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RESEARCH ARTICLE

Educating primary care physicians about eating disorders: Pilot data from a microlearning programme

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Abstract

Background: Over two-thirds of people present to their primary care physician (or general practitioner; GP) as a first point of contact for mental health concerns. However, eating disorders (EDs) are often not identified in a primary care setting. A significant barrier to early detection and intervention is lack of primary care physician training in EDs; compounded by the significant time commitments required for training by already time-poor general practitioners. The aim of the current study was to pilot and evaluate a microlearning programme that can be delivered to general practitioners with high workloads to help support patients with, or at risk of, developing an ED.

Methods: Fifty-one Australian general practitioners aged between 25-to-60 years old were recruited. Participants completed a baseline questionnaire to ascertain their experience working in general practice and with EDs. Participants then completed an online programme consisting of a series of 10 case studies (vignettes) delivered over a 6–10 week period related to various facets of ED care. Following conclusion of the programme, participants were asked to complete an evaluative questionnaire related to the content of the programme; perceived knowledge, confidence, willingness-to-treat, skill change; and their overall experience of microlearning.

Results: All 51 GPs completed the programme and reached completion criteria for all vignettes, 40 of whom completed the programme evaluation. Participants indicated improved skill, confidence, willingness-to-treat, and knowledge following the completion of the pilot programme. Almost all (97.5%; $n = 39$) found microlearning to be an effective method to learn about EDs; with 87.5% ($n = 35$) of participants reporting they felt able to apply what was learnt in practice. Qualitative feedback highlighted the benefit of microlearning's flexibility to train general practitioners to work with complex health presentations, specifically EDs.

Conclusions: Findings from the current study lend support to the use of microlearning in medical health professional training; notably around complex mental health concerns. Microlearning appears to be an acceptable and effective training method for GPs to learn about EDs. Given the significant time demands on GPs and the resulting challenges in designing appropriate training for this part of the workforce, this training method has promise. The pre-existing interest in EDs in the current study sample was high; future studies should sample more broadly to ensure that microlearning can be applied at scale.

KEYWORDS
eating disorder learning, education, general practice, health professionals, learning, microlearning

Highlights

- Due to busy schedules and job-demands, GP's often have limited opportunity to learn about working with patients with complex mental health needs, such as eating disorders. Knowing how to support patients with eating disorders is particularly important given that most individuals present with seemingly unrelated concerns to the eating disorder
- The current study reports on the development and piloting of a GP Microlearning programme. Microlearning is a flexible yet focussed approach to online learning that offers health professionals the opportunity to learn, without the requirement to commit to traditionally lengthy training programs
- GPs reported that the microlearning approach to learning about eating disorders may be an acceptable and effective approach for increasing GP knowledge, skill, confidence, and willingness to treat eating disorders.

1 | BACKGROUND

Over 70% of people with mental health concerns first present to their primary health physician (Richards et al., 2004). However, due to lack of appropriate training, there is hesitation among many general practitioners (GPs) to work with individuals who present with mental health worries, particularly those complex in nature such as eating disorders (EDs) (Ballester et al., 2005; Garcia-Campayo et al., 1998; Hay et al., 2020; Lam et al., 2018; Rowe, 2017; Waller et al., 2014; Ööpik et al., 2006). System barriers, such as time-constraints and lack of appropriate training and resources needed to support patients with psychiatric disorders may play a significant role in GP hesitation (Ballester et al., 2005). Consequently, when people with EDs do present to a primary care setting many GPs lack the required knowledge to respond appropriately, leading patients to report negative experiences of ED support from their doctor (Malson et al., 2022).

Addressing the stigma surrounding eating disorders in primary care, particularly physician biases that may lead to misidentification of ED - especially among high weight patients, is crucial for improving eating disorder outcomes. Stigma surrounding eating disorders, can have significant implications for diagnosing and treating eating and related pathology in primary care settings. Weight stigma, in particular, appears to perpetuate negative attitudes and beliefs towards individuals with eating disorders (Harrop et al., 2023). Such stigma can often be internalized by individuals, and leads to feelings of guilt, self-blame, and shame, which can hinder an individual's willingness to seek help or disclose their symptoms or the impact these may be having on a persons' life (Brelet et al., 2021).

Consequently, some medical professionals may hold biased attitudes towards patients with eating disorders, particularly as it related to higher BMI (Puhl et al., 2021). These biases can manifest as weight-based judgements or assumptions about eating disorders or their 'cause', leading to a lack of appropriate assessment and intervention (Eiring et al., 2021), particularly in younger patients where intervening early is important. Children and youth, in particular, may face weight-related stigma, which can

impact their body image and self-esteem, making it difficult for them to seek help and receive appropriate care (Roberts & Chaves, 2023).

It is essential for GPs to receive education and training on how to identify and support patients with eating pathology across the weight spectrum and co-occurring conditions, in a manner that is understanding and sensitive to the needs of the patient.

EDs are associated with high rates of psychiatric comorbidity (Barakat et al., 2023; Hambleton et al., 2022; National Eating Disorders Collaboration, 2020), mortality (Arcelus et al., 2011; Keel et al., 2003; Paxton et al., 2012) and relapse, and low rates of detection and intervention (Bryant et al., 2022; Currin & Schmidt, 2005; Hay et al., 2023; Keel et al., 2003; Koreshe et al., 2023; Paxton et al., 2012). In Australia, it is estimated that over 1 million people have a diagnosable ED (Paxton et al., 2012), with this figure likely much higher when taking into consideration the spectrum of disordered eating. Nevertheless, EDs continue to have one of the lowest early identification and treatment rates of the psychiatric conditions (Butterfly Foundation, 2020), particularly in primary care settings, in part due to lack of GP training to support patients with ED and disordered eating (Bryant et al., 2022; Malson et al., 2022).

Identification of EDs by GPs is exceedingly low (Waller et al., 2014), with a significant proportion of individuals with EDs only seeking treatment after they become medically unstable or require hospitalisation (Ali et al., 2020). A recent analysis of 15 years of primary care encounters with GPs in Australia showed that less than half of 1% of encounters related to management of EDs, and of those cases that were recorded and managed very few were referred onto mental health treatment plans (Ivancic et al., 2021). Specifically, low detection rates may be attributed to the challenges faced by GPs in identifying EDs in patients presenting with seemingly unrelated concerns, and a paucity in practitioner knowledge to understand how EDs may present across the lifespan; and thus, how to effectively treat them (Rowe, 2017).

In the field of eating disorders, several education programs are already in place to provide training for health professionals working in the eating disorder space (National Eating Disorders Collaboration, 2019; InsideOut Institute). These programs aim to improve the knowledge, skills, and confidence of GPs in identifying, assessing, and managing eating disorders. However, training targeting general practitioners (GPs) in particular, appear to be limited (National Eating Disorders Collaboration, 2019).

The outcomes of these education programs have been promising. Research has shown that participating in eating disorder training programs can lead to significant improvements in healthcare professionals' knowledge, skills, and confidence in working with eating disorders; and can be useful in reducing stigma around eating disorders (Brownlow et al., 2015; Linville et al., 2013; Raffoul et al., 2022).

Current training courses (either online or in-person) are often lengthy, delivered over multiple days and ill-suited to the fast-paced, time poor nature of GP practices. However, 'shorter' (~1–1.5 h) training programs have shown to improve knowledge and attitudes of primary care physicians (Raffoul et al., 2022), as well as nurse practitioners, GPs, and specialist medical professionals - such as obstetricians and paediatricians (Linville et al., 2013). Training in this context needs to be highly flexible in-terms of required timing, targeted, interactive, spaced in its delivery of new information and repeated over time to consolidate the knowledge gained (Fennelly Atkinson & Dyer, 2021; Phillips et al., 2019; Raffoul et al., 2022; Sozmen, 2022; Stratton, 2019).

By providing primary care physicians with tailored, flexible, yet targeted learning to engage with patients exhibiting increased eating pathology we may be able to impact identification and response rates in primary care by increasing GP knowledge of EDs. Emerging evidence has demonstrated the positive influence that such early intervention can have on illness trajectory and clinical outcomes (Austin et al., 2021; Richards et al., 2021; Rosello et al., 2022), particularly when GP knowledge of EDs is high (Hamilton et al., 2022) (Clarke & Polimeni-Walker, 2004). Thus, to better equip the general practice workforce with required knowledge a consideration of how time-poor GPs best learn about EDs and other complex psychiatric conditions needs to occur.

Microlearning, a form of electronic learning that is delivered in interactive yet short, focussed and spaced lessons, may offer an advantageous avenue to train GPs with high workloads about EDs (Fennelly Atkinson & Dyer, 2021). Microlearning has demonstrated efficacy in delivering high-level information to health professionals with high workloads who are required to maintain or improve their knowledge and skills across a number of health care settings (Lei et al., 2019; Phillips et al., 2019). Its design allows learners to quickly engage with the content and focuses on its clinical application (Fennelly Atkinson & Dyer, 2021; Phillips et al., 2019; Sozmen, 2022; Stratton, 2019).

Despite emerging evidence supporting the use of microlearning for GP training (Phillips et al., 2019), few studies have examined the use of this approach in complex, multidimensional, psychiatric conditions such as EDs, with no studies conducted in Australian GPs. Therefore, the primary objective of the current study was to develop, pilot, and evaluate a microlearning programme that can be delivered to GPs with high workloads in order

to equip them with foundational skills required to identify and support individuals who may have, or be at risk of, developing an ED. Specifically, the study evaluated the acceptability and feasibility, effectiveness, and applicability of a microlearning programme to train GPs about EDs.

2 | METHODS

The current study took a systematic approach to development and evaluation of the programme. Moreover, the method outlined below aims to allow flexibility for individual, self-paced, learning.

2.1 | Participants and recruitment

Participants were recruited from across Australia through online advertising, promotion within the sector and through personal and professional networks and bodies. To be eligible for the study participants had to be eligible for registration as a GP with the Australian Health Practitioners Regulation Agency (AHPRA); and due to their similarity, not have completed either i) [BLINDED FOR REVIEW] programme (Sozmen, 2022; Stratton, 2019); nor ii) the *National Eating Disorder Collaboration (NEDC) Eating Disorder Core Skills: eLearning for GPs* programs. Additionally, participants were required to speak, read and understand English; and have access to their own Internet accessible device (such as a computer, phone or tablet). GP participants were not required to be currently treating patients with eating disorders but did need to be registered and therefore, actively seeing patients at the time of participation in the current study. The study was approved by the [UNIVERSITY NAME WITHHELD FOR PEER-REVIEW] Human Research Ethics Committee (Approval Number: 2021/785), with participants providing written informed consent prior to their participation in the study.

2.2 | Study design and procedure

Learning objectives and case studies (vignettes) for the programme were co-designed and developed in consultation with clinical and subject matter experts, as well as lived experience researchers (*see supplementary material for examples*). While participants were not required to diagnose a specific eating disorder during the training, they were required to become familiar with key features of common eating disorders (American Psychiatric Association & Association, 2013). Specifically, vignettes included presentations consistent with Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, and Other Specified Feeding and Eating Disorders (American Psychiatric Association & Association, 2013). Further to this, participants were provided vignettes that covered the lifespan. For example, understanding that evidence-based practice indicates family based therapies for young people who may be presenting with restrictive type eating pathology. Thus, facilitating appropriate referral to support their patients.

Participants completed a pre-programme questionnaire; followed by the microlearning programme which consisted of 10 vignettes completed over 6–10 weeks delivered through the QStream® microlearning platform (Raffoul et al., 2022). Upon completion of the microlearning programme, participants completed a post-programme questionnaire evaluating the overall learning and microlearning experience (*see supplementary material for more information).*

2.3 | Measures

Baseline Questionnaire: Data collected included the following—demographics (age, gender, work location, work practice size); experience in general practice and working directly with EDs; previous ED training (including non-microlearning based learning); as well as perceived confidence, willingness, skill level, and overall knowledge of assessing and treating people with EDs; and past microlearning use. Further, participants were asked whether they had used microlearning in the past.

Vignette-specific Knowledge Questions: Each case-study asked participants a question related to the topic covered. Topics covered included ED risks, treatments, screening and assessment, comorbidity, medical risks and deterioration, relapse, collaborative care, and appropriate engagement of patients with suspected eating pathology.

Evaluation Questionnaire: At completion of the microlearning programme participants were asked repeat questions related to perceived overall knowledge, willingness, confidence, and skill level to assess and treat people with an ED. Additionally, participants were asked to rate their overall learning experience and the programme's feasibility, acceptability, effectiveness, complexity, format, platform, useability, and anticipated practice change as a result of the learning activity.

Overall Knowledge: In addition to the knowledge questions asked during the microlearning programme, five knowledge questions were asked at baseline and again at evaluation. Overall knowledge questions were not based on any specific case but rather assessed broader knowledge of EDs gained through the programme. Answers to these questions helped determine applicability and

effectiveness of the microlearning pilot (Clarke & Polimeni-Walker, 2004).

Qualitative Questions: Six optional qualitative questions were asked of participants that allowed participants the opportunity to provide additional feedback. Questions included.

1. Please list any positive experiences (or advantages) [you] associated with using microlearning to learn about eating disorders?
2. Please list any negative experiences (or disadvantages/barriers) [you] associated with using microlearning to learn about eating disorders?
3. Were there any barriers to you engaging in or completing this programme (e.g. language differences, cultural differences, time commitment, cost, etc)?
4. Is there a way you think the programme could be improved?
5. Do you have any suggestions for other trainings you would be interested in?
6. Please provide any additional comments or feedback you may have.

2.4 | Data analysis and programme evaluation

All data were analysed using SPSS (current version: 26; IBM Corp.), with graphs generated in Excel (Microsoft). Evaluation of the microlearning programme was in line with the Kirkpatrick Model of Evaluation (Fennelly Atkinson & Dyer, 2021) (*see supplementary material for additional detail*). Descriptive statistics were used to examine demographic and user experience data, and to determine accuracy across all 10 vignettes. Applicability and effectiveness of the microlearning platform was determined by change in scores from the overall knowledge assessment at baseline to evaluation. Due to the small-sample size (power) and non-normal distribution of variables, a non-parametric Wilcoxon signed-rank test was used to ascertain the significance in knowledge score change. Qualitative feedback was examined thematically, generally aligned with steps outlined by Braun & Clarke (2006). However, modification to the Braun and Clarke approach was needed as 1) participant responses were recorded as typed free-text; and 2) only short-responses to questions were provided by participants. Specifically, Table 1 details the process used to analyse qualitative feedback.

It should be noted that analysis was conducted on participants that completed both the pre-programme questionnaire and microlearning programme (vignettes) but may not have completed the post-programme evaluation. Analyses relating to the effectiveness of the programme was only conducted on those that completed all aspects of the study (pre-programme questionnaire, microlearning programme and post-programme evaluation). Thus, descriptive and comparison statistics were conducted between the subgroups: (a) who evaluated the programme; and (b) those who did not.

TABLE 1 Steps utilised for Qualitative analysis.

Step #	Description
Step 1: Familiarisation with data	Responses to questions were reviewed several times by coders to familiarise themselves with the data. Responses were then extracted to a spreadsheet, with columns representing questions asked, and rows representing individual participant responses.
Step 2: Initial codes; and Step 3: theme generation	As the evaluative questions asked were related to specifically understanding participant experiences, an open-coding approach was used. Responses were analysed by one coder (PA), who generated themes determined by participant responses to the questions asked. The approach taken allowed for more focused questions and was complementary to the overall mixed-methods evaluation.
Step 4: Theme review; and Step 5: Theme definition	A review of themes was conducted by a second coder (AJ), with disagreements discussed and put forward to a third independent reviewer if required. No subthemes were noted by either coder, and theme definition was interpreted in a literal-manner. That is, to be a direct answering of the question posed to participants. Nonetheless, as there were a contained number of responses, a third reviewer was not required.
Step 6: Write-up	Results were tabulated by one author (PA) and reviewed by all contributing authors.

3 | RESULTS

3.1 | Response rate and sample characteristics

In total 79 individuals consented to take part in the study; however, 51 (64.6%) participants proceeded to complete the pre-programme questionnaire and microlearning programme. All 51 GPs who commenced the microlearning programme completed it, reaching the required 80% completion rate on vignettes. Specifically, 98% ($n = 50$) achieved a 100% completion rate, while 2% ($n = 1$) achieved a 90% completion rate due to a technology related issue. On average, 1.2 attempts were required to achieve a correct response across all individual case study questions. However, as previously noted of the 51 participants who completed the microlearning programme, only 40 participants completed the post-programme evaluation; and thus, 40 were included in the post-programme evaluation analysis (see Figure 1).

The sample consisted entirely of women aged between 25 and 60 years old, with 53% ($n = 27$) being aged between 35 and 44 years old. Around two-thirds (66.7%; $n = 34$) of participants were from small practices (<10 GPs), with 64.5% ($n = 33$) having up to 10 years of experience as a GP and over one-quarter of participants (25.4%; $n = 13$) at least 15 years of practice experience. Participants predominately came from the East coast of Australia, particularly South-East Queensland and Sydney; however, there was some representation from all Australian States and Territories, except the Northern Territory.

Over 88% ($n = 47$) of participants indicated working with EDs in the past, with approximately two-thirds (66.7%; $n = 34$) of GPs having treated between 1 and 5 patients with an ED in the preceding 6-month period, and on average having approximately 3 h of eating disorder training in the preceding 12-month period.

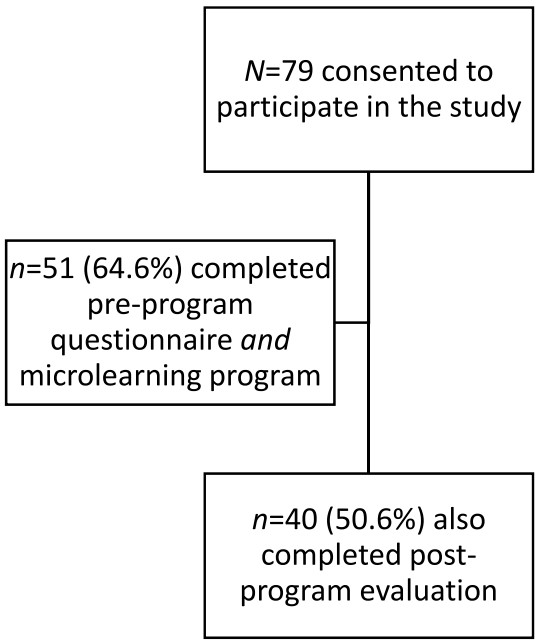

FIGURE 1 Completion at each stage of study.

3.2 | Effectiveness and applicability

Change in Perceived Overall Knowledge, Willingness, Confidence, and Skill Level.

Baseline and post-programme self-perceived knowledge, willingness, confidence, and skill levels to assess and treat patients with EDs are presented in Figure 2. All domain ratings increased on average by approximately a score of 0.5, with participants feeling that their perceived overall knowledge, skill and confidence to assess and treat EDs had the most improvement following the programme.

Wilcoxon signed-rank tests were conducted between pre- and post-domain scores (perceived knowledge, willingness, confidence, and skill); all of which demonstrated statistically significant change following completion of the microlearning programme ($Z_{knowledge} = -4.10$, $p < 0.001$; $Z_{willingness} = -2.41$, $p = 0.013$; $Z_{confidence} = -3.85$, $p < 0.001$; $Z_{skill} = -3.36$, $p < 0.001$).

3.3 | Knowledge impact

Knowledge change was assessed using pre- and post-knowledge test scores, with a median score increase of one-point following completion of the microlearning programme. To determine if the increase in knowledge-score was significant, a Wilcoxon signed-rank test was conducted on raw scores of participants who completed both pre- and post-knowledge assessment ($n = 40$). Pre-programme quiz scores and post-programme quiz scores demonstrated a marginal statistically significant change following completion of the microlearning programme ($Z = -1.97$, $p = 0.049$).

Following the completion of the microlearning programme, the majority of participants (90%; $n = 36$) reported they felt they could apply what was learnt to their practice with patients. Specifically, as can be seen in Figure 3, a majority (range: 67.5%–82.5%) of participants considered microlearning a positive tool for impacting knowledge, specifically for transferring knowledge into practice (i.e. real-life scenarios helped them learn), gaining new knowledge, and reinforcing existing knowledge.

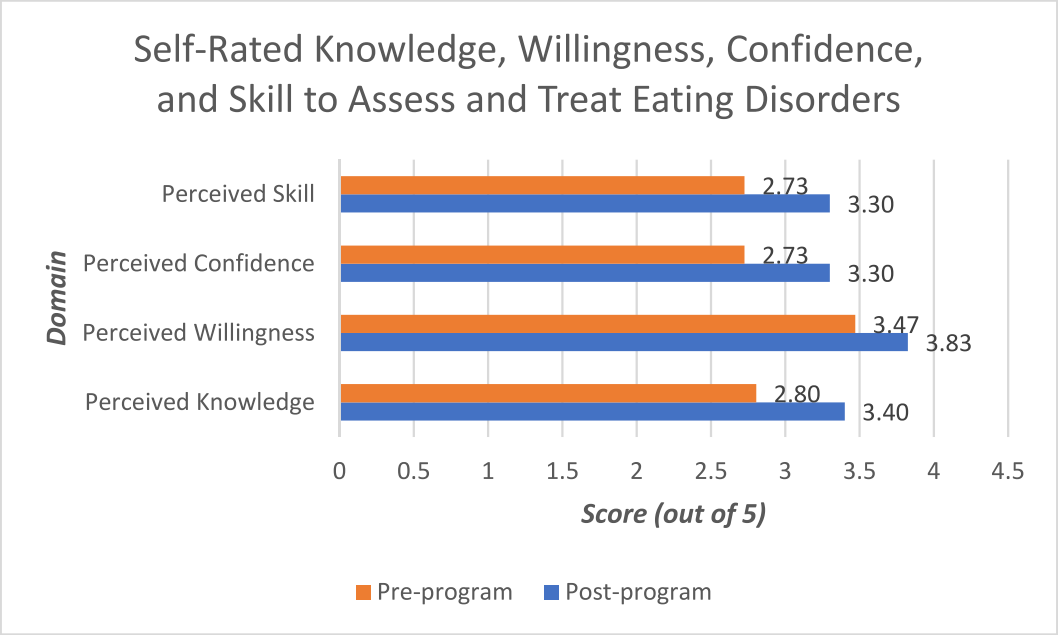

FIGURE 2 Perceived knowledge, willingness, confidence, and skill to assess and treat EDs

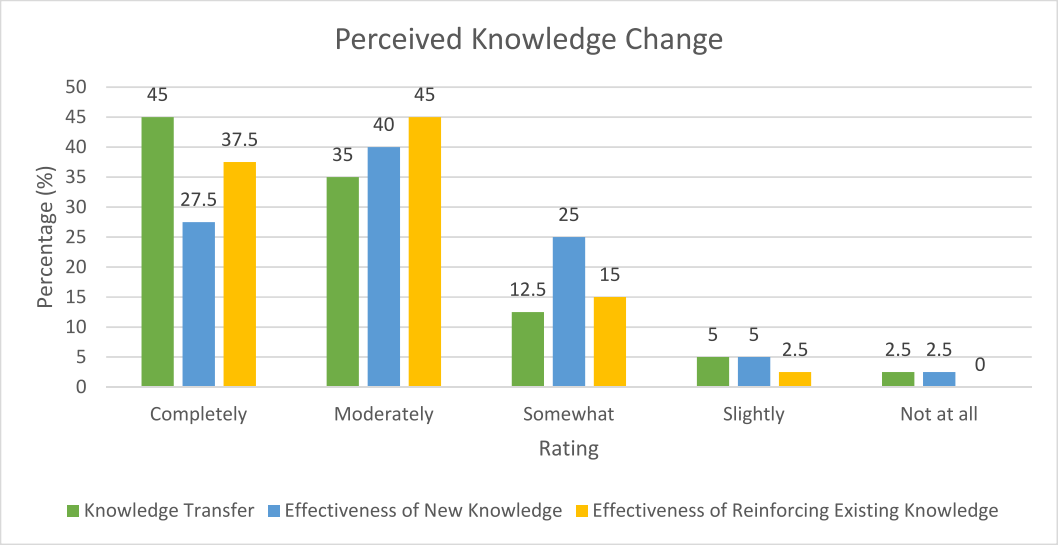

FIGURE 3 Perceived impact of microlearning on knowledge change.

3.4 | Acceptability and feasibility

Using a microlearning programme to learn about EDs was rated by 80% (n = 32) of participants as being completely feasible (Figure 4). Similarly, 77.5% (n = 31) found microlearning to be a completely acceptable way to learn about EDs (Figure 3).

Differences Between Participants Who Did Not Complete the Post-programme Evaluation versus Those That Did.

A Kruskal-Wallis test was used to compare participants who completed the microlearning programme without completing the post-programme evaluation (n = 11) with those who completed the programme and evaluation (n = 40), on pre-programme demographic and perceived knowledge, confidence, willingness and skill to treat. No significant differences between the two groups were noted. Table 2, below highlights differences between these two groups.

3.5 | Overall user experience

Figure 5 highlights that the vast majority of participants found the programme appealing, easy to access, at an

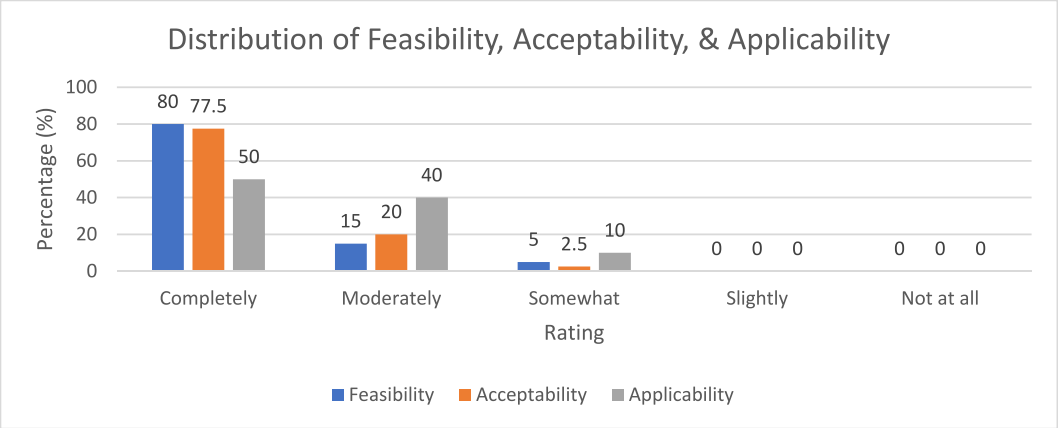

FIGURE 4 Feasibility, acceptability, and applicability of microlearning.

TABLE 2 Demographic and pre-programme perceptions and knowledge of participants who completed the post-programme evaluation, compared to those that did not complete the evaluation (microlearning programme only).

Demographics	Evaluation completers *n* (%)	Evaluation non-completers *n* (%)
Sample size	40	11
Remote or rural	10 (25%)	2 (18%)
Metropolitan	30 (75%)	9 (82%)
Practice size (large or corporate)	13 (32.5%)	3 (27.3%)
Gender (female)	40 (100%)	11 (100%)
Years practicing (≥5 years)	28 (70%)	8 (72.7%)
EDs patient tx past 6 months (≥5)	34 (66.7)	9 (81%)
Microlearning experience	2 (5%)	0 (0%)
ED training (preceding 12 months)	3 h	1.6 h
Pre-programme outcomes	***Mean Score***	***Mean Score***
Willingness (perceived)	3.47	3.5
Confidence (perceived)	2.7	2.7
Skill (perceived)	2.7	2.5
Knowledge (perceived)	2.8	2.7
Knowledge (assessed)	3.5	3.6
Correct vignettes (1 attempt; max: 10)	8.1	7.5

Note: No significant differences between participants that completed the microlearning programme without completing the post-programme evaluation ($n = 11$) compared to participants that completed the programme and evaluation ($n = 40$) were noted for perceived knowledge, confidence, willingness or skill to treat.

appropriate level of language and a good investment of time. Moreover, 84% of participants ($n = 32$) would recommend microlearning to others, while 52.5% ($n = 21$) found that microlearning completely or moderately met their learning needs, no participants indicated the programme did not meet any of their learning needs. Moreover, three-quarters (75%; $n = 30$) of participants indicated they would be willing to using microlearning again in the future.

3.6 | Qualitative feedback

Qualitative data from open-response survey questions was analysed to get a sense of participants experiences with the programme. A total of 40 participants provided an answer to the open response questions. Overall, qualitative feedback was positive, with participants expressing gratitude and praise for the pilot programme with a number of participants requesting longer (ongoing) versions of the programme. Emerging themes centred around 1) ability to fit around full schedules; 2) a need for varied complexity of cases; (c) a need to develop content on specific learning areas of need. A number of participants indicated that the complexity, or difficulty, of the programme could have been increased, while others found it acceptable. Several participants suggested topics for 'future' iterations of the programme including. Table 3, highlights some comments made by participants around these themes.

4 | DISCUSSION

The primary aim of the current study was to develop, pilot, and evaluate (acceptability, feasibility, effectiveness and applicability) an ED microlearning programme for

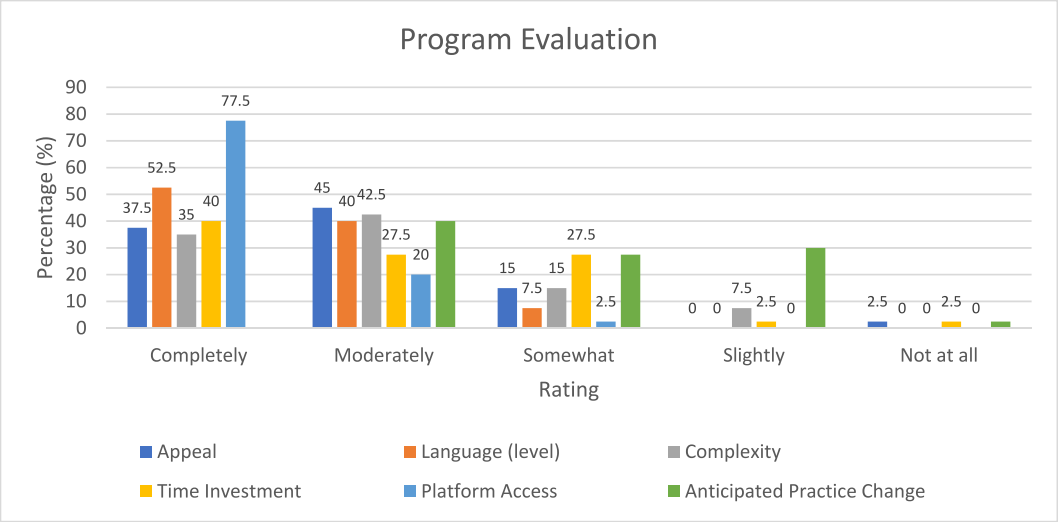

FIGURE 5 Microlearning programme evaluation.

TABLE 3 Study participant feedback of programme.

Theme 1: Ability to fit around high workloads and full schedules	
Quote	**Participant #**
least stressful learning opportunity I have had in a long time, I felt I could continue with this even after a long day at work or when I was feeling stressed. I actually looked forward to the next email as I was enjoying learning without out the pressure or burden on my time..."	17
"able to do it on the go"	20
"engaging and minimal time"	22
"quick and easy time commitment and I did learn things."	24
"easy to fit in with work schedule. Thought provoking"	28
"easy to access, motivating to have broken into smaller parts"	36
Theme 2: Varied case complexity	
Quote	**Participant #**
"Questions were a little simplistic but great for GPs with little experience with eating disorder patients"	3
"Not in depth enough for complex management"	7
"Simplistic"	11
Theme 3: Content for specific learning area	
Quote	**Participant #**
"[eating disorders in the context of] transgender health"	21
"nutrition [information for eating disorders] with good evidence base, and [learning around] updates in medicine [specific to eating disorders]"	6
"this [microlearning] method would be great for almost all topics"	13

GPs with high workloads, to support patients of all ages with complex mental health concerns—specifically, those who may have, or be at risk of, developing an ED. Overall, the findings of the current pilot study found that microlearning may be an acceptable, feasible, and effective method of training the GP workforce on EDs; particularly when taking into consideration the development of the overall programme (*see Supplementary Table*

S2 for a summary of programme development considerations). All 51 GPs enroled in the study completed the microlearning programme, suggesting that the very brief case study format was workable within their often-full schedule. 11 did not complete the post evaluation questionnaire perhaps a result of the extra time commitment required to do this longer exercise. Qualitative feedback did indicate that a varied level of complexity was needed, particularly for users who may have more existing knowledge of EDs. This may have impacted anticipated practice change, however further testing is required.

Changes from pre to post measures of perceived knowledge, willingness, confidence, and skill lend further support to the conclusions of several studies (Fennelly Atkinson & Dyer, 2021) supporting the use of microlearning in health professional settings, continuing clinical education, and GP workforce training. Moreover, the study findings show preliminary support for the use of microlearning to support practitioner education about complex mental health conditions, namely EDs, which are critical to positive patient outcomes (Hamilton et al., 2022).

Overall, significant differences were observed on primary outcome measures, and more marginally significant results in the pre-post knowledge quizzes. However, no significant differences were noted between individuals that did and did not complete the post-programme evaluation and those that did. Nonetheless, in the context of using a microlearning approach for educating busy GPs, particularly as part of continuing professional development, a practical application of the knowledge gained through the learning process is required to identify more meaningful behavioural and practice changes. Actively applying knowledge is more likely to see a more pronounced shift in practitioner confidence, willingness to treat, and skill (Fennelly Atkinson & Dyer, 2021). Similarly, microlearning may be useful to supplement and complement on-the-job learning and may accelerate learner outcomes (Fennelly Atkinson & Dyer, 2021). In the current study, participants were unable to be assessed during their course of practice. Nonetheless, the limited shift in pre- and post-programme willingness, confidence, and skill may see a greater shift once participants are able to apply their learnings. However, further research is required to determine how to maximise these outcomes.

The findings are better contextualised when considering that ED symptoms are often overlooked when multiple presenting issues are being addressed simultaneously in a primary care setting (Waller et al., 2014). Nonetheless, mounting evidence (Ali et al., 2020) suggests that the signs of disordered eating or EDs should not be ignored, particularly in general practice. In large part due to the evasive nature of the ED, and the worsening prognosis and patient outcomes should eating pathology remain unaddressed (Austin et al., 2021).

4.1 | Strengths and limitations

A number of limitations exist with the current pilot study including a small sample-size, high potential for sampling-bias due to attracting GPs already interested and having some existing knowledge of EDs, and unavailability of standardized measures for evaluating microlearning programs, particularly in the ED field. The study attempted to overcome this latter limitation by developing a robust evaluation process methodology. This approach is easily adaptable and could support the assessment of microlearning programs on different topics and in different cohorts. The co-design of learning objectives and content with clinical and lived experience experts is essential to mimick 'real-world' scenarios that may present in practice.

Nonetheless, there is a distinct lack of diversity and thus limited generalizability of the study findings. All participants in the study identified as female. It is important to note that women healthcare providers have shown a greater interest in learning about and treating eating disorders (Banas et al., 2013). Therefore, the findings may not accurately represent the knowledge, attitudes, and behaviours of all GPs.

Additionally, while the study aimed to improve GP knowledge and comfort in screening and supporting patients with disordered eating, it did not specifically address referral practices. Previous research has shown that knowledge about EDs does not necessarily lead to increased diagnosis however, can contribute to increased referral to specialized services (Currin et al., 2009). Referral practices are crucial in ensuring that patients receive appropriate and comprehensive care for complex mental health conditions, such as EDs. However, the program described in the study did not explicitly cover referral practices, which is a limitation to consider.

It is important for future research and training programs to address these limitations by including a more diverse sample of GPs and health professionals while incorporating education on referral practices. This would help ensure that healthcare providers are equipped not only with knowledge about eating pathology but also with the skills to effectively refer patients to specialized services when necessary. By addressing these limitations, we can improve the overall quality of care for individuals with EDs and disordered eating.

4.2 | Future research

In order to build on current findings, future research on microlearning—particularly in EDs, should repeat the study in a larger and broader sample of GPs with varying levels of existing knowledge and interest in EDs. Moreover, in response to the qualitative feedback the development of additional modules and learnings should also be considered to produce a more comprehensive learning programme. Further consideration into expanding research in to understanding and addressing knowledge gaps about EDs among other health professionals and how microlearning can be effectively used, may further support improvements in ED workforce capacity.

4.3 | Significance and implications

The findings of the current pilot study demonstrate that microlearning may be a viable solution for the development of skills and knowledge that will allow GPs to support a broader range of patients. Further, the current study highlights that primary care physicians are receptive to learning about complex mental health presentations, specifically EDs. Thus, microlearning may be an effective learning tool, which may be utilised to address critical ED workforce shortages in primary care by making learning accessible and flexible—without increasing burden on increasingly time-poor GPs or disrupting work-life balance.

5 | CONCLUSIONS

The outlined study uses a rigorous and evidence-based approach to help support an ED-informed GP workforce shortage. It is expected that the current study will help in the development of knowledge to allow GPs to feel more comfortable identifying, providing early intervention and supporting patients at elevated risk of developing or living with a complex mental health condition, like EDs.

AUTHOR CONTRIBUTIONS

PA and SM conceived the idea of the study; PA draughted the first iteration of the manuscript; all authors contributed to the design and draughting of the current manuscript.

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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 APPROVAL AND CONSENT TO PARTICIPATE

The study was approved The University of Sydney Human Research Ethics Committee (Approval Number: 2021/785), with participants providing written informed consent prior to their participation in the study.

CONSENT FOR PUBLICATION

As part of the informed consent process, all participants agreed to the dissemination of research findings as per Ethics Committee approval.

COMPETING INTERESTS

Beyond funding noted below, the researchers declare no other potential conflicts of interest for this research study.

USE OF LARGE LANGUAGE MODULES AND AI

AI, including LLM, may have been used for idea generation; editing of language, spelling and grammar; and/or contextualisation purposes. In such instances, all output was based on author input and edited/paraphrased to reflect the authors intended meaning/tone.

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REFERENCES

Ali, K., Fassnacht, D. B., Farrer, L., Rieger, E., Feldhege, J., Moessner, M., Griffiths, K. M., & Bauer, S. (2020). What prevents young adults from seeking help? Barriers toward help-seeking for eating disorder symptomatology. *International Journal of Eating Disorders*, *53*(6), 894–906. https://doi.org/10.1002/eat.23266

American Psychiatric Association, D., & Association, A. P. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. American psychiatric association.

Arcelus, J., Mitchell, A. J., Wales, J., & Nielsen, S. (2011). Mortality rates in patients with anorexia nervosa and other eating disorders: A meta-analysis of 36 studies. *Archives of General Psychiatry*, *68*(7), 724–731. https://doi.org/10.1001/archgenpsychiatry.2011.74

Austin, A., Flynn, M., Richards, K., Hodsoll, J., Duarte, T. A., Robinson, P., Kelly, J., & Schmidt, U. (2021). Duration of untreated eating disorder and relationship to outcomes: A systematic review of the literature. *European Eating Disorders Review*, *29*(3), 329–345. https://doi.org/10.1002/erv.2745

Ballester, D. A., Filippon, A. P., Braga, C., & Andreoli, S. B. (2005). The general practitioner and mental health problems: Challenges and strategies for medical education. *Sao Paulo Medical Journal*, *123*(2), 72–76. https://doi.org/10.1590/s1516-31802005000200008

Banas, D. A., Redfern, R., Wanjiku, S., Lazebnik, R., & Rome, E. S. (2013). Eating disorder training and attitudes among primary care residents. *Clinical Pediatrics*, *52*(4), 355–361. https://doi.org/10.1177/0009922813479157

Barakat, S., McLean, S. A., Bryant, E., Le, A., Marks, P., Aouad, P., Boakes, R., Brennan, L., Byrne, S., Caldwell, B., Calvert, S., Carroll, B., Castle, D., Caterson, I., Chelius, B., Chiem, L., Clarke, S., & Maguire, S. (2023). Risk factors for eating disorders: Findings from a rapid review. *Journal of Eating Disorders*, *11*(1), 8. https://doi.org/10.1186/s40337-022-00717-4

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brelet, L., Flaudias, V., Désert, M., Guillaume, S., Llorca, P.-M., & Boirie, Y. (2021). Stigmatization toward people with anorexia nervosa, bulimia nervosa, and binge eating disorder: A scoping review. *Nutrients*, *13*(8), 2834. https://doi.org/10.3390/nu13082834

Brownlow, R. S., Maguire, S., O'Dell, A., Dias-da-Costa, C., Touyz, S., & Russell, J. (2015). Evaluation of an online training program in eating disorders for health professionals in Australia. *Journal of Eating Disorders*, *3*, 1–6. https://doi.org/10.1186/s40337-015-0078-7

Bryant, E., Spielman, K., Le, A., Marks, P., Aouad, P., Touyz, S., Boakes, R., Brennan, L., Byrne, S., Caldwell, B., Calvert, S., Carroll, B., Castle, D., Caterson, I., Chelius, B., Chiem, L., Clarke, S., Conti, J., & Maguire, S. (2022). Screening, assessment and diagnosis in the eating disorders: Findings from a rapid review. *Journal of Eating Disorders*, *10*(1), 1–16. https://doi.org/10.1186/s40337-022-00597-8

Butterfly Foundation. (2020). *The reality of eating disorders in Australia*. Butterfly Foundation.

Clarke, D. E., & Polimeni-Walker, I. (2004). Treating individuals with eating disorders in family practice: A needs assessment. *Eating Disorders*, *12*(4), 293–301. https://doi.org/10.1080/10640260490521343

Currin, L., & Schmidt, U. (2005). A critical analysis of the utility of an early intervention approach in the eating disorders. *Journal of Mental Health*, *14*(6), 611–624. https://doi.org/10.1080/09638230500347939

Currin, L., Waller, G., & Schmidt, U. (2009). Primary care physicians' knowledge of and attitudes toward the eating disorders: Do they affect clinical actions? *International Journal of Eating Disorders*, *42*(5), 453–458. https://doi.org/10.1002/eat.20636

Eiring, K., Wiig Hage, T., & Reas, D. L. (2021). Exploring the experience of being viewed as "not sick enough": A qualitative study of women recovered from anorexia nervosa or atypical anorexia nervosa. *Journal of Eating Disorders*, *9*, 1–10. https://doi.org/10.1186/s40337-021-00495-5

Fennelly-Atkinson, R., & Dyer, R. (2021). *Assessing the learning in microlearning. Microlearning in the digital age* (pp. 95–107). Routledge.

Garcia-Campayo, J., Sanz-Carrillo, C., Yoldi-Elcid, A., Lopez-Aylon, R., & Monton, C. (1998). Management of somatisers in primary care: Are family doctors motivated? *Australian and New Zealand Journal of Psychiatry*, *32*(4), 528–533. https://doi.org/10.1046/j.1440-1614.1998.00435.x

Hambleton, A., Pepin, G., Le, A., Maloney, D., Aouad, P., Touyz, S., Boakes, R., Brennan, L., Bryant, E., Byrne, S., Caldwell, B., Calvert, S., Carroll, B., Castle, D., Caterson, I., Chelius, B., Chiem, L., Clarke, S., Conti, J., & Maguire, S. (2022). Psychiatric and medical comorbidities of eating disorders: Findings from a rapid review of the literature. *Journal of eating disorders*, *10*(1), 1–23. https://doi.org/10.1186/s40337-022-00654-2

Hamilton, A., Mitchison, D., Basten, C., Byrne, S., Goldstein, M., Hay, P., Heruc, G., Thornton, C., & Touyz, S. (2022). Understanding treatment delay: Perceived barriers preventing treatment-seeking for eating disorders. *Australian and New Zealand Journal of Psychiatry*, *56*(3), 248–259. https://doi.org/10.1177/00048674211020102

Harrop, E. N., Hutcheson, R., Harner, V., Mensinger, J. L., & Lindhorst, T. (2023). "You Don't Look Anorexic": Atypical anorexia patient experiences of weight stigma in medical care. *Body Image*, *46*, 48–61. https://doi.org/10.1016/j.bodyim.2023.04.008

Hay, P., Aouad, P., Le, A., Marks, P., Maloney, D., Barakat, S., Boakes, R., Brennan, L., Bryant, E., Byrne, S., Caldwell, B., Calvert, S., Carroll, B., Castle, D., Caterson, I., Chelius, B., Chiem, L., Clarke, S., Conti, J., & Maguire, S. (2023). Epidemiology of eating disorders: Population, prevalence, disease burden and quality of life informing public policy in Australia—a rapid review. *Journal of Eating Disorders*, *11*(1), 23. https://doi.org/10.1186/s40337-023-00738-7

Hay, P., Ghabrial, B., Mannan, H., Conti, J., Gonzalez-Chica, D., Stocks, N., Heriseanu, A., & Touyz, S. (2020). General practitioner and mental healthcare use in a community sample of people with diagnostic threshold symptoms of bulimia nervosa, binge-eating disorder, and other eating disorders. *International Journal of Eating Disorders*, *53*(1), 61–68. https://doi.org/10.1002/eat.23174

InsideOut Institute *The essentials: Training clinicians in eating disorders*. InsideOut Institute. N.D. [The Essentials: Training Clinicians in Eating Disorders (IOI eLearning)]. Available

from: Retrieved from https://insideoutinstitute.org.au/resource-library/the-essentials-training-clinicians-in-eating-disorders

Ivancic, L., Maguire, S., Miskovic-Wheatley, J., Harrison, C., & Nassar, N. (2021). Prevalence and management of people with eating disorders presenting to primary care: A national study. *Australian and New Zealand Journal of Psychiatry*, *55*(11), 1089–1100. https://doi.org/10.1177/0004867421998752

Keel, P. K., Dorer, D. J., Eddy, K. T., Franko, D., Charatan, D. L., & Herzog, D. B. (2003). Predictors of mortality in eating disorders. *Archives of General Psychiatry*, *60*(2), 179–183. https://doi.org/10.1001/archpsyc.60.2.179

Koreshe, E., Paxton, S., Miskovic-Wheatley, J., Bryant, E., Le, A., Maloney, D., Aouad, P., Barakat, S., Boakes, R., Brennan, L., Byrne, S., Caldwell, B., Calvert, S., Carroll, B., Castle, D., Caterson, I., Chelius, B., Chiem, L., & Maguire, S. (2023). Prevention and early intervention in eating disorders: Findings from a rapid review. *Journal of Eating Disorders*, *11*(1), 1–20. https://doi.org/10.1186/s40337-023-00758-3

Lam, T. P., Sun, K. S., Piterman, L., Lam, K. F., Poon, M. K., See, C., & Wu, D. (2018). Impact of training for general practitioners on their mental health services. *Australian Journal of General Practice*, *47*(8), 550–555. https://doi.org/10.31128/ajgp-01-18-4478

Lei, Z., Ruiying, Z., Li, M., & Chen, W. (2019). Effectiveness of learning with mobile" 100-day training" APP among general practitioners in Beijing: an empirical study. *Chinese General Practice*, *22*(19), 2374.

Linville, D., Aoyama, T., Knoble, N. B., & Gau, J. (2013). The effectiveness of a brief eating disorder training programme in medical settings. *Journal of Research in Nursing*, *18*(6), 544–558. https://doi.org/10.1177/1744987112452182

Malson, H., Tischner, I., Herzig, H., Kitney, D., Phillips, C., Norweg, S., Moon, J., Holmes, S., Wild, K., & Oldham-Cooper, R. (2022). Key stakeholder perspectives on primary care for young people with an eating disorder: A qualitative study. *Journal of Community and Applied Social Psychology*, *32*(2), 288–301. https://doi.org/10.1002/casp.2575

National Eating Disorders Collaboration. (2019). *Eating disorder training within Australia*. NEDC. Available from: https://nedc.com.au/professional-development/eating-disorder-training-within-australia/

National Eating Disorders Collaboration. (2020). Comorbidity: Nedc. Available from: https://nedc.com.au/eating-disorders/eating-disorders-explained/types/comorbidity/

Ööpik, P., Aluoja, A., Kalda, R., & Maaroos, H.-I. (2006). Family doctors' problems and motivating factors in management of depression. *BMC Family Practice*, *7*(1), 1–6. https://doi.org/10.1186/1471-2296-7-64

Paxton, S. J., Hay, P., Touyz, S. W., Forbes, D., Madden, S., Girosi, F., Doherty, A., Cook, L., & Morgan, C. (2012). Paying the price: The economic and social impact of eating disorders in Australia.

Phillips, J. L., Heneka, N., Bhattarai, P., Fraser, C., & Shaw, T. (2019). Effectiveness of the spaced education pedagogy for clinicians' continuing professional development: A systematic review. *Medical Education*, *53*(9), 886–902. https://doi.org/10.1111/medu.13895

Puhl, R. M., Lessard, L. M., Himmelstein, M. S., & Foster, G. D. (2021). The roles of experienced and internalized weight stigma in healthcare experiences: Perspectives of adults engaged in weight management across six countries. *PLoS One*, *16*(6), e0251566. https://doi.org/10.1371/journal.pone.0251566

Raffoul, A., Vitagliano, J. A., Sarda, V., Chan, C., Chwa, C., Ferreira, K. B., Gooding, H. C., Forman, S. F., & Austin, S. B. (2022). Evaluation of a one-hour asynchronous video training for eating disorder screening and referral in US pediatric primary care: A pilot study. *International Journal of Eating Disorders*, *55*(9), 1245–1251. https://doi.org/10.1002/eat.23766

Richards, J. C., Ryan, P., Mccabe, M. P., Groom, G., & Hickie, I. B. (2004). Barriers to the effective management of depression in general practice. *Australian and New Zealand Journal of Psychiatry*, *38*(10), 795–803. https://doi.org/10.1111/j.1440-1614.2004.01464.x

Richards, K. L., Flynn, M., Austin, A., Lang, K., Allen, K. L., Bassi, R., Brady, G., Brown, A., Connan, F., Franklin-Smith, M., Glennon, D., Grant, N., Jones, W. R., Kali, K., Koskina, A., Mahony, K., Mountford, V. A., Nunes, N., Schelhase, M., & Schmidt, U. (2021). Assessing implementation fidelity in the first episode rapid early intervention for eating disorders service model. *BJPsych Open*, *7*(3), e98. https://doi.org/10.1192/bjo.2021.51

Roberts, K. J., & Chaves, E. (2023). Beyond binge eating: The impact of implicit biases in healthcare on youth with disordered eating and obesity. *Nutrients*, *15*(8), 1861. https://doi.org/10.3390/nu15081861

Rosello, R., Gledhill, J., Yi, I., Watkins, B., Harvey, L., Hosking, A., & Nicholls, D. (2022). Recognition and duration of illness in adolescent eating disorders: Parental perceptions of symptom onset. *Early Intervention in Psychiatry*, *16*(8), 854–861. https://doi.org/10.1111/eip.13224

Rowe, E. (2017). Early detection of eating disorders in general practice. *Australian Journal for General Practitioners*, *46*(11), 833–838.

Sozmen, E. Y. (2022). Perspective on pros and cons of microlearning in health education. *Essays in Biochemistry*, *66*(1), 39–44. https://doi.org/10.1042/ebc20210047

Stratton, D. B. (2019). *The feasibility of using a theory-based, online delivery microlearning system to educate nurse practitioners about clinical skin examination for melanoma*. The University of Arizona.

Waller, G., Micali, N., & James, A. (2014). General Practitioners are poor at identifying the eating disorders. *Advances in Eating Disorders: Theory, Research and Practice*, *2*(2), 146–157. https://doi.org/10.1080/21662630.2013.859437

SUPPORTING INFORMATION

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

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