

## RESEARCH ARTICLE

# Osteoporosis screening in Australian community pharmacies: A mixed methods study

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## Abstract

**Issues Addressed:** Osteoporosis and poor bone health impact a large proportion of the Australian population, but is drastically underdiagnosed and undertreated. Community pharmacies are a strategic location for osteoporosis screening services due to their accessibility and the demographic profile of customers. The aim of this study was to develop, implement and evaluate a community pharmacy health promotion service centred on encouraging consumers to complete an anonymous osteoporosis screening survey called Know Your Bones.

**Methods:** The implementation process was documented using the REAIM (reach, effectiveness, adoption, implementation, maintenance) framework. Uptake of the Know Your Bones screening tool was monitored anonymously with website traffic. Surveys and interviews were designed to capture consumer outcomes after screening. Semi-structured interviews were conducted with Australian community pharmacy stakeholders during design and implementation phases to explore their perspectives of the barriers and facilitators.

**Results:** The service was implemented in 27 community pharmacies. There were 448 visits to the screening website. Interviews were conducted with 41 stakeholders. There were a range of factors that appeared to influence implementation of the service. Perceived acceptability was critical, which depended on staff training, pharmacists' altruism, and remuneration. Staff relied heavily on their existing close relationships with consumers. No consumers completed non-anonymous surveys or agreed to participate in interviews post-screening.

**Conclusion:** Using an implementation science approach, a community pharmacy osteoporosis screening service for the Australian context was designed and found to be acceptable to pharmacy staff and effective in reaching the target population.

**So What?** This low-cost and non-invasive health promotion has potential to sustainably increase national screening rates for osteoporosis.

## KEYWORDS

community pharmacy, implementation science, osteoporosis, screening

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## 1 | BACKGROUND

Osteoporosis, a disease resulting in weakened bones and increased risk of fragility fractures, affects over 200 million people worldwide causing significant morbidity and mortality.<sup>1</sup> It is often referred to as a silent disease where complications are not generally considered until fractures occur.<sup>1</sup> Over 1.2 million people live with osteoporosis in Australia, and the prevalence is increasing with the ageing population, creating an osteoporosis epidemic.<sup>2</sup> The Australian Burden of Disease Analysis showed that osteoporosis was underdiagnosed and undertreated, with over 80% of individuals presenting with a fracture, lacking follow up and treatment.<sup>2,3</sup> The cost of osteoporosis to the Australian health care system is approximately 3B AUD each year.<sup>2</sup>

There are a number of screening methods to identify individuals at risk of osteoporosis that include questionnaires, and bone mineral density testing with DEXA or peripheral ultrasound.<sup>4–6</sup> The benefit of early detection is that consumers can reduce risk factors, commence treatment sooner, lessen bone loss, lower risk of fracture, and decrease the burden on the health system.<sup>7–9</sup> While Dual X-Ray Absorptiometry Scans (DXA) are the standard diagnostic method for osteoporosis they are not equitably resourced and are time intensive.<sup>6,10</sup> Sustaining a minimal trauma fracture is another diagnostic method for osteoporosis yet this is often overlooked. Moreover, DEXA has high specificity but low sensitivity for predicting fractures.<sup>11</sup> Over 50% of Australians >50 years (4.74 million) have osteopenia; this sub-clinical group has numerically the most fractures yet are not usually aware that they are at risk, as eligibility for subsidised testing is restricted.<sup>6,12</sup>

Within Australia's National Strategic Action Plan for Osteoporosis, Priority 1 is *'to increase community awareness and understanding of the importance of bone health and osteoporosis including its risk factors and prevention. The Know Your Bones online tool to become the foundation of risk assessment across all population groups including the general public'*.<sup>13</sup> 'Know your Bones' (KYB) is an Australian osteoporosis screening survey developed by the Garvan Institute of Medical Research and Healthy Bones Australia based on the Dubbo Osteoporosis Epidemiology Study.<sup>14</sup> Know Your Bones is designed for consumers to self-complete without need for a health professional or DXA result. It provides a report regarding fracture risk.

Given their accessibility and consumer demographic, community pharmacies, are in a unique position to provide health services including screening for conditions such as osteoporosis.<sup>15–17</sup> It is important to note that the role of the pharmacist in Australia is not to diagnose, but to identify and refer high risk individuals.<sup>16,18</sup> A recent systematic review of osteoporosis screening programs in community pharmacy reported that these programs result in improved referral for diagnosis and subsequent treatment of osteoporosis.<sup>7</sup> Barriers to implementation of screening services include: appropriate staff training, lack of fidelity testing, high rates of loss to follow-up, low uptake of referral to GPs, and limited sustainability of interventions.<sup>7,15</sup> An implementation science approach can explore and address how some of these potential barriers can be overcome. Overcoming such barriers can maximise success and reduce the lengthy time it takes for research to be translated into practice.<sup>19,20</sup>

## 2 | AIMS

The overall aim was to develop and determine the feasibility, acceptability, and effectiveness of a community pharmacy osteoporosis screening health promotion campaign. The objectives were (a) to quantitatively report consumers' engagement with the service and (b) to qualitatively report stakeholders' perspectives of the barriers and facilitators of the campaign.

## 3 | METHODS

A mixed methods approach was used in multiple phases, to inform the design and implementation processes of a community pharmacy osteoporosis screening campaign. The campaign was designed to encourage consumers to be screened for osteoporosis anonymously, using the 'Know Your Bones' survey. The campaign design and implementation evaluation was guided by a literature review, and the use of an implementation framework which allowed for mid-course corrections to optimise implementation.<sup>7,21</sup> The REAIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework was selected to guide this research because it encourages researchers to be more transparent and consider internal and external validity across pilot, efficacy, effectiveness, demonstration, and translational research.<sup>22</sup> REAIM has been utilised in both quantitative and qualitative research. The REAIM domains were defined and adapted to the present study, as guided by Holtrop et al. (Table 1).<sup>23</sup>

### 3.1 | Health promotion design

#### 3.1.1 | Phase 1 flyers

The health promotion campaign was designed to be delivered during the week surrounding World Osteoporosis Day in October 2021. Since researcher access to community pharmacies were restricted due to COVID-19 lockdowns, a passive approach to screening was adopted using purpose-designed flyers (Appendix 1). The flyer included consumer information regarding osteoporosis and a link to the Know Your Bones survey, along with a QR code to an electronic survey. Four pharmacies were recruited to distribute 500 flyers each by placing flyers into consumers' shopping bags during purchasing transactions.

#### 3.1.2 | Phase 2 kiosks—hosting the Know Your Bones tool

During the period April–May 2022, researcher access to community pharmacies had improved, allowing for the use of interactive, in-store kiosks (iPad and stand). In the pharmacy, consumers could complete the Know Your Bones survey on the kiosk. At the completion of the survey, consumers were invited to participate in the follow-up quantitative and qualitative research (see below).

**TABLE 1** REAIM outcomes and definitions.

	REAIM definition	Qualitative definition (Holtrop et al. <sup>23</sup> )
Reach	Reach ( <a href="https://re-aim.org/about/what-is-re-aim/reach/">https://re-aim.org/about/what-is-re-aim/reach/</a> )—The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program	WHO is (was) intended to benefit and who actually participates or is exposed to the intervention?
Effectiveness	Effectiveness (or Efficacy; <a href="https://re-aim.org/about/what-is-re-aim/effectiveness-or-efficacy/">https://re-aim.org/about/what-is-re-aim/effectiveness-or-efficacy/</a> )—The impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes	WHAT is (was) the most important benefits you are trying to achieve and what is (was) the likelihood of negative outcomes?
Adoption	Adoption ( <a href="https://re-aim.org/about/what-is-re-aim/adoption/">https://re-aim.org/about/what-is-re-aim/adoption/</a> )—The absolute number, proportion, and representativeness of settings and intervention agents (people who deliver the program) who are willing to initiate a program	WHERE is (was) the program or policy applied and WHO applied it?
Implementation	Implementation ( <a href="https://re-aim.org/about/what-is-re-aim/implementation/">https://re-aim.org/about/what-is-re-aim/implementation/</a> )—At the setting level, implementation refers to the intervention agents' fidelity to the various elements of an intervention's protocol, including consistency of delivery as intended and the time and cost of the intervention. At the individual level, implementation refers to clients' use of the intervention strategies	HOW consistently is (was) the program or policy delivered, HOW will (was) it be adapted, HOW much will (did) it cost, and WHY will (did) the results come about?
Maintenance	Maintenance ( <a href="https://re-aim.org/about/what-is-re-aim/maintenance/">https://re-aim.org/about/what-is-re-aim/maintenance/</a> )—The extent to which a program or policy becomes institutionalised or part of the routine organisational practices and policies. Within the RE-AIM framework, maintenance also applies at the individual level. At the individual level, maintenance has been defined as the long-term effects of a program on outcomes after 6 or more months after the most recent intervention contact	WHEN will (was) the initiative become operational; how long will (was) it be sustained (Setting level); and how long are the results sustained (Individual level)?

To facilitate consumer engagement, a study site 'champion' (typically a pharmacist) was appointed by each pharmacy owner to take responsibility for conducting the promotion for seven consecutive days. Using a train-the-trainer approach, store champions were shown by the research team (JP, an academic pharmacist) how to use the Know Your Bones tool and interpret the report. They were instructed to refer individuals at risk of fracture to their GP and to take with them the Know Your Bones report. They were also shown how to encourage customers to engage with the health promotion. Training was provided for all available staff using face-to-face instruction, supplemented with online learning modules accredited by Pharmacy Guild of Australia. Therapeutic topics included osteoporosis and disease burden, treatment options, and over the counter calcium and vitamin D supplementation.

### 3.1.3 | Phase 3 kiosks—extra training and promotional material

Phase 3 was conducted during September–October 2022 using the same approach as Phase 2, supplemented with additional staff training, promotional material (posters), and consumer information fact cards. Several of the pharmacies purchased plastic human skeletons to supplement the promotional material and prominently displayed

calcium and vitamin D. The same follow-up prompts for research interviews were utilised as described in Phase 2.

## 3.2 | Quantitative research

Given the anonymous nature of the screening, engagement with the health promotion was measured using volume of traffic to the study website. In order to estimate the national impact of the health promotion at each phase of the study the volume of traffic on the study site was compared with the volume of screening completions to Know Your Bones from 1st January 2022 to 31st December 2022, as provided by Healthy Bones Australia. At completion of each screening interaction, consumers were invited to complete an optional follow-up survey on REDCap.<sup>24</sup> The follow-up survey was designed to capture participants' background data such as age, gender, along with Know Your Bones Results, and intentions to seek further advice regarding osteoporosis from their pharmacist or GP.

## 3.3 | Qualitative research

Qualitative semi-structured interviews were planned with key stakeholders at various phases of implementation to inform the study

design and evaluate the implementation. Prior to implementation (June to December 2020), a needs analysis was conducted with a convenience sample of community pharmacist owners, pharmacists, pharmacy assistants, and pharmacy consumers who were invited to participate via email and social media posts and informed consent was obtained. To improve consumer representation, a sample of consumers was recruited through contacts of a musculoskeletal consumer representative group. During Phases 2 and 3, consumers were offered an opportunity to participate in qualitative interviews after completing the survey tool. Pharmacist owners, pharmacists and pharmacy assistants including study site 'champions' were invited to be interviewed. Interviews were conducted online or face-to-face where appropriate.

An interview guide, informed by implementation frameworks, was designed to be used across each of the implementation phases (Appendix 2). All interviews were recorded, transcribed verbatim, and personal identifying information removed. A qualitative analysis was undertaken at the conclusion of the study by aggregating the data from all phases. The data were coded deductively to the domains of the REAIM framework by two researchers (JP and DM). The initial coding of two interviews were reviewed by the supervisory team (SC and RM) for concordance to the framework, completeness, and accuracy. Where discrepancies arose, discussion with the team was undertaken in successive meetings until agreement was achieved. The deductive coding of all data was then completed independently by JP and DM. During the next step of analysis, inductive themes within the domains were created named and explained by JP and presented to the team. After an iterative process of analysis and review, thematic structure was finalised and is presented in the results. A SPQR checklist for methodological rigour in reporting qualitative studies is presented in Appendix 3.<sup>25</sup>

### 3.4 | Consolidated findings

The findings and results from the qualitative and quantitative research were then consolidated and presented under the domains of the REAIM framework.

### 3.5 | Ethics and funding statement

This study was approved by the Human Research Ethics Committee of the University of Sydney HREC2021/555 and HREC2020/633. Community pharmacies were paid 250 AUD as an infrastructure support payment for each Phase they participated in. Funding was provided by the Australian Government Department of Health Osteoporosis Consumer Awareness Grant G0113.

## 4 | RESULTS

The health promotion was implemented in 27 pharmacies, with 4 participating in Phase 1, 15 pharmacies in Phase 2, and 25 pharmacies in

Phase 3. Eleven pharmacies completed the promotion two times and 2 pharmacies participated three times. In total 160 pharmacy personnel were trained including 50 pharmacists, 109 pharmacy assistants, and one pharmacy practice nurse.

### 4.1 | Quantitative results

The number of hits to the study website during each of the phases of this study are presented in Table 2. Phase 1 resulted in very low participation, with 0.3% ( $n = 6/2000$ ) flyers resulting in traffic to the study website. During Phase 2 there were 191 hits. For Phase 3, there were 251 hits, which accounted for 28% of the Australian total of KYB screenings in this time-period. There was a high level of variation in the number of screenings per pharmacy at each phase. The median number of screenings in Phase 2 was 12, and for Phase 3 the median was 6. The top three pharmacies did 33, 28, and 24 screenings in a single phase. In Phase 3, two pharmacies only completed 1 screening and 7 pharmacies did none. No consumer participants completed the non-anonymous follow-up surveys and therefore no information regarding age, gender, Know Your Bones results, and intentions to seek further advice regarding osteoporosis from their pharmacist or GP was captured.

### 4.2 | Qualitative results

In total, 41 stakeholders (consumers, pharmacists, and pharmacy assistants) were interviewed at different stages of the study. During the pre-implementation phase, interviews were conducted with 10 consumers and 11 pharmacists. During Phases 2 and 3, 20 interviews were conducted with study site champions—14 pharmacists, 5 pharmacy assistants, and 1 pharmacy practice nurse. No consumers consented to qualitative interviews after receiving the service due to not completing the non-anonymous follow-up surveys.

### 4.3 | Results synthesised by domains of the REAIM framework

#### 4.3.1 | Reach domain

Themes arising from the qualitative study suggest that reach may be influenced by advertising, relationship quality between consumers and pharmacists, consumer's perceived importance of preventative health care, and how consumers approach the use of technology in health promotions.

#### *Promotion/advertising*

Participants reported that in-store posters, advertisements on social media, calendars, and other paraphernalia alerted consumers to the services that the pharmacy offered.

**TABLE 2** Number of hits to Know Your Bones from the study website and time matched total completions of Know Your Bones from Healthy Bones Australia.

	Phase 1 (October 2021)	Phase 2 (31 March 2022 to 3 July 2022)	Phase 3 (3 October 2022 to 13 November 2022)
Number of hits to Know Your Bones from study website	6	191	251
Number of completions of the Know Your Bones tool overall during the study period	Not captured	1229	877

When I see those posters, I like them, and I usually read them all ... I may ask them—what they offer and how they offer them, and are they free, or like how much they charge ... (Consumer, pre-implementation)

Others believed that there is too much going on in a pharmacy and health promotion messaging is drowned out.

I feel like everything is a bit saturated these days, so all the advertisements, all the posters ... people become a little bit numb (Pharmacist Owner, after Phase 2)

#### Relationships

Consumers and pharmacists reported that engagement from trusted health professionals, particularly one that they 'know', resulted in targeted screening and increased participation.

I'm now reaching my 40 years at the same pharmacy, with the same pharmacist. They know me by my name, they know me by prescription. It's kind of knowing that there is a personal relationship and that they take care in the patients that they're seeing. (Consumer, Needs Analysis)

... passion drives it. Because if I care about it, they'll do it. It's almost like they're trying to do me a favour. (Pharmacist, after Phase 3)

#### Dedicating resources to preventative health care

Consumers widely reported they were too busy to participate in screening, often feeling unsure of the benefit.

It's like so if I do this (screening), what do I get out of it? What's the value? (Consumer, pre-implementation)

Pharmacists believed that osteoporosis may not be prioritised by consumers.

People feel like they have an issue with their sleep, but they don't feel their bones being unwell. (Pharmacist, after Phase 3)

However, waiting for prescriptions affords an ideal opportunity.

We talk to them, 'Oh, you know, while you're waiting we have this iPad here, it's got a screening tool for your bone health' ... they have nothing else to do, why not screen for bone health? (Intern Pharmacist, after Phase 3)

Low health literacy may have reduced consumer interest in preventative health care.

We have a high volume of people that are from different languages ..., or their health literacy is a bit low, they just really value ..., 'Okay, the doctor's giving me a prescription, this is all I need'. (Pharmacist, after Phase 3)

#### Health technology

Using the kiosk was viewed as an efficient way to screen for osteoporosis, but attitudes appeared to vary by demographics. For example, younger people were more likely to engage.

I found oddly enough, it was probably around 40- to 50-year-olds, or it's the ladies who are probably at that menopause stage, ... I think some of your more geriatric patients, obviously anything technological is a bit spooky for them. (Pharmacist, after Phase 3)

All the technology (is a barrier) ... The thing about phones in my generation are quite suspicious of all our data being stolen. (Consumer, pre-implementation)

That was the beauty of it. It was completely anonymous ... especially with the data leaks a lot of patients were very happy to do it but not happy to put in any extra details about themselves into the computer systems. (Pharmacist, after Phase 3)

## 4.4 | Effectiveness

Views about effectiveness were only spoken of among pharmacy staff. Subthemes included referrals to doctors, risk factor reduction, upskilling staff, and building relationships.

#### 4.4.1 | Referrals and risk factor reduction

Pharmacists reported referring participants who Know Your Bones identified as being at risk, to their doctor and suggesting that their consumers should take the report to the doctor. Some pharmacists reported that their consumers had returned with a new diagnosis of osteoporosis, presenting prescriptions for antiresorptive therapy.

Two or three I know of (that were screened) have actually ended up on Prolia. (Pharmacist, after Phase 3)

Pharmacists reported that the screening prompted conversations around supplementation for calcium and vitamin D.

I said look, probably a good idea to have a catch up with the GP and just kind of assess where things are at. Calcium and vitamin D did come up quite a lot. A lot of the patients, their dietary intake was not sufficient, so I provided advice about their dietary intake for starters and then ... there is supplements you can take. (Intern Pharmacist, after Phase 2)

#### 4.4.2 | Upskilling staff

Pharmacists tended to state that they did not need extra training to run the screening. Pharmacy assistants on the other hand, reported lacking therapeutic and procedural knowledge on the topic, especially prior to training. Even after training, pharmacy assistants reported being somewhat hesitant but with experience, gained confidence to approach potential consumer participants.

(At the start) Nervous. ... Even if we're telling them the same thing that the pharmacist is going to tell them, they don't really listen to us ... [later on] a little bit more confident ... little bit easier to talk to people, and that people were actually listening. (Pharmacy Assistant, after Phase 3)

#### 4.4.3 | Developing relationships

Participants stated that being involved in osteoporosis screening afforded extra opportunities to build rapport.

... at least the patient is aware. Then it makes it easier for them to start talking about treatment when they approach the pharmacist for the prescription for that particular disease. (Consumer, pre-implementation)

Pharmacy personnel said that consumers became more comfortable speaking with them about osteoporosis and led to conversations about other health topics as well.

Well, strangely enough, it wasn't really about osteoporosis, but often about other things ... But they get a sense of who you are and that you're happy to talk about anything with them. (Practice Nurse, after Phase 3)

### 4.5 | Adoption

Pharmacy participants discussed reasons for participating in the screening and their level of engagement. Emerging themes included building reputation of the pharmacy, *divergence* between altruism and financial incentives, and staffing and leadership.

#### 4.5.1 | Building reputation

Pharmacy staff believed that they were a health destination for consumers, and exhibited pride in having a reputation as a service oriented pharmacy.

I feel like because we're one of the biggest pharmacies in the area, to keep our reputation intact, I guess. We've had lots of compliments with our customer services. (Pharmacy Assistant, after Phase 2)

... we do want to spend some time to really implement these things to help bring the value of our pharmacy up in our community. (Pharmacist, after Phase 3)

Pharmacists often reported that over time, screening for osteoporosis seemed entirely coherent with their practice.

I never thought of an awareness for it, but it really does make a lot of sense though because we do see a lot of our patients who do have a fall and they do break or fracture something, their confidence levels really drop ... Where else would you do it? (Pharmacist, after Phase 3)

#### 4.5.2 | Intrinsic altruistic values and financial motivation

Employed pharmacists largely reported that they would be happy to conduct the intervention and that financial incentives did not really influence their engagement.

I don't really care about the money to be honest. The only thing I care about is the patient's health. But that's thinking of me personally ... my duty of care. That's how I look at. (Pharmacist, after Phase 2)



Pharmacy owners and managers tended to have a more nuanced response and were encouraging of external funding. Some believed that through screening they may build loyalty.

You could gain a customer for life, because you've gone that extra mile with that patient to make sure that their bone health is good. (Pharmacy Owner, after Phase 3)

#### 4.5.3 | Staffing and leadership

Having dedicated staff to perform screening was the ideal scenario, however, this was reported as impractical due to conflicting needs.

So, everyone feels her (the champion) as someone who is really easy to go to if there's any problems ... I mean, the only way (to run a successful intervention) is just having one person there and that's their role and they don't need to be doing anything else. (Pharmacist, after Phase 2)

Store champions were a point of contact with the researchers and led by example in recruiting participants. When the leader was busy or away, engagement with the intervention decreased significantly or ceased.

If I wasn't there for a day, the scan, or the signups probably really dropped off for a bit, no fault of what the other pharmacists are doing. They've all got their hands on other areas as well too, but they're probably not driving it in that same way. (Pharmacist, after Phase 3)

Interestingly, consumer participants also doubted the capacity of pharmacy to take on extra roles and the risk that entails.

I don't know if they've got the bandwidth to actually take on another task when you know traditionally their role has been to dispense medication ... I think could be an additional burden that could take away from the key role. I'd hate for pharmacists to be so distracted. (Consumer, pre-implementation)

## 4.6 | Implementation

Emerging themes included physical infrastructure and location, contemporary issues, staffing, and timing.

### 4.6.1 | Physical infrastructure

Some pharmacies had adequate space for the health promotion kiosk which integrated well into workflow and naturally facilitated the

implementation of the health promotion. Other pharmacies had the kiosk further away from staff which made it more out of reach and difficult to integrate into workflow.

Our layout, I guess, worked well for it, because we had the iPad set up right at scripts out, right next to it. When we have people waiting, they all congregate right around the scripts-out bench. So, it's very easy to have people look at it and go, 'Oh, you know, like, I'm interested in doing it'. (Intern Pharmacist, after Phase 2)

The promotional displays with bone models and images, and displays of supplements such as calcium and vitamin D introduced in Phase 3 prompted conversations around screening.

Having the skeleton as a prop worked in well around the Halloween period ... just because people make a joke about it ... made it a lot easier to convince them just to have ... bone screening. (Pharmacist, after Phase 3)

## 4.6.2 | COVID-19

The COVID-19 pandemic significantly affected implementation, where social distancing measures, isolation periods, vaccination needs and workloads limited the ability to implement additional services.

COVID has been happening for two years, so we've been having vaccinations for so long. It's not something new, but it's just the time that is the issue. But it is of clinical value. It's a great initiative. I don't think it should be delayed, even though there's a lot happening .... (Pharmacist, after Phase 2)

## 4.7 | Maintenance

Pharmacy staff were motivated to conduct screening but also suggested that financial viability and consumer demand would influence future participation.

### 4.7.1 | Financial viability and government remuneration

It was clear that community pharmacist owners and employees recognised the need for pharmacies to remain financially viable.

It's business. There's no healthcare without it making you a dollar and there's no dollars without providing the healthcare. (Pharmacist, after Phase 3)

We should have programs that are backed by something like Medicare or backed by federal funding, because \$50 spent here obviously saves the healthcare system 10 times, 50 times that amount of money ... if someone has a fall or cracks a rib or fractures a vertebra or something, one stay in hospital is somewhere between \$10 000 and \$40 000 .... (Pharmacy Owner, after Phase 3)

#### 4.7.2 | Consumer demand

After the intervention period, pharmacy staff reported consumers coming back with friends and family members to complete the screening.

We had people come in after we had gotten rid of the iPad and was like, 'Hey, do you still have it, we want to do it.' And we had to go, 'We don't, but it was on a website'. So kind (of) just kept directing people. (Pharmacy Assistant, after Phase 3)

There was a snowball effect, where participants shared osteoporosis knowledge with others and encouraged others to complete the screening and engage more with their pharmacy.

I had a few patients where I did for them and I went through it with them and then they had a friend or their partner or something and referred and said, 'Oh, you should give this a go and see what your results are like' ... So, I think it had a little bit of a snowballing effect. (Intern Pharmacist, after Phase 2)

## 5 | DISCUSSION

This study aimed to develop and evaluate the factors influencing the feasibility, acceptability, and effectiveness of a novel way to promote evidence-based screening for osteoporosis in community pharmacy. Previous studies of osteoporosis screening interventions have shown that they can be effective in increasing rates of diagnosis and reducing risk factors.<sup>7,9,10,26</sup> This study resulted in 448 pharmacy consumers being screened for osteoporosis. It is estimated that during Phase 3 of this study, 28% of all KYB screenings in Australia were accounted for by this intervention. This study reports valuable qualitative feedback from stakeholders regarding the barriers and facilitators of providing the community pharmacy osteoporosis screening service. Pharmacy staff reported feeling more knowledgeable on the topic and believed that they had generated heightened awareness of osteoporosis in their communities. Pharmacists reported having initiated conversations with consumers about reducing their risk factors for osteoporosis through exercise and appropriate calcium and vitamin D intake and supplementation if required. Pharmacists provided anecdotal reports

of referring consumers to their GP, which then led to diagnosis and treatment. While these observations are encouraging, this research highlighted several important gaps in evaluation of impact on the health promotion. A key limitation of the research is that no consumers who had undertaken screening participated in the quantitative or qualitative summative evaluation. Accordingly, this study was not able to provide evidence that screening led to measurable outcomes, or report feasibility or acceptability at the consumer level. Additionally, there was a wide variation in screening rates, and several pharmacies where there were zero screenings recorded.

Similar to previous public health screening interventions, key facilitators were perceived to be employing sufficient staff with adequate training in content and process, the appointment of pharmacy staff champions, and the provision of adequate external remuneration.<sup>15,27</sup> The non-invasive intervention design may have also increased acceptability to consumers.<sup>15</sup> Pharmacy staff recognised that they were uniquely positioned to screen for osteoporosis by being accessible, trusted, and trained to deliver the intervention. The passive approach, using the flyer method resulted in a very low uptake of screenings, whereas a personalised approach from trusted pharmacy staff resulted in higher yield.<sup>28</sup> Interventions with adequate training has been described to generate more positive results and outcomes.<sup>29</sup> All pharmacy staff interviewed described a willingness to conduct screening, and this is consistent with a high level of altruism expressed by pharmacists regarding participation in public health interventions.<sup>30</sup> Overall, consumers expressed a general willingness to be screened for osteoporosis, but all stakeholders recognised the competing demands on pharmacy's capacity to undertake public health initiatives. The COVID-19 pandemic had a devastating impact on the delivery of non-remunerated pharmacy services due to the persistent lockdowns, but also because of the associated increased staff workload, and burnout.<sup>31-33</sup> Despite this, community pharmacies still partook in the campaign, raising awareness and screening for osteoporosis.

Despite using an implementation science approach, there were still issues with implementation and uptake. Interviews highlighted discussions on the future of the intervention. It is unclear whether the osteoporosis screening service will continue in the future without the researchers, infrastructure, and reimbursement. Wide dissemination and sustainability of the program will require a source of funding, either externally (e.g. government), internally through the pharmacy, or out of pocket costs to the consumer. Presently, Australian consumers are able to receive most pharmacy services with no charge.<sup>34</sup> The impact of a consumer payment for this osteoporosis screening intervention in Australia is unclear despite international studies showing consumers are often willing to pay.<sup>35</sup> An Australian pharmacy cardiovascular screening study found even though the service was highly rated by consumers, only 41% were willing to pay out of pocket (median 20 AUD), 40% unwilling, and 28% believing it should be funded by the government, citing reasons such as cost prohibition (29%) or would rather see the GP (33%).<sup>36</sup> While profitability and commercialisation can influence service provision there are potential synergies when high quality service provision generates consumer



loyalty and future financial gains.<sup>37,38</sup> Our study mainly interacted with community pharmacy end users and further discussion about the steps to achieve adequate remuneration with pharmacy stakeholders and policymakers would inform the potential for broad dissemination and future sustainability of the intervention.

## 5.1 | Overall strengths and limitations

This study used a range of quantitative and qualitative measures to comprehensively capture the contextual factors used to evaluate implementation of the intervention.<sup>39</sup> The evaluation was hindered by the opt-in approach to obtaining post-intervention qualitative and quantitative outcome measures from consumers, therefore future work should explore methods which ensure this data is captured. Biases such as the Hawthorne effect may have limited any negativity towards the intervention throughout the interviews, as health care workers have a reputation to maintain as a professional.<sup>40</sup> This study captured data from only English-speaking individuals, yet Australian is a culturally diverse and multilingual nation, where the needs of these individuals may differ.

The study may have benefitted from an ethnographic approach and researcher field notes to capture data such as time taken, pharmacist led survey completion, patient survey self-completion, number of participants approached and declined. However, an observer effect may detract from the natural method of the study, especially as the pre-existing relationship and encouragement between pharmacy staff and consumer was cited to be a major facilitator.<sup>28,40</sup> This difficulty in measuring fidelity to the intervention is similar to other studies.<sup>7</sup> Additionally, this was a feasibility study for the screening service where individualisation of service delivery to cater to the pharmacy's unique consumers and workflow is ideal.

## 6 | CONCLUSION

Community pharmacies in Australia present a promising, yet underutilised avenue for health promotion and screening for osteoporosis within Australia. Using an implementation science approach, a low-cost, non-invasive osteoporosis screening service for the Australian context was designed and found to be acceptable to pharmacy staff and effective in reaching the target population. The long-term impact, sustainability and future of the intervention is unclear and further research and resources should be directed into early recognition and management of this silent disease.

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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 on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## ETHICS STATEMENT

This study was approved by the Human Research Ethics Committee of the University of Sydney HREC2021/555 and HREC2020/633.

## PATIENT CONSENT FOR PUBLICATION STATEMENT

Informed patient consent was obtained as per ethical approval, no identifying patient information has been included.

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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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