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Development and evaluation of an online education module to improve clinician knowledge and management of eating disorders in the peripartum: a pre-post survey study

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Abstract

Objective Eating disorders (EDs) comprise a range of illnesses characterised by disordered eating, distressing thoughts, and changes in weight. EDs in the perinatal period are a growing concern. Maternity staff receive little training in this area and often report feeling ill-equipped to recognise or respond to presentations of ED during this time. The study aimed to develop and evaluate an online educational module for clinicians and support workers to improve knowledge of EDs in the perinatal period.

Method Education modules were developed using a co-design process with consumer advocates, peer support workers, clinicians, and experts. Consumer perspectives, evidence-based videos, activities, and text relating to screening, management, monitoring and referral of perinatal individuals with EDs were included in the module. Quantitative and qualitative data from pre- and post- surveys were used to evaluate changes in knowledge and confidence before and after completing the module, and to assess staff satisfaction, usability, and obtain feedback for improvement.

Results Use of the online education module significantly increased staff knowledge of EDs in the perinatal period. Participants also felt more confident in discussing the topic with patients, screening, supporting, and referring a person with ED in the perinatal period. Participants also reported the module was engaging and easy-to-use.

Conclusions Findings indicate that the ED online education module is an engaging and easy-to-use tool for improving the knowledge and skills of the healthcare workforce, thereby improving patient care and health outcomes. The development of additional online resources for clinicians would be beneficial for increasing staff capability and improving patient services.

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Plain English Summary

Eating disorders (ED) in pregnancy and after birth are a serious and growing concern for maternity services. Few educational and training options currently exist to support clinicians to identify and manage EDs during this time. The authors co-designed an online education module with lived experience consumers, peer workers, and clinicians, designed to improve identification, management, and referral of women experiencing ED's. Evaluation of the modules using online surveys showed that the online module was acceptable and engaging for users, and increased staff knowledge and confidence in identifying and managing these presentations. Online modules are a cost-effective resource that could improve staff capabilities and patient care in the long term.

Keywords Eating disorders, Education, Online, Maternity, Perinatal, Pregnancy, Midwifery

Background

Pregnancy and the transition to motherhood can be an extremely challenging time for individuals with eating disorders (EDs). Physical, hormonal, and psychosocial changes during this time can lead many to the development of EDs for the first-time during pregnancy, whereas those with a prior history have a high risk of relapse [1, 2]. EDs are associated with a significantly greater risk of maternal and infant health problems such as hyperemesis gravidarum, maternal anaemia, gestational hypertension, premature delivery, failure to thrive, low birth weight, and perinatal death [3, 4]. Maternal EDs are also linked to childhood feeding difficulties, developmental delays, and later life behavioural problems [5, 6]. While ED research has primarily been conducted in western countries, a growing body of research in non-Western countries highlights the global burden of EDs and maternal EDs [7, 8].

Regular antenatal, postnatal, and child health reviews offer an opportune time for screening, monitoring, and assessing treatment needs and making appropriate referrals for individuals with ED. However, ED is often a secretive illness; individuals often fail to disclose, even when asked [9]. There may be a number of factors contributing to this, including patient factors (shame, ego-syntonic beliefs, denial of illness, reluctance to accept treatment, or lack of rapport with clinician) or system factors (lack of clinician time or knowledge, no continuity of care, or failure to enquire) [9, 10]. Identification of an ED relies on clinicians having awareness of risk factors and signs and symptoms, having the confidence and skills to talk to patients in a non-judgemental way, and an awareness of monitoring and management and how to refer patients to specialist services.

Maternity staff have reported feeling inadequately trained and ill-equipped to recognise and respond to EDs in the peripartum [9]. The peripartum is a unique period and requires specialised knowledge regarding assessment, pregnancy care, and management that warrants tailored training for maternity care providers. Specific physical and psychosocial challenges also arise in the postpartum period, requiring particular knowledge and skills for clinicians [1]. Non-mental health professionals

who treat individuals who may be experiencing ED would benefit from being upskilled in this area, including obstetricians and general practitioners, nursing and midwifery staff, and perinatal peer workers. Mental health professionals would also benefit from an improved understanding of the different risks and requirements for ED assessment and management in the perinatal period. Having clinicians and peer workers confident and competent in ED knowledge and skills for the perinatal population will support these clinicians to better assess and manage those with ED.

There is little in the way of formal education for health-care staff around ED in the perinatal period. Online learning can be a useful and cost-effective tool to deliver health information and education. Shift work and busy schedules can impact access to face-to-face teaching opportunities for healthcare staff. An online format allows clinicians to manage their time and permits self-directed learning at the individual's chosen pace. Recent research found that some valued aspects of online education were accessibility, interactivity, and flexibility; being offered multiple formats and being adaptable to different learning needs and styles [11, 12].

The current study aimed to develop an online educational module for clinicians and support workers who work with perinatal individuals who may experience ED, have disordered eating, or have a history of ED and are vulnerable to relapse. The education module is designed to improve knowledge around ED in the perinatal period, and enable clinicians to improve their skills in screening, identification, monitoring, management, and referral of individuals with ED. The study then aimed to determine the usability, satisfaction, and benefits of the online education module using online pre-post surveys. It was hypothesised that knowledge relating to screening, identification, referral, and management of ED in the perinatal period would be significantly improved following completion of the online module.

Module development

To create the online education module, the research team worked in collaboration with consumer advocates, peer workers from community and peer-led support

organisations such as Peach Tree Perinatal Wellness (Peach Tree) and Eating Disorders Queensland (EDQ). The online learning module uses evidence-based videos, case studies, interactive activities, and text to provide information about screening, monitoring, management, and referral to clinicians and peer workers working with perinatal individuals. Our study will investigate the benefits of this education using a pre-post- quantitative survey to assess knowledge, skills, and confidence relating to eating disorders in healthcare staff.

Co-design

The following section described the process which was undertaken to co-design the online ED education module:

1. Stakeholder engagement: Maternity and mental health staff were supportive of the development of education, and many were actively involved in the project: including perinatal psychiatrists, eating disorder specialists, dietitians, obstetric medicine physicians, general practitioners, midwives and midwifery educators. Clinicians were involved in the co-design process to make sure that their specific knowledge gaps and educational goals were addressed, and that these were presented in a way that was appropriate, easy to understand, and engaging. The project also engaged the support of: Peach Tree, a leader in the lived experience workforce for perinatal mental health, and; EDQ, a statewide not-for-profit community support and treatment service for individuals and families living with, or recovering from ED. This ensured that all modules would be co-designed with individuals who had a lived experience of perinatal eating disorders and mental illness.
2. Consumer engagement: engagement with consumers and peer workers was necessary to ensure that modules targeted information and issues significant to perinatal individuals experiencing ED, and that treatment strategies were appropriate and relevant to the experiences of perinatal individuals with ED. Surveys were given to those who had attended maternity services; asking about their experiences of care and their opinions and suggestions for appropriate screening and management strategies and techniques. A peer worker from Peach Tree acted as a consumer advocate and participated in three working party meetings. Consumer input obtained from surveys and meetings was used to create and develop the content of the modules. Quotes from individuals with lived experience were used throughout the education modules to illustrate their experience, and to reinforce the severity

and complex nature of the illness to clinicians undertaking the training.

3. Developing the modules: Professional eLearning consultants were contracted to develop storyboards and draft modules. These were shared with the working party and five separate iterations were created based on feedback from clinicians, lived experience advisors, and peer workers until a final draft was approved for evaluation.
4. Evaluating the modules: The final modules were shared with a small group of clinicians, experts, and consumers who gave feedback regarding the content, format, length, visual elements, and usability of the modules. Minor changes were made to reflect these opinions before the modules were disseminated and evaluated in the current research project.

Methodology

Study design

The study was a pre-post design using online surveys to evaluate changes in knowledge of eating disorders in the perinatal period after completing an online education module. The study also collected feedback from participants for the further development and improvement of the modules.

Ethical statement

Ethical approval was obtained from the Human Research Ethics Committees from both hospital sites (HREC/2022/QGC/90364). Participants were sent a link to the information and consent form, and provided electronic consent by checking a box prior to commencing the first online survey.

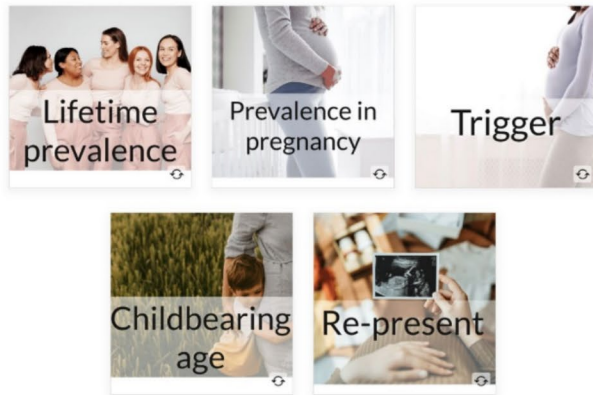
Participants

Purposive sampling was used to recruit clinicians working in maternity services and perinatal mental health services at two of Queensland's largest maternity hospitals and peer workers employed at a perinatal wellness centre. Participants included peer workers, midwives, medical specialists, nursing staff, and allied health staff who work in maternity and perinatal mental health services, and screen and/or manage perinatal individuals who may experience an eating disorder.

Procedure

The eligibility criteria included any clinician or peer worker who screens and/or manages perinatal individuals at one of the participating sites. Participants responded to intranet advertisements, emails and flyers distributed at team meetings and posted in communal areas, using QR codes, and were sent links to the information and consent form, online surveys, and education

Now that you have learnt about the prevalence of eating disorders in the general population, flip the cards to understand more about eating disorders during pregnancy.



Binge Eating Disorder

Mothers with binge eating disorder are more likely to have non-responsive feeding practices. These are also known as coercive feeding practices, where food is used as a reward (instrumental feeding), withheld as a punishment (overt restriction), or where children are pressured to eat (persuasive feeding).

For example, withdrawal of sweets as punishment, and giving food for comfort and to express love.

Bulimia Nervosa

Mothers with bulimia nervosa more commonly describe their infants as difficult eaters.

They may control their infant's diet with higher levels of maternal concern about their infant being overweight or overeating.



Fig. 1 Screenshots from the 'eating disorders in the peripartum' online education course

Table 1 Online education content

Module	Content
Module 1: An introduction to eating disorders	Types of ED, introduction to ED in pregnancy, common comorbidities, and barriers to detection and disclosure.
Module 2: Impact of eating disorders during pregnancy, postpartum, and early parenting	Impact of ED on fertility, breastfeeding, and infant development.
Module 3: Screening and assessment of eating disorders	Management of an ED, screening, and treatment approaches.
Module 4: Supporting, monitoring, and managing eating disorders in pregnancy.	Multidisciplinary management, nutritional and psychological management, hospitalisation, and postpartum care.
Module 5: Summary for providing support for a person with an eating disorder in the peripartum	Monitoring progress, relapse, and further information and support services.

modules. Pre- and post- surveys were embedded into the online module using an open-source learning management platform (Moodle), and participants were asked to complete all activities in approximately one week. Participants were also given a follow-up survey at three months to determine the sustainability of the education. That aspect of the study is still ongoing. On completion of the study, clinicians were presented with a \$30 supermarket voucher.

Education module

The online education package was created using the online training tool platform, Articulate [13]. Using this platform, the research team created a learning package that was broken up into five modules. Each module contained case studies, quotes from individuals with lived experience, and a short questionnaire to reinforce learning. A number of interactive elements were embedded into the modules: videos and audio of individuals with lived experience and clinicians; matching words or questions to definitions and answers; clicking on images that reveal additional information; and links that opened new tabs to related information and resources (see Fig. 1).

Once completed, a certificate of achievement was generated. Section topics are described in Table 1.

Measures

Confidence and knowledge

The evaluation of the educational modules was designed using the Kirkpatrick Evaluation Model of Education, which rates four stages of learning: (1) reaction, the subjective experience of the learner; (2) learning, the acquisition of skills, knowledge or confidence; (3) behaviour, the application of learning, and; (4) results, the impact of training [14]. Surveys were created to assess stages one to three of the Kirkpatrick model. Stage Four could not be measured without an evaluation of ED screening, management, and referrals to measure practical changes due to education, which was outside the scope of the present study. A bespoke confidence and knowledge survey, based on the key learnings and objectives of the online learning package, was designed in collaboration with researchers and clinician experts (see Supplementary Files 1 and 2 for surveys). Section A collected demographic information about employment experience and previous ED training. Section B of the survey asked participants to rate their level of agreement with statements

regarding their confidence in their ability to screen, manage, identify, and refer a person with an ED on a scale of 1 (strongly disagree) to 7 (strongly agree). Section C of the survey aimed to determine participants' level of knowledge by asking 20 short answer or multiple-choice questions about ED signs and symptoms, risk factors, screening, and management considerations.

Satisfaction survey

The post-education survey included sections B and C, along with an additional 16 questions asking participants how they felt about the module. This included questions relating to the organisation and usability of the module, whether the module increased their knowledge, whether or not the module contained adequate and relevant information, and suggestions for improvement.

Statistical analysis

Data analysis was conducted using IBM Statistical Package for Social Sciences (SPSS) version 29.0. Normality was investigated using a visual inspection of P-P plots. Scores for confidence in knowledge and skill were averaged to give a score of 0 to 7 out of 7. Knowledge scores were summed to give a total score out of 20. Reliability of the scales was evaluated by Cronbach's alpha. The Cronbach's alpha for the confidence scale was 0.884, and for the knowledge scale was 0.740, indicating good internal consistency. Descriptive statistics were displayed using means and standard deviations. Paired *t*-tests, with statistical significance set at $p < 0.05$, were used to compare mean and total survey scores before and after completion of the online education module. Subgroup differences and interaction effects were unable to be investigated due to the limited demographic data collected.

Qualitative data were analysed using thematic content analysis [15]. Respondent feedback was read through and key words were identified and used to create codes,

categories, and themes relating to what participants did and did not like about the module. Data was managed in an excel spreadsheet. Codes were refined using a reiterative process of reading and refining codes. Data that fit under each code was represented in a summative manner in the content analysis. This form of analysis was chosen as it limited researcher interpretation of included data. Quotes provided were selected based on their representativeness of findings and of included participant health-care roles.

Power analysis

A power calculation was conducted prior to the commencement of the study using G*Power software for matched pairs *t*-tests. As no previous research using these measures exists to provide approximations of effect size, the authors chose to include into sample the size calculation, the conservative estimate of a moderate effect size ($d = 0.5$), with 90% power, and an alpha error probability of $\alpha = 0.05$. Given these parameters, a total sample size of at least 44 was required.

Results

Demographics

131 participants completed the baseline survey, and 77 completed post-training follow-up. The majority of participants were midwives and nursing staff employed in maternity services or a psychiatric inpatient Mother-Baby Unit (MBU) (see Table 2).

Baseline knowledge of clinicians

For all participants that completed the baseline survey, confidence scores ranged from 1 to 6.5, with a mean score of 3.19 (SD = 1.18). Nearly three quarters (74.0%) of the participants scored four or below. Only 12.2% considered themselves knowledgeable about ED in the perinatal period. Participants felt the most confident in referring patients with ED (41.2%) and least confident in screening or identifying ED in the perinatal period (17.6%). Knowledge scores were also low with a mean of 9.33 (SD = 3.12), and 77.1% scoring 11 or below out of a possible 20. Participants scored the lowest on knowing the recommended screening tools used to identify ED (7.6%), which ED was the most prevalent in pregnancy (9.9%), knowing which organisations or websites to use to seek further information (9.9%), and barriers to disclosing ED (10.7%). Participants were most likely to correctly answer questions about frequency of ED monitoring (90.8%), signs of ED relapse (75.6%), and the importance of screening for ED without the requirement of a low BMI (87.0%). Confidence in skills was correlated with knowledge in midwives only. Enrolled Nurses (ENs) had a negative correlation between confidence and knowledge, scoring the

Table 2 Participant employment details (N = 131)

Item	N (%)
Role	
Midwife	88 (67.1)
Peer Worker	8 (6.1)
Registered Nurse / Enrolled Nurse	8 (6.1)
Obstetrics and gynaecology	4 (3.1)
Psychologist	5 (3.8)
Social Worker	3 (2.3)
Other / Unknown	15 (11.5)
Years in current profession	
0–1 year	8 (6.1)
2–5 years	45 (34.4)
6–10 years	38 (29.0)
11 or more years	40 (30.5)
Previous training specialising in ED	27 (20.6)

highest in confidence, but receiving the lowest scores in knowledge.

Post-education follow-up

Scores on all confidence and knowledge questions were significantly improved post-education. Confidence scores were not correlated with knowledge scores at timepoint two for any participant group. Paired *t*-tests showed significant improvements at post-education for those 77 participants who completed both timepoints (see Table 3). Scores were lowest for questions regarding barriers to disclosing an ED (42.9%), when to consider increasing support for a person with an eating disorder (55.8%), recognising additional stakeholders that should be part of patient care (57.1%), and knowing which organisations and websites to use to seek further information (59.7%). Participants were most likely to correctly answer questions regarding the key signs of relapse (93.5%), timing (93.5%) and frequency (100.0%) of screening for an ED, and the importance of screening for ED outside the presence of a low BMI (98.7%).

Satisfaction

Between 92.2% and 100% of the 77 post-education participants said that they gained knowledge or skills relating to ED, that the module was relevant to their learning needs, was easy to use, encouraged them to reflect upon their knowledge and skills, and improved their knowledge of the latest clinical best practice. Participants were also asked to provide any comments or suggestions regarding the module. The most common request was for further information or training about how to approach and navigate safe communication with individuals who may be experiencing an ED. Participants also suggested incorporating an ED screening tool into usual practice as part of the intake assessment. Other comments included

requesting a downloadable list of ED organisations in the community, links to external training sources, and printable handouts outlining education and support services for patients. Two participants commented on the benefit of having a handbook or handouts available for clinician use that included key points and clinical guidelines. Other suggestions were to include additional information around referral pathways, psychological interventions like cognitive behavioural therapy for eating disorders (CBT-E), and ED in neurodivergent patients.

When asked what the best aspects of the modules were, 59 participants responded (see Table 4). The most common responses were that it included useful information and greatly improved their knowledge (*n*=24), that it was engaging and easy to use (*n*=17), the videos from individuals with lived experience (*n*=11), and the inclusion of case studies (*n*=7). When asked what the worst aspects of the module were, 28 participants responded most commonly that it was too long, wordy, or repetitive (*n*=10), that they experienced technical issues (*n*=9), that the content was irrelevant or confusing (*n*=7) or that they didn't like the format (*n*=2).

Discussion

The aim of this study was to develop and evaluate an online educational module for ED in the perinatal period. Using co-design procedures with women with lived experience, and collaborations with experts in the areas of ED and perinatal mental health, the research team developed a five-part online education resource. The findings of the pre-post surveys indicate that the education significantly enhanced participant confidence and knowledge about ED in the perinatal period. Participants rated themselves as having greatly improved knowledge regarding identification, screening, management, and referral of perinatal individuals with ED.

Table 3 Survey results at pre- and post-education timepoints

	Time 1	Time 2	<i>p</i>
Self-reported knowledge and confidence ^{<i>N</i>(%)}	Somewhat agree / Agree / Strongly agree		
I am knowledgeable about ED in the perinatal period.	12 (15.6)	73 (74.0)	< 0.001
I am confident in having conversations with a person with an ED in the perinatal period.	20 (26.0)	74 (96.1)	< 0.001
I am confident in screening or identifying a person with an ED in the perinatal period	14 (18.2)	71 (92.2)	< 0.001
I am confident in supporting a person with an ED in the perinatal period.	18 (23.4)	74 (96.1)	< 0.001
I am confident in referring a person with an ED in the perinatal period to the appropriate person / place.	35 (45.5)	75 (97.4)	< 0.001
I am confident identifying risk in a person with an ED in the perinatal period.	23 (29.9)	75 (97.4)	< 0.001
Self-reported knowledge and confidence average score ^{<i>Mean</i>(<i>SD</i>)}	3.20 (1.12)	5.78 (0.61)	< 0.001
Range	1.0–6.5	4.5–7.0	
Knowledge score ^{<i>Mean</i>(<i>SD</i>)}	9.31 (3.25)	15.47 (2.51)	< 0.001
Range	0–16	9–20	

Table 4 Participant quotes

1. Easy to access, very engaging, very good information that was relevant and laid out easily how to incorporate the care of women with eating disorders during pregnancy into every day practice (196, RN).
2. Easy to follow module, explained symptoms and management in just enough detail and the overviews and repeating of content helped to consolidate learning (172, midwife).
3. Enjoyed reflecting on the case studies and the experiences of the women that were embedded throughout for diverse perspectives (41, midwife).
4. Good flow of information covering all stages from pre-pregnancy through to after birth. Also really appreciated the consumer quotes (19, psychologist).
5. I found I had a strong lack of knowledge and this educated me and will give me the ability to be able to ask the right questions in my peer practice and recognise the signs of ED in parents that access the service. Broadened my knowledge and practice (153, peer worker).
6. I like the review points and the quizzes. The module was concise and easy to follow. Good terminology that was easy to understand with little knowledge to begin with on the subject (31, midwife).
7. I loved the interactive aspects of the module, clicking on the cards to reveal answers and the + icons + ticking of boxes & the videos with the personal experiences that put the information into perspective of a real-life situation. I also found the breakdown of information into small paragraphs and dot points to be helpful for taking in the information (98, midwife).
8. I really enjoyed and was pleased to see women's lived experience used. I believe this gives a much deeper in site on how to deliver best practice. The videos are perfect to break up the reading and it makes it easier to stay engaged (207, peer worker).
9. Knowing what the barriers for woman are and things to ask to identify historical and current eating disordered thinking/behaviour (189, social worker).
10. They were a good introduction for someone who has no experience in ED (197, RN).

Baseline measures from the study highlight the fact that healthcare providers in maternity services have very limited knowledge of ED in the peripartum, and are not adequately trained or prepared to screen, refer, or manage perinatal individuals with ED. Low subjective confidence ratings in pre-education survey highlight that healthcare providers are aware of their limited knowledge regarding the topic, and feel unprepared to identify or manage perinatal patients with ED. This aligns with previous studies that revealed minimal knowledge or training regarding ED among health professionals, along with poor knowledge of policies, guidelines, or referral pathways [9]. However, the findings from the survey also highlight the fact that self-rated confidence surveys are a very poor indicator of knowledge and skills. Surveys of self-rated confidence can frequently over- or under-estimate ability and should never be used in lieu of a more objective test of knowledge or competency.

Participants reported greatly appreciating the interactive nature of the module and the videos providing anecdotal and experiential information from health professionals and individuals with lived experience. This is in line with the findings of Wallace and colleagues [11] who found that participants perceived short videos as a valuable and beneficial way to receive and retain knowledge. Including written, video, and interactive content that often-repeated important topics and key learnings, was aimed at engaging the audience by providing alternative methods of receiving information that could be easily navigated. Points of interest could be returned to, and items that participants know well can be skipped. Based on participant responses, this goal was mostly achieved. Further improvements to the module may be warranted to address participant concerns regarding the length of the module. Potentially, sections may be streamlined, or

offered individually to reduce burden on learners. Videos showing role-play scenarios between clinicians and patients may also be included to provide examples of screening techniques.

Limitations

A major limitation of the study was that demographic variables such as gender, age, and ethnicity were not collected. It would be beneficial for future studies to include these measures to determine the acceptability of these education modules for both male and female clinicians, and for those from ethnically diverse backgrounds. Another limitation was that feedback was only obtained from participants who completed the module. Approximately 7% of participants withdrew from the study after beginning the modules, without completing them. These participants may have had less positive feedback that could be used to improve the retention rate of those who use the module. The study was disseminated at the two largest public and private hospitals in Queensland, Australia. The module should be evaluated in a more diverse population to better investigate participant engagement, satisfaction, and benefit in terms of increased perinatal ED knowledge.

Conclusion

The ED online education module is an engaging and easy-to-use tool for improving the knowledge and skills of the healthcare workforce, thereby holding the potential to improve patient care and health outcomes. Further refinement and development of the education modules may improve the learning outcomes of participants, including addressing the technical issues and minor formatting concerns that have been reported. The creation of written guidelines and handouts for clinicians and

individuals with ED should be the next step to add to the current resources available for clinicians who care for perinatal individuals with ED. The findings also highlight that healthcare providers in maternity services are desirous of, and may benefit from, the implementation of a validated ED screening tool into usual practice. The positive response and interest in the topic that was observed in this study suggest that the creation of face-to-face workshops and more in-depth, online education modules tailored to specific roles, ED subtypes, or comorbidity subgroups, would be a valuable resource for healthcare providers.

Abbreviations

ED	Eating disorder
EDQ	Eating disorders Queensland
CBT-E	Cognitive behavioural therapy for eating disorders

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40337-024-01105-w>.

Supplementary Material 1

Supplementary Material 2

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Author contributions

The study was conceptualised by GB, AE, and SR. Study methodology was designed by GB, AE, and SR. Data acquisition and analysis and the original draft of the manuscript was completed by KG. Review and editing of the final manuscript was conducted by GB, AE, and SR. All authors read and approved the final manuscript.

Data availability

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Written informed consent was required for this study. Ethical approval was obtained from the Human Research Ethics Committees from the Gold Coast Hospital and Health Service and Mater Hospital (HREC/2022/QGC/90364).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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