factors and preventative measures across general health domains. Majority of dietitians agreed that oral health can affect nutrition interventions (95.5%) and dietitians should be discussing oral health (88.0%). However, nearly half were not confident in providing counselling or education and felt that undergraduate training for oral health promotion was inadequate (78.2%). A small proportion (6.0%) of dietitians were already providing oral health promotion regularly. Key barriers included a lack of clear guidelines for practice, limited training opportunities and indistinct referral pathways.

Conclusion: Dietitians have acknowledged that oral health promotion should be incorporated into their practice. However, they are challenged by a lack of resources and training to support this in clinical practice.

So What?: Capacity building dietitians to promote oral health allows opportunity for improvement in the oral health, nutritional status and quality of life of priority population groups.

KEYWORDS
clinical practice; cross sectional survey; Knowledge, attitudes, practices, dietitians, oral health; quantitative

1 | INTRODUCTION

The role of dietitians has grown in the last few decades as the burden of chronic illness continues to worsen, and public health interest turns towards dietetic interventions to promote health and prevent diseases.[1,2] In addition to non-clinical roles, dietetics has become an integral part of the allied health team working alongside medical and nursing staff to translate the impact of good nutrition and a healthy diet on biochemistry, physiology and genetics.[3,4] Increased understanding of the association between many diseases and functional foods has reinforced the need for dietitians and grown the profession globally.[5–8] The discipline of clinical dietetics focuses on the relationship between nutrients and disease, with the dietitian's role centred on using nutrition as a therapy.[9] Many well-noted examples of the 'diet disease relationship' exist[10–12] including the link between nutrition deficiencies and oral health.[13] Poor oral health is considered to be a significant global health issue affecting more than 3.5 billion individuals.[14] As noted in a literature review by Gondvikar et al., macro and micronutrients from over or under-nutrition has the potential to affect oral mucosa and structures.[13] This can lead to oral health complications including dental erosion, caries, periodontal disease, breakdown of oral mucosa and oral cancer.[13,15] When exploring the impact of malnutrition on oral health in more detail, deficiencies in key nutrients such as vitamins A, B, D, C and calcium can lead to periodontal disease, angular cheilitis, ulcers and hypomineralisation of the teeth.[16] Conversely, over-consumption of calories or sugars can precipitate dental caries and increase the risk of metabolic conditions which are also linked to poor oral health.[14] Gondvikar et al. report that oral health and nutrition are 'inseparably associated' and therefore, poor oral health can significantly influence an individual's oral intake, compromise nutritional status and increase the risk of malnutrition.[13] In addition to the nutritional impacts, poor oral health has also been associated with low self-rated quality of life, self-esteem and confidence.[17,18]

Although a well-informed relationship between nutrition and oral health exists, several barriers can impede an individual from seeking dental services with affordability being one of the most cited barriers among the general population.[19] As reported in a Canadian-based population study, individuals without private health insurance and lower socioeconomic status were four times more likely to avoid going to see the dentist.[20] One in five of the surveyed participants reported cost as a barrier to engaging with dental services.[20] Many others living in affluent countries including New Zealand, France and the United States were also found to avoid dental care due to cost.[21] In addition to affordability, a rapid review of barriers to oral health care in vulnerable population groups concluded that difficulty accessing appropriate care and limited access to specialized dental services were other challenges faced by vulnerable populations.[19] Although utilisation of private dental services outweighs that of the public dental system, individuals who are unable to afford the cost of dental services have limited choice but to engage with the public system and endure the extensive waiting lists for treatments.[22,23]

General health and oral health have often been viewed separately in main stream health services. However, this mindset has been changing in recent years through growing awareness around the oral-systemic links and the role of the non-dental professional in improving healthcare.[24,25] The non-dental professional is any health professional without a dental background who, within their scope of practice, is capable of coordinating care for dental issues by providing oral health promotion (OHP), performing initial oral health screenings and providing referrals to dental practitioners.[25] Maxey et al., in their review of non-dental professionals and their role, highlighted that there are a variety of professions that have already adopted oral health into their practice.[25] Following appropriate training, midwives, nurses, general practitioners, diabetes educators and other allied health professionals have integrated oral health into their routine practice and therefore, have been able to reach vulnerable priority populations to promote oral health.[26–31] Additionally, a process and economic evaluation of a midwifery-led oral health model of care in Australia, demonstrated that using non-dental professionals was an acceptable and feasible option for promoting maternal oral health and is cost-effective for health services.[32] Further, the utilisation of non-dental professionals supports changing current approaches to oral health care from being treatment-focused to preventative and early intervention dental care.[14]

In terms of dietetic practice, a recent review of global evidence showed that there were limited examples where dietitians working in certain population groups, including those with human immunodeficiency virus, eating disorders, women, infants and children, and aged care, were discussing OHP with clients, providing basic risk assessment and providing referrals for dental treatments.[33,34] Recommendations from leading dietetic organisations in Australia and the United States encourage engagement in OHP, especially in vulnerable population groups as part of routine dietetic practice.[35,36] However, despite current evidence in this area, to our knowledge, there are no studies that have explored the perceptions and practices of dietitians in Australia towards OHP. Hence this study aimed to explore the knowledge, attitudes and practices of Australian dietitians and OHP. Specifically, the study objectives aimed to review dietitian awareness of oral health risk factors and preventative strategies for promoting oral health, understand the availability of training and resources to support dietetic health professionals and, their current barriers and facilitators to incorporating OHP in their clinical practice.

2 | METHODS

2.1 | Study design

A cross-sectional survey design was used to capture the oral health knowledge, attitudes and practices of practising dietitians across Australia. This study is part of a larger sequential multi-phase program of research that aims to develop an OHP model of care for dietitians working within the eating disorder clinical setting.[33–35,37,38] This study was guided by the 'adapted Medical Research Council (MRC) development framework'.[38] Ethics approval for this project was provided by X. Human research ethics committee.

2.2 | Participants

Individuals were eligible to participate in the survey if they were aged over 18 years old, were registered or met the qualifications to be registered as an accredited practising dietitian with Dietitians Australia and were currently practising dietetics in Australia in either the public or private health setting.

2.3 | Sample size

To inform sample size calculation, a review was undertaken to understand the current distribution of the dietetic workforce in Australia followed by consultation with a biostatistician. *Dietitians Australia* is the leading organisation for dietitians in Australia with over 8000 registered dietitians. A conservative prevalence estimate of 50% of dietitians promoting oral health with a 7.5% margin of error was used. Based on these limits, it was estimated that 160 participants would need to be recruited.

2.4 | Data collection

A variety of items that had been specifically used to explore the knowledge, attitudes and practices of non-dental health professionals and dietitians were reviewed to inform the development of an online survey.[30,39–43] Items relating to the aims and objectives of this study as well as alignment to the Medical Research Council development phase framework were included to inform the survey development (see Supplementary File 1). The tool also included questions that aimed to understand the availability of oral health training and resources and demographic information such as age, gender, educational attainment, years of practice as a dietitian and geographical location.

Prior to being circulated, the survey tool was pilot tested by an expert panel of eight individuals consisting of academics with dental, nursing, medical and nutrition backgrounds as well as practising clinical dietitians. The expert panel reviewed the survey for face and content validity, in addition to the usability of the online platform. Feedback from the expert panel was collated, reviewed and implemented following a consensus meeting with the research team. Following this, the final 27-item survey tool was developed and uploaded onto the web-based software Qualtrics to allow for broad and cost-effective distribution of the survey. Except for one open-ended question (excluding demographics), most were true/false style, multiple-choice, or based on a Likert scale. Some examples include 'It is recommended that you brush your teeth immediately after vomiting to reduce the risk of enamel (tooth) erosion?' (True/False/Not sure) and 'I feel confident in providing oral health counselling to vulnerable individuals' (likert scale).

These styles of questions were used to ensure questions caused minimal participant burden and allowed participants to easily progress through the survey. Refer to Supplementary File 2, for questionnaire.

Various targeted and broad survey recruitment strategies were adopted using purposive and snowballing sampling to ensure wide representation. The first approach was a broad recruitment strategy which included distribution of flyers at local and national conferences (face-to-face), via social media (X-formerly Twitter, LinkedIn and Instagram) using relevant hashtags and via weekly newsletter mailouts to members of leading dietetic organisations including Dietitians Australia and Dietitian connection. The second approach was a more targeted strategy, using publicly available databases of practising dietitians that exist on the websites of Dietitians Australia[44] and Australia and New Zealand Academy of Eating Disorders (ANZAED).[45] When searching the ANZAED database, all individuals living in New Zealand were filtered out and excluded from the recruitment strategy as they did not meet the eligibility criteria. All dietitians living in capital cities across Australia were emailed with an invitation to participate in the survey ($n = 918$). Individuals who received the mail out were emailed at fortnightly intervals for 6 weeks (initial invitation, reminder, and final reminder) until the survey was closed in April 2023. All participants who completed the survey were also encouraged to share the survey link within their professional networks. Upon receiving the invitation to participate (either via email or following the link from social media) individuals who met the inclusion criteria and provided electronic consent progressed through to the online survey. Individuals were redirected out of the online survey and therefore, excluded if they were under the age of 18 years and were not a practising clinical dietitian in Australia.

Due to the coronavirus pandemic, recruitment had to be extended over a longer period and occurred between June 2020 and April 2023. Between March 2021 to October 2021 limited recruitment was undertaken due to lockdowns, travel and face-to-face restrictions, and the increased workload and turbulence in the public and private health sector. Despite this, a total of 149 participants completed the survey. The most effective recruitment strategies were via social media and mass mail out.

To reduce risk of spam or bot interactions with the survey, social media posts were monitored for usual activity including 'likes', shares or spam comments. Completed surveys were checked for date and time of survey completion, geolocation and reasonable completion time (close to the approximated time to complete survey) to minimise the inclusion of fraudulent or automated computer responses.[46] In addition, the IP addresses and demographic information collected were compared to ensure participants did not respond twice.

2.5 | Data analysis

The online survey data were downloaded and imported into SPSS statistics Version 29 (IBM) software for analysis. Descriptive statistics were run for all variables, including frequencies and proportions for categorical variables and mean, median and standard deviation for continuous variables. The total knowledge score was computed by tallying the number of correct responses across and where required for

analysis was dichotomised at the median (lower scores indicating inadequate knowledge and higher score indicating adequate knowledge). Total practice scores were calculated by adding the scores on each item. Bivariate analyses were conducted using Pearson's chi-square tests or Fischer exact tests, as appropriate. Group differences in continuous variables such as knowledge and perception scores, were assessed using Mann–Whitney *U* tests and Kruskal–Wallis tests. The significance level for all analyses was set at $p < .05$.

3 | RESULTS

3.1 | Participants

A total of 149 participants accessed the survey. This included 80 participants via the public available databases (8.7% response rate). Of these, 16 participants were excluded as they completed less than 50% of the questions, leaving a total of 133 participants to be included in the analysis. Most of the respondents were females (95.3%), and the age ranged from 22 to 65 years, with a mean age of 37.8 (SD = 11.5) years. Most of the participants worked in private practice (46.2%) and 47.6% encountered around 1–3 patients with oral health concerns weekly. Full demographic characteristics of the sample can be seen in Table 1.

4 | MAIN RESULTS

4.1 | Knowledge

The mean total knowledge score was 17.5 (SD = 3.6) out of a total of 23 possible points with a range of 3–23. The lowest numbers of correct responses were seen in items regarding chronic diseases associated with oral health (chronic kidney disease – 27.1% and stroke – 49.6%) (see Table 2). Participants were knowledgeable about eating disorders being associated with oral health with correct responses ranging from 78.2% to 96.2%. Knowledge scores were different among people with access to information and brochures on oral health care (Pearson chi-square = 12.53, 1df, $p < .001$).

4.2 | Attitude

Majority of dietitians reported that they should discuss oral health risks with clients (88.0%), and agreed that poor oral health can affect the nutrition interventions they suggest (95.5%). Most of the participants (81.2%) agreed that dietitians should provide dental referrals and this was significantly associated with knowledge scores (Fischer exact test, $p = .002$). More than half (52.6%) of the participants felt confident in providing oral health counselling to vulnerable individuals, however, almost half (48.9%) felt that they were not confident in providing dental referrals. Majority of the participants (78.2%) felt that

TABLE 1 Demographic characteristics of participants.

Demographics[a]	*n* (%)
Gender	
Male	5 (3.9)
Female	123 (95.3)
Age (mean ± SD), median	37.8 ± 11.5, 34
Highest educational qualification	
Bachelor degree	42 (32.8)
Post graduate school	12 (9.4)
Master degree	62 (48.4)
Doctorate	9 (7.0)
Other	3 (2.3)
Initially gained qualifications as a dietitian	
Australia	127 (98.4)
Overseas	2 (1.6)
Years practicing/working as a dietitian (mean ± SD)	11.4 ± 9.3
Weekly hours in clinical practice (mean ± SD)	26.1 ± 12.2
Main area of practice	
Private practice	60 (46.2)
Public health service	48 (36.9)
Academia/research	5 (3.8)
Other	17 (13.1)
State/location of practice	
NSW	47 (37.9)
VIC	39 (31.5)
Queensland	20 (16.1)
Western Australia	14 (11.3)
Tasmania	3 (2.4)
Northern Territory	1 (0.8)
No. of individuals with oral health concerns encountered in a week	
0	33 (26.2)
1–3	60 (47.6)
4–6	22 (17.5)
7–10	5 (4.0)
>10	6 (4.8)
Providing dental referrals to clients with oral health problems	
Yes	34 (26.6)
No	94 (73.4)
Received education/training on oral health care	
Yes	23 (17.8)
No	106 (82.2)
Have access to any information/brochures on oral health care in practice	
Yes	21 (16.4)
No	107 (83.6)

[a]Number of Missing cases per item range from 3 to 9.

TABLE 2 Oral health related Knowledge.

Item—(correct answer)[a]	Correct *n* (%)
Frequent snacking can contribute to dental caries (tooth decay)—(True)	102 (76.7)
Dental caries is associated with certain bacteria in the mouth—(True)	106 (79.7)
Individuals should only see the dentist if they have an oral health concern—(False)	128 (96.2)
Oral health is associated with the following chronic diseases	
• Cardiovascular disease—(True)	96 (72.2)
• Stroke—(True)	66 (49.6)
• Chronic kidney disease—(True)	36 (27.1)
• Diabetes—(True)	87 (65.4)
• Osteoporosis—(True)	68 (51.1)
• Obesity—(True)	67 (50.4)
Chewing sugar free gum can help reduce the risk of dental caries—(True)	99 (74.4)
Oral health problems do not affect oral intake—(False)	130 (97.7)
Certain medications commonly used to treat mental health conditions can affect oral health—(True)	99 (74.4)
People who experience regular vomiting (e.g. during morning sickness, bulimia etc.) are not at risk of enamel (tooth) erosion—(False)	103 (77.4)
It is recommended that you brush your teeth immediately after vomiting to reduce the risk of enamel (tooth) erosion—(False)	69 (51.9)
Eating disorders have been associated with the following	
• Dental caries—(True)	122 (91.7)
• Halitosis—(True)	126 (94.7)
• Xerostomia—(True)	104 (78.2)
• Enamel erosion—(True)	128 (96.2)
• Bleeding gums—(True)	114 (85.7)
Only people with eating disorders who adopt self-induced vomiting practices are at risk of oral health concerns—(False)	119 (89.5)
People with an eating disorder may experience trauma (damage) to their mouth and gums—(True)	121 (91.0)
Nutritional deficiencies as a result of eating disorders can affect oral health—(True)	130 (97.7)
It is recommended that dietitians promote oral health, provide routine oral health screening, and provide dental referrals if required, especially for vulnerable populations—(True)	105 (78.9)

[a]Number of missing cases per item range from 0 to 5.

the oral health training provided during undergraduate/postgraduate studies was inadequate and 82.0% were interested in further training to promote oral health, undertake oral health screening and provide referrals. Dietitians attitude towards oral health and training are detailed in Table 3.

4.3 | Practices

The mean total practice score was 12.5 (SD = 2.7) out of a total maximum score of 20 and minimum possible score of 6. Of the total participants, very few (6.0%) always provided counselling regarding the importance of oral health to clients and nearly 27.8% provided counselling only when oral health concerns have been raised by the client (see Table 4 for full results). Additionally, less than a third of the participants always asked about oral health concerns in their clinical assessment (15.0%) and referred clients with oral health issues to a dental professional (27.8%). Total practice scores were significantly associated with access to information and brochures on oral health care (Mann–Whitney $U = 592.5$, $p < .001$) and age (Mann–Whitney $U = 1381.0$, $p = .002$). Furthermore, dietitians practice of providing counselling regarding the importance of oral health to clients were significantly associated with knowledge scores (Fischer exact test, $p < .001$) and, knowledge scores were significantly different among those who always referred their clients to dental professionals (Pearson chi-square = 7.63, 2df, $p = .022$).

4.4 | Barriers

The key barriers for dietitians in providing dental care for clients included lack of proper guidelines regarding OHP (89.5%), lack of training programs (87.2%), lack of affordable dental care pathway for clients (81.2%), and client's lack of awareness about the importance of oral health (77.4%) (see Table 5 for all ratings on agreement). Around 62.4% of the respondents felt that they lack confidence to discuss oral health and this was significantly associated with total practice scores (Kruskal–Wallis H (2) =20.57, $p < .001$) and knowledge scores (Pearson chi-square = 11.49, 2df, $p = .003$). More than half of the participants (53.4%) agreed to not having enough time to provide oral health counselling, screening, referrals and this was significantly associated with total practice scores (Kruskal–Wallis H (2) =10.48, $p = .005$). Moreover, 16.5% felt that initiating discussion around a client's oral health is a sensitive issue, which was also significantly associated with total practice scores (Kruskal–Wallis H (2) =7.16, $p = .028$).

5 | DISCUSSION

This cross-sectional study aimed to explore the knowledge, attitudes and practices of dietitians within the Australian context. To date, other studies in this area have focused on literature reviews of dietetic practice, cross-sectional surveys exploring oral health practices across multi-disciplinary health professionals and most recently, a qualitative study of Australian dietitians working in the eating disorder clinical setting.[33,34,47,48] Australian dietitians who participated in this survey were reflective of the dietetic workforce across Australia. Although routine data on dietetic workforce is scarce, combining data from other Australian cross-sectional surveys involving dietitians,[49–51]

TABLE 3 Statements relating to attitudes towards oral health.

Attitudes	Disagree *n* (%)	Neutral *n* (%)	Agree *n* (%)
Dietitians role in oral health			
Dietitians should discuss oral health risks with their clients	7 (5.3)	9 (6.8)	117 (88.0)
Advising/counselling individuals about their oral health is NOT an important part of my practice	78 (58.6)	34 (25.6)	21 (15.8)
Poor oral health can affect the nutrition interventions that I suggest	2 (1.5)	4 (3.0)	127 (95.5)
Although I do not routinely include oral health promotion for my clients, I would like to include it more	4 (3.0)	35 (26.3)	94 (70.7)
Dietitians should NOT provide basic oral health screening for vulnerable individuals	105 (78.9)	19 (14.3)	9 (6.8)
The association between adverse oral health problems and eating disorders is not strong enough for me to assess it routinely in practice	100 (75.2)	23 (17.3)	10 (7.5)
Dietitians should provide dental referrals (where appropriate) for vulnerable individuals	7 (5.3)	18 (13.5)	108 (81.2)
Perceived confidence			
I feel confident in providing oral health counselling to vulnerable individuals	56 (42.1)	7 (5.3)	70 (52.6)
I have the skills/training required to promote oral health	63 (47.4)	10 (7.5)	60 (45.1)
I am not confident in conducting oral health screening in practice	40 (30.1)	11 (8.3)	82 (61.7)
I am not confident in providing dental referrals to clients	52 (39.1)	16 (12.0)	65 (48.9)
Acceptability of clients[a]			
There is little I can do to make an impact on the oral health of clients of clients	115 (86.5)	9 (6.8)	8 (6.0)
Clients may be interested in oral health advice from their dietitian	11 (8.3)	27 (20.3)	94 (70.7)
If I provide oral health screening and referral to dentists, clients will not be likely to follow through	48 (36.1)	52 (39.1)	32 (24.1)
Attitude towards training[a]			
I feel the oral health training provided during my undergraduate/postgraduate studies was inadequate	19 (14.3)	10 (7.5)	104 (78.2)
I am interested in further training to promote oral health, undertake oral health screening and provide referrals	11 (8.3)	12 (9.0)	109 (82.0)
There is a need for guidelines outlining the role of dietitians in oral health promotion	4 (3.0)	5 (3.8)	124 (93.2)

[a]Number of missing cases per item range from 0 to 1.

Government Organisations,[52] and leading dietetic organisations such as Dietitians Australia[8] all revealed a similar picture being that Australia's dietetics workforce is largely female dominated, having completed either a bachelors or masters qualification, generally fall between the ages of 25 to over 30 years old and practice mostly within the public health sector.[49–51]

Overall, dietitians felt they were well placed to discuss oral health with their clients, agreed they could make a difference to their client's oral health through nutrition counselling, and felt they would like to include more oral health in their clinical practice. However, despite the positive attitudes to engaging in OHP a lack of confidence in implementing this role was evident in their responses. This is echoed throughout the limited research in this area. When exploring the attitudes of dietitians in the literature from countries including Australia, the United Kingdom, the United States, Canada, Saudi Arabia, Europe and Asia, their findings are synonymous with the findings of this

TABLE 4 Statements relating to practices of dietitians when treating clients.

Role in oral health[a]	Never *n* (%)	Sometimes *n* (%)	Always *n* (%)
I provide counselling regarding the importance of oral health	38 (28.6)	86 (64.7)	8 (6.0)
I provide counselling regarding enamel (tooth) protection, especially for individuals with an eating disorder, GORD, and those with high intakes of acidic food/drinks	39 (29.3)	73 (54.9)	19 (14.3)
I provide oral health counselling only when oral health concerns have been raised by the client	22 (16.5)	71 (53.4)	37 (27.8)
In my clinical assessment, I ask all clients about any oral health concerns e.g. dental pain, compromised oral function, sensitivity	36 (27.1)	76 (57.1)	20 (15.0)
I ask clients specific questions about their oral hygiene practices; for e.g. brushing and flossing	87 (65.4)	41 (30.8)	2 (1.5)
I refer clients with an oral health concern to a dental professional	49 (36.8)	43 (32.3)	37 (27.8)
I follow-up with clients who I have referred to dental professionals at the next time I see them	65 (48.9)	42 (31.6)	25 (18.8)

[a]Number of missing cases per item range from 1 to 4.

TABLE 5 Agreement on possible challenges dietitians may face regarding dental care for clients.

Role in oral health[a]	Disagree *n* (%)	Neutral *n* (%)	Agree *n* (%)
I feel I don't have enough confidence to provide oral health counselling	31 (23.3)	17 (12.8)	83 (62.4)
I don't have enough time to provide oral health counselling, screening, and referrals to dental professionals in practice	35 (26.3)	25 (18.8)	71 (53.4)
I find initiating discussion around a clients oral health is a sensitive issue	75 (56.4)	34 (25.6)	22 (16.5)
I feel my knowledge is limited regarding performing basic oral health screening	23 (17.3)	18 (13.5)	90 (67.7)
I feel there is a lack of guidelines informing the expected scope of practice for dietitians regarding oral health promotion	2 (1.5)	9 (6.8)	119 (89.5)
I feel there is a lack of adequate oral health training programs for dietitians	1 (0.8)	14 (10.5)	116 (87.2)
I think there is an inability for clients to access affordable dental care	8 (6.0)	15 (11.3)	108 (81.2)
I feel clients lack an awareness about the importance of oral health	3 (2.3)	24 (18.0)	103 (77.4)
I don't think oral health is important	126 (94.7)	2 (1.5)	3 (2.3)

[a]Number of Missing cases per item range from 2 to 3.

survey, reiterating that dietitians feel OHP is, and should be part of their practice.[33,34,49] Additionally, in a related qualitative study involving Australian dietitians working in ED settings, participants were also keen to promote oral health and provide referrals although they lacked the confidence or resources to be able to perform this role.[34] Similar results were also noted in cross-sectional surveys of other non-dental health professionals and OHP.[29,30,48,53] Health professionals including general practitioners, diabetes educators and midwives have all reported an intrinsic motivation to include OHP in their practice but feel limited by their confidence due to barriers such as limited knowledge, a lack of appropriate training, and resources for both the professional and client.[26,29,30]

Despite their limited confidence, dietitians were generally knowledgeable across most items in the survey, especially regarding risk factors to oral health and the impacts of poor oral health practices in vulnerable population groups. An interesting point to note is that dietitians who had access to resources were found to be more knowledgeable than those who had access to training or more years of

experience. In other studies, non-dental health professionals were found to be knowledgeable in the topic area of oral health but this was not being translated into their practice.[26,29,30] Although a lack of resources and training were highlighted as barriers to practice and the availability of resources to support professional knowledge is limited, there are some OHP resources that do exist and may assist with improving knowledge and access.[33] Resources provided by government organisations such as New South Wales (NSW) Health are free to access and can be ordered or downloaded for dissemination.[54] Further, specific resources for specialty population groups such as eating disorders and diabetes exist for health professionals to use and are also free to download.[54] In addition to this, the leading dietetic organisation in Australia, *Dietitians Australia*, has collaborated with Dental Services Victoria to form a position statement on the importance of OHP in dietetic practice and promote aspects such as basic assessment and referral of clients to dental professionals.[36] However, awareness of available resources appears to be limited as found in this survey with more than half of surveyed dietitians feeling they lacked the confidence to provide counselling which includes dissemination of resources and more than two-thirds reporting that guidelines around practice were lacking. This corroborates the findings from the earlier qualitative study with Australian dietitians.[34] Considering this, a lack of knowledge around the availability of resources, in addition to inadequate time and the sensitive nature of the topic, could be constraining the implementation of OHP in practice. In addition to developing more resources including specialty resources for vulnerable population groups, existing resources could also be promoted among relevant health professionals such as dietitians.

Identification of key barriers provided insight into the practices of participants. Most dietitians were providing intermittent counselling for risk factors for oral disease however, the translation of this into a practical clinical task such as screening for oral health concerns or referring oral health risk factors or concerns was absent for more than half of the surveyed participants. Significant barriers that influenced practice included a lack of confidence in their knowledge, limited knowledge in the specific area of oral health or sequeale of disease, lack of guidelines or recommendations for practice and sparse availability of training or resources. All of which influenced their engagement in providing counselling or dental referrals. The emphasis on these particular barriers is to be expected considering the lack of available continued professional development (CPD) resources for non-dental health professionals in oral health. Many studies that have explored barriers for non-dental health professionals have cited an insufficiency in relevant OHP CPD programs.[33,34,55–57] This is also noted at an undergraduate level, where again, non-dental health professionals have reported little to no coverage of oral health in their undergraduate curriculum leaving them unprepared prior to even entering the workforce. This is not specific to dietitians,[33] but also noted in other disciplines including pharmacy,[58] nursing and midwifery[30,59,60] and general practice.[29,61] Further, essential resources for professional development such as guidelines or recommendations for practice are inadequate for non-dental health professionals.[30,33,58,60] For dietitians specifically, two resources have been identified that provide broad information on OHP however, these are position statements and do not provide guidance or recommendations for practice.[35,62]

Providing referrals for clients to seek dental care was also an area affected by low practice in this study and, another area missing resources such as decision aids or referral pathway for dietitians. Similar barriers to practice including lack of dental referral pathways and limited oral health resources were identified in qualitative interviews with dietitians working in the eating disorder clinical setting.[34] Having these resources in place and utilizing non-dental health professionals could have a role in alleviating system issues, including lengthy waitlists for public dental services, through early intervention and management of basic oral health concerns and, reduce the need for accessing costly private dentists. In another model exploring the impact of midwives as non-dental health professionals and providing pre-emptive OHP during antenatal care, the findings indicated that using this workforce was an economically viable and cost-effective option.[32] Further, in a study that looked at the value of a dietitian's first clinic for gastroenterology patients, findings indicated a significant reduction in waitlist times.[63]

Lastly, promoting oral health through non-dental professionals like dietitians could play a key role in improving dietary choices among clients which ultimately can reduce the risk of dental diseases.[64] Studies across Iran, Australia and United states have seen improvements in healthy eating among children (reduction in sugary snacks) through oral health education of parents by public health staff, dietitians and child care teachers.[65,66] Sustained oral health education and interaction with clients through health professionals can also reduce dental decay rates.[67–69] A study in Brazil involving a diet-focused intervention involving nine home visits by undergraduate nutrition students found significant reduction in early childhood caries after educating parents about dietary behaviours.[70] All these successful models of care[64] show that investing in non-dental health professionals by improving access to informative resources may aid in improving their confidence and skills to provide basic OHP which may encourage clients to seek early intervention for oral health concerns, promote improved dietary practices and improve their access to oral health education and dental services.

6 | LIMITATIONS

This survey is not without its limitations. Due to the difficulty in engaging dietitians and changes to recruitment methods as a result of the COVID-19 pandemic, a small sample size participated in this study and limited complex analysis of the data. Further, due to the long duration of recruitment, it is possible that some dietitians may have undertaken further education in this area or changed their opinions since participating in this study. Even though the results provide a first insight into dietetic practice in OHP in Australia and are meaningful in contributing to the limited literature on this topic, the small sample

size limits also the generalizability. Therefore, it cannot be assumed that these findings would be reflective of all dietetic practice. In saying this, low research participation by dietitians is not unique to this study. Prior studies investigating dietitian engagement in research has provided insight into predictors for research involvement concluding that departmental engagement in research, years of experience, level of education, independent engagement in research training or reading research materials and amount of role dedicated to research as predictors for participation.[71,72] However, significant attempts were made to enhance recruitment including engaging dietitians through various mediums such as social media, email and conferences as well as, through frequent reminder emails. Additionally, a specific survey tool based on other successful survey tools for understanding knowledge, attitudes and practice was developed, pilot tested and reviewed by an expert panel and dietitians for appropriateness, face and content validity thereby strengthening the data collection tool and rigour of the findings.

In summary, dietitians acknowledge that oral health is part of their scope of practice, however barriers including inadequate undergraduate training and access to resources impede their knowledge and practice. Although the results of this survey provide some meaningful insight into dietitians and OHP, more research is required to explore the needs of dietitians in specific clinical areas and vulnerable populations such as diabetes or eating disorders with regards to OHP. Further, development of guidelines for practice to inform and 'guide' the dietitian through the process of OHP, screening and referral is an important and recurring finding from this survey and the existing literature, that needs to be addressed. Lastly, capitalizing on dietetic confidence and willingness to adopt OHP into practice, training at an undergraduate and professional level need to be developed in consultation with dietitians to support practice.

AUTHOR CONTRIBUTIONS

Conceptualisation: Tiffany Patterson Norrie, and Ajesh George. *Methodology*: Tiffany Patterson Norrie, Mariana S. Sousa, Lucie Ramjan, and Ajesh George. *Software*: Shwetha Kezhekkekara. *Formal analysis*: Shwetha Kezhekkekara and Tiffany Patterson Norrie. *Writing—original draft preparation*: Tiffany Patterson Norrie and Shwetha Kezhekkekar. *Writing—review and editing*: Tiffany Patterson Norrie, Mariana S. Sousa, Lucie Ramjan, and Ajesh George. *Supervision*: Mariana S. Sousa, Lucie Ramjan, and Ajesh George. All authors have read and agreed to the published version of the manuscript. All authors are in agreement with the manuscript and declare that the content has not been published elsewhere.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethics approval for this project was provided by Western Sydney University Human Research Ethics Committee—approval H13316.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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