



# BMJ Open Examining the prevalence of disordered eating in a cohort of young Australians presenting for mental health care at a headspace centre: results from a cross-sectional clinical survey study

Amy Leigh Burton <sup>1,2</sup>, Blake Hamilton,<sup>1</sup> Frank Iorfino <sup>1</sup>, Haley M La Monica,<sup>1</sup> Elizabeth M Scott,<sup>1</sup> Ian B Hickie<sup>1</sup>

**To cite:** Burton AL, Hamilton B, Iorfino F, *et al*. Examining the prevalence of disordered eating in a cohort of young Australians presenting for mental health care at a headspace centre: results from a cross-sectional clinical survey study. *BMJ Open* 2022;**12**:e061734. doi:10.1136/bmjopen-2022-061734

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-061734>).

Received 03 February 2022  
Accepted 19 July 2022



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<sup>1</sup>The Brain and Mind Centre, The University of Sydney, Camperdown, New South Wales, Australia

<sup>2</sup>Graduate School of Health, University of Technology Sydney Faculty of Health, Sydney, New South Wales, Australia

**Correspondence to**  
Dr Amy Leigh Burton;  
[amy.burton@uts.edu.au](mailto:amy.burton@uts.edu.au)

## ABSTRACT

**Objectives** The aim of this study was to determine the prevalence of disordered eating in young people attending a headspace centre, an enhanced primary care centre providing early intervention services for mental health disorders for young people aged 12–25 years, in metropolitan Sydney.

**Design** Cross-sectional assessment of disordered eating symptoms and behaviours.

**Setting** An enhanced primary care youth mental health service in inner urban Sydney, Australia.

**Participants** A sequential cohort of 530 young people aged 14–26 years presenting to headspace Camperdown for support with mental health concerns.

**Outcome measures** Participants completed a series of questionnaires online which included items assessing the presence of eating disorder symptoms and behaviours.

**Results** Over one-third of young people aged 14–26 years presenting to headspace Camperdown in a 22-month period reported symptoms of disordered eating. Of these, 32% endorsed overeating behaviours, 25% endorsed dietary restriction and 8% reported purging behaviours. In total, 44% reported engaging in one of more of these behaviours on a regular basis. Almost half reported experiencing significant shape and weight concerns. Eating disorder behaviours were particularly prevalent among female and gender-diverse participants (48% of females and 46% of gender-diverse participants compared with 35% of males) and overall scores across all of the eating disorder and body image items assessed were significantly higher for female participants compared with males.

**Conclusions** Disordered eating behaviours and symptoms are common among those presenting to youth mental health primary care services. Proactive screening for these behaviours presents opportunities for early detection and specific interventions.

**Trial registration number** ACTRN12618001676202; Results.

## INTRODUCTION

### Eating disorders

Eating disorders are serious, deadly disorders that emerge in adolescence and early

### STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A large cross-sectional study of a clinical cohort of young people seeking help for mental health concerns.
- ⇒ Study is conducted in a youth primary healthcare setting.
- ⇒ Survey data are used to assess the prevalence of disordered eating symptoms and behaviours in a vulnerable population.
- ⇒ This study is limited by the use of self-reported data only.

adulthood.<sup>1 2</sup> Common eating disorders presenting in young people include the well-known conditions of anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED), as well as conditions that fall into the diagnostic category of otherwise specified feeding or eating disorder (OSFED, previously known as ‘EDNOS’).<sup>1</sup> As a diagnostic category, OSFED includes purging disorder, atypical AN (where the person otherwise meets criteria but is not yet underweight), and presentations of BN and BED with lower frequency of binge or purge episodes or reduced duration of condition, and unspecified feeding or eating disorder (UFED).<sup>1</sup> It has been estimated that for the Australian population aged 15 years and older, there is a point prevalence of approximately 16.3% of the population experiencing an eating disorder (AN: 0.5%; BN: 0.7%; BED: 5.6%, OSFED: 8.2%, UFED: 1.4%).<sup>3</sup> Various cohort studies of adolescents have indicated estimated prevalence of eating disorders at roughly 15%–22%, with rates of eating disorders observed to be higher in female adolescents than in male adolescents.<sup>3–7</sup> A study of young adults (college students in the USA)

identified a prevalence of 57% which included 43% who met criteria for either OSFED or UFED, 9.9% who met criteria for BED, 0.1% meeting criteria for AN and 1.2% meeting criteria for BN.<sup>8</sup>

As these disorders are known to emerge in adolescence and early adulthood, and prevalence rates are increasing,<sup>9 10</sup> early detection and early intervention are critical to changing the trajectory of these serious and often fatal conditions.<sup>2</sup> These conditions initially present as subclinical or subsyndromal presentations and can be difficult to detect unless specifically assessed.<sup>2</sup> Subsyndromal presentations of eating disorders are thought to be less intractable and easier to treat, yet if these symptoms go on untreated, it is likely that full-threshold eating disorders will develop, which are notably difficult to treat.<sup>2</sup> Therefore, it is believed that early detection and early intervention in subclinical eating disorders, or as close to the onset as possible, will lead to prevention of the development of severe and chronic eating disorders in adulthood.<sup>2</sup>

Many people do not seek help due to the ego-syntonic nature of eating disorders and particular stigma associated with the disorders.<sup>11 12</sup> A study of Australian adolescents who met criteria for an eating disorder identified that only 10.1% of those suffering had sought help.<sup>11</sup> A study of college-aged females with eating disorder symptoms identified that 56% did not believe they needed treatment.<sup>12</sup> Due to high comorbidity of eating disorders with symptoms of anxiety, depression and other mental health concerns,<sup>1 4</sup> eating disorders are often only identified when individuals seek help for other presenting concerns. In addition to young people tending not to disclose their disordered eating to clinicians due to denial and stigma, another common reason that disordered eating symptoms and behaviours go undetected is that clinicians fail to ask about disordered eating as part of their standard clinical assessment.<sup>13</sup> It has been found that assessing for disordered eating will usually result in the symptoms being disclosed to the clinician, emphasising the importance of integrating screening for eating disorder symptoms and severity as standard clinical practice in all primary care mental health settings.<sup>13</sup> Acknowledging the need for specific eating disorder intervention to be integrated into general youth mental healthcare settings, in recent years some headspace centres have trialled early intervention treatment programmes for young people presenting with disordered eating concerns with promising results.<sup>14</sup> However, to date, no research has been conducted to examine the prevalence of eating disorder presentations attending a headspace centre.

Headspace is Australia's national youth mental health initiative designed to provide services to young Australians 12–25 years old. Begun in 2006, headspace has become a national and international phenomenon now nearing 150 centres, and 626 000 young people seen since inception.<sup>15</sup> While designed to provide enhanced primary care mental health interventions to young people aged 12–25 years experiencing mild-moderate symptoms,

headspace also offers enhanced primary care physical health treatment (via general practitioners (GPs)), drug and alcohol intervention, and vocational and educational support.<sup>16–18</sup> headspace remains the largest international integrated primary mental healthcare initiative undertaken, and it has demonstrated the demand for mental health and associated services in young Australians.<sup>15 18</sup>

Headspace Camperdown is a large inner-city headspace centre located at the Brain and Mind Centre, University of Sydney. headspace Camperdown sees on average 1200 young people per year, of which around half are new patients, and who attend for around 6000 occasions of service per year with a multidisciplinary team (psychologists, GPs, psychiatry registrar, social workers and exercise physiologists). The average age of young people who present for treatment is 19.3 years (65.9% female) with 3.5% identifying as Aboriginal or Torres Strait Islander, 24.5% as culturally or linguistically diverse (CALD) and 37.8% as LGBTQIA+ (lesbian, gay, bisexual, transgender, intersex, queer, asexual and other sexually or gender diverse).<sup>19</sup> Compared with national headspace averages, the Camperdown centre has an older cohort (average of 19.3 years vs 17.3 years nationally), less Aboriginal young people (3.5% vs 8.6%) but more CALD young people (24.5% vs 12.1%) and more LGBTQIA+ young (37.8% vs 24.1%).<sup>19</sup> This reflects the demographics of the urban area where the centre is located. Young people seen at headspace Camperdown reported an average K10 of 29.6 on service entry and a social and occupational functioning (SOFAS) score of 65.4, with these scores being comparable with other headspace centres nationally.<sup>19</sup> A high proportion of young people present as either being sad or depressed (39.9%), or anxious (29.5%), to account for 69.4% of total presentations and comparable with national averages.<sup>19</sup>

Significant public funding is dedicated to the establishment and running of headspace centres for the purpose of early detection and timely intervention of emerging mental health disorders for young people. Additionally, there is clear evidence of the critical importance of early detection and treatment of eating disorders in changing their trajectory and reducing the likelihood of a severe and deadly full-threshold disorder emerging. Yet, to date, there has been no formal study of the presence of disordered eating behaviours and body image concerns in young people presenting for support at headspace or other youth mental health centres. Given the considerable investment of public funds in headspace centres and the importance of early interventions in eating disorders, it is critical that we establish a better understanding of disordered eating in this population. At headspace Camperdown, young people presenting for treatment are invited and encouraged to complete an online assessment prior to attending their intake appointment via the Innowell Platform. The online assessment via the Innowell Platform involves a multidimensional assessment comprising a series of sociodemographic questions and self-report health questionnaires. The assessment

covers socio-occupational functioning, suicidal thoughts and behaviours, incidences of deliberate self-harm, physical health, substance use, and mental health symptoms and severity which include mood, anxiety, psychosis and eating disorder.<sup>20–22</sup> The integration of the Innowell Platform survey into standard clinical practice at headspace Camperdown in 2018 provided an opportunity for the quantitative assessment of the prevalence of particular symptoms of interest in the population of young people seeking treatment at a headspace centre. Using the self-report data collected via the Innowell survey, the present study aimed to determine the frequency and prevalence of disordered eating behaviours and body image concerns in a cohort of young people attending a community youth primary care mental health service in inner Sydney (headspace Camperdown) over a 22-month period.

## METHOD

### Participants

N=530 young people presenting at headspace Camperdown between 8 November 2018 and 8 September 2020 who completed the Innowell survey and consented to have their data used for research purposes.

### Procedure

All young people aged 15 years or over presenting to headspace Camperdown are invited to the Innowell Platform to complete an online assessment prior to attending their first appointment at headspace.<sup>20 21</sup> Young people completing the Innowell Platform assessment are given the option to consent, or abstain, to their de-identified data being used for research purposes. After providing consent, young people created a profile in the Innowell Platform and were then asked to complete a multidimensional assessment. The assessment comprised of a series of sociodemographic questions and self-report health questionnaires (assessing socio-occupational functioning, suicidal thoughts and behaviours, incidences of deliberate self-harm, physical health, substance use, and mental health symptoms and severity which include mood, anxiety, psychosis and eating disorders) that are presented to the participants who are asked to complete them with specific instructions provided for each question. For the purpose of the research question, only data for those consenting to research and pertaining to the sociodemographic items and the eating disorder questions were extracted for analysis.

## Measures

### Demographic questions

A series of questions collected responses to record the participants' age, gender, sex at birth, indigenous status, primary language, disability status, living situation, relationship status, sexuality and highest level of education.

## Eating behaviours

The questions to assess eating behaviours and body image disturbance configured for this study in the Innowell Platform are based on structured interview questions from the Eating Disorders Examination (EDE)<sup>23</sup> regarding the experience of eating disorder behaviours which were developed for use in large epidemiological surveys and were included as part of the Health Omnibus Surveys.<sup>3 9 24</sup> Delivering the EDE assessment as a structured face-to-face interview provides the gold-standard approach for valid and reliable assessment of eating disorder symptoms; however, where conducting a full interview is not feasible or practical, self-report assessment is recommended and research has demonstrated that self-report-based assessments do provide a valid and reliable measure of eating disorder symptom severity.<sup>25 26</sup> The measure used in the present study consists of four self-report questions where question 1 provides an assessment of binge eating, question 2 provides an assessment of purging behaviours, question 3 provides an assessment of dietary restriction and question 4 provides an assessment of body image importance (shape/weight concerns). See [table 1](#) for the specific wording of the questions used.

## Analysis

Data were cleaned prior to pooling for analysis. Dataset provided for analysis was a complete dataset; there were no missing data in the dataset. SPSS V.24 (IBM) was used to analyse the data and to obtain descriptive statistics (means and SDs) and frequency data reporting the percentage of participants who endorsed particular items in the test battery. One-way analyses of variance (ANOVAs), Kruskal-Wallis test (one-way ANOVA on ranks) and  $\chi^2$  tests were used to assess between-group differences. A standard one-way ANOVA was applied where the data met the assumptions for homogeneity of variance (evidenced by the Levene's Test for Equality of Variance); a Kruskal-Wallis test was used when the data did not demonstrate homogeneity of variance and there were more than two levels of the independent variable. Where there were less than two levels of the independent variable, a Pearson's  $\chi^2$  test was employed.

## Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

## RESULTS

The summary demographics of the total sample are presented in [table 2](#).

### Self-reported eating disorder symptomatology

#### Binge eating (question 1)

A mean score of 1.07 (SD=1.11), with a range 0–3 (0='not at all' to 3='two or more times per week'), was observed for question 1 (binge eating). Of the total of



**Table 1** Eating behaviours and body image question set used through the Innowell Platform

Question no	Question wording
Q1	Over the past 3 months, how often have you overeaten or binge eaten? (ie, eating an unusually large amount of food in one go and at the time feeling that your eating was out of control)? 0—not at all 1—less than weekly 2—once a week 3—two or more times a week
Q2	Over the past 3 months, have you regularly used, that is at least once a week—any laxatives, diuretics or water tablets, or made yourself sick, in order to control your shape or weight? 0—no 1—yes
Q3	Over the past 3 months, have you regularly done any of the following: gone on a very strict diet or eaten hardly anything at all for a time, in order to control your shape or weight? 0—no 1—yes
Q4	Over the past 3 months, how important has your weight or your shape influenced how you think about yourself as a person? For example, has it been a really important issue to you/to your self-confidence? 0—not at all important 1—1 2—2 3—3 4—4 5—5 6—extremely important

530 participants, 169 (32%) reported binge eating at least weekly in the 3 months prior to survey completion. In terms of self-reported binge eating frequency, of our 530 participants, 41% endorsed 'not at all', 27% endorsed 'less than weekly', 15% endorsed 'once per week', and 17% endorsed 'two or more times per week'.

#### Purging behaviours (question 2)

Of the total 530 participants, 42 (7.9%) reported purging behaviours, which involved using laxatives, diuretics or self-induced vomiting (purging) at least weekly for the purpose of controlling their shape or weight in the 3 months prior to survey completion.

#### Dietary restriction (question 3)

Of the total 530 participants, 133 (25%) reported dietary restriction such as going on a strict diet or fasting for the purpose of controlling their shape or weight in the 3 months prior to survey completion.

**Table 2** Demographics of the sample, N=530

Age	Mean age 20.33 years (SD=2.66), range 14–26 years
Gender identity	64.3% female, 30.0% male and 5.7% gender diverse (gender diverse refers to any gender identity that is not either 'male' or 'female', includes non-binary, transgender, intersex, genderqueer, agender and others)
Sex at birth	69.2% female, 30.7% male
Indigenous status	2.3% Aboriginal, 97.7% non-Indigenous
Primary language	90.9% English, 2.8% Chinese, 1.9% other Asian, 0.6% other European, 3.8% other undefined
Disability status	7.4% reported living with a disability (3.0% with physical disability, 2.5% with psychological, 1.9% with developmental disability), 87.4% stated 'no disability', 5.3% of users declined to answer
Living situation	72.4% live with family, 17.0% live in shared accommodation, 10.2% live independently, 0.4% are homeless
Relationship status	63.8% are single, 25.0% are dating, 9.7% are living with partner, 1.5% declined to answer
Sexual identity	58.3% are straight, 6.6% are gay/lesbian, 23.1% are bisexual and 11.6% are other sexuality
Level of education	20.3% at high school, 42.6% completed year 12, 15.3% completed certificate or diploma, 19.5% completed undergraduate degree, 2.3% completed postgraduate degree

Factoring in symptom overlap (whereby some young people are identifying as engaging in two or three of the behaviours binge eating, purging behaviours and dietary restriction), we observed that a total of 233 young people out of the total of 530 (44%) were reporting engaging in disordered eating practices on a regular basis (ie, at least weekly episodes for binge eating or purging and 'regular' use of dietary restriction as per the wording of Q3) over the 3 months prior to survey completion. Of these 233 young people, 162 were of female gender (69.5%), which represents 47.5% of all female participants included in this study; 57 were of male gender (24.5%), which represents 35% of all male participants included in this study; and 14 were gender diverse (6%), which represents 46% of all gender-diverse participants included in our study. When looking at the participants' sex as determined at birth, of the 233 young people reporting disordered eating practices, 177 were female sex at birth (76%), which represents 48% of all female participants included in this study; and 56 were of male sex at birth (24%), which represents 34% of all male-sex-at-birth participants included in this study.

**Table 3** Endorsement of regular eating disorder behaviours

Q1. binge eating	Q2. purging behaviours	Q3. dietary restriction	n	% of N
✓	✓	✓	24	4.5
✓	✓		6	1.1
✓		✓	48	9.1
	✓	✓	9	1.7
✓			91	17.2
	✓		3	0.6
		✓	52	9.8

Table 3 summarises the total number of young people endorsing regularly experiencing these eating disorder (ED) symptoms.

#### Shape/weight concerns (question 4)

A mean score of 3.3 (SD=2.01), and a range 0–6 was observed for question 4 (shape/weight concerns). Of the total 530 participants, 46.6% reported that their body shape and weight have influenced how they think about themselves as a person, with 21.1% stating that their body weight and shape are extremely important and have influenced how they think about themselves as a person.

#### Between-group differences

A series of between-group comparisons were used to investigate if there were differences in binge eating frequency (Q1), purging behaviours (Q2), dietary restriction (Q3) and shape/weight concerns (Q4) based on participants' demographic groups such as gender, sex at birth, sexuality, living situation, relationship status and level of education. A comprehensive description of these analyses can be found in online supplemental material.

Across all four items (Q1–4), there were no significant differences in binge eating frequency observed between groups based on sexuality, living situation, relationship status or level of education ( $p>0.05$ ).

#### Analyses by gender

A significant main effect of gender was observed for all four items ( $p<0.05$ ). Contrast analyses identified that female-gendered participants ( $n=341$ ) scored significantly higher on the eating behaviours and body image items than male-gendered participants ( $n=159$ ;  $p<0.05$ ); the scores of gender-diverse participants ( $n=30$ ) were

not found to differ significantly from the scores of male-gendered participants ( $p>0.05$ ) or female-gendered participants ( $p>0.05$ ). Refer to table 4 for the group means and SDs, and see online supplemental material A for more detail and for analyses based on sex at birth.

#### DISCUSSION

This study aimed to ascertain the frequency and prevalence of disordered eating in a cohort of young people attending a community youth mental health primary care service in central Sydney (headspace Camperdown) over a 22-month period. Our results showed that self-reported eating disorder-related symptomatology was high in the current sample with 44% of young people engaging in regular binge eating, purging and/or dietary restriction behaviours over the 3 months prior to survey completion and 46.5% of young people endorsing having shape and weight concerns (where their weight or shape has influenced how they view themselves as a person). Our findings indicate that approximately one-third of young people surveyed reported engaging in regular binge eating, one-quarter of young people engaged in regular attempts to restrict their diet, and 8% of young people had been regularly engaging in purging behaviours such as self-induced vomiting, laxative and diuretic use for the purpose of influencing their shape and weight.

These findings are in line with what was observed in a similar population with a similar study method in the USA.<sup>8</sup> In their study, Quick and colleagues examined the prevalence of eating disorders in a sample that was 64% female and their mean age was 19.7 years (where the mean age of the present study was 20.3 years).<sup>8</sup> Similar to our sample, this study observed a surprisingly high prevalence of disordered eating symptomatology with 54% of their sample self-reporting some type of eating disorder pathology (43% of their sample meeting criteria for OSFED, 9.9% meeting criteria for BED and 1.2% meeting criteria for BN).<sup>8</sup> These findings highlight that a significant proportion of the young people presenting for assessment and treatment at our community youth mental health service also present with some level of disordered eating behaviours and/or body image concerns. This is despite the headspace Camperdown minimum dataset identifying that 69.4% of presentations to the centre are for the primary presenting concern of sadness/depression or anxiety.<sup>19</sup> These findings support the use of multi-dimensional assessments among young people presenting

**Table 4** Means and SDs of self-reported eating disorder (ED) symptom experienced organised by groups based on participants' self-reported gender identity

Subgroup based on self-reported gender	Binge eating mean (SD)	Purging behaviours mean (SD)	Dietary restriction mean (SD)	Shape/weight concerns mean (SD)
Male, n=159	0.86 (1.10)	0.03 (0.18)	0.16 (0.37)	2.68 (2.00)
Female, n=341	1.16 (1.11)	0.10 (0.30)	0.30 (0.46)	3.62 (1.95)
Gender diverse, n=30	1.20 (1.19)	0.07 (0.25)	0.20 (0.41)	2.97 (1.96)



for care, since the needs of young people span many areas of health and well-being which may be cause for concern and critical for effective early intervention.<sup>21</sup>

Unsurprisingly, we found that the eating disorder symptoms were significantly intercorrelated, with the largest correlations being observed between shape/weight concerns and dietary restriction, as well shape/weight concerns and binge eating. We observed that the prevalence of self-reported disorder eating symptoms was higher in female (47.5%) and gender-diverse (46%) participants compared with the male participants (35%). Further, our study identified that female-gendered people were significantly more likely than male-gendered people to endorse higher rates of disordered eating symptoms and place a higher importance on the influence of shape and weight on their sense of self. Our results did not indicate any significant difference between scores for people identifying as gender diverse compared with male or female-gendered participants, though this has likely been impacted by the comparatively small *n* of the gender-diverse group. There were no significant differences observed between ED symptom scores based on other sexuality, relationship status, living situation or level of education.

### Limitations and future directions

There are a number of important limitations of this study that must be noted. Primarily, these findings are limited by the use of self-report measures. Young people may have over-reported their symptoms, especially with consideration to the binge eating question as the term 'binge' has entered the common lexicon of young people who may confuse overeating with objective binge episodes (which require an objectively large amount of food eaten in a discrete period of time accompanied by a sense of loss of control over the eating). While these requirements were clearly referenced in the wording of question 1 of the measure, there is a chance that the data have also captured subjective binge episodes (where the amount eaten was not objectively large) and objective overeating (where there was not also a loss of control). In addition, the use of this self-report instrument may have resulted in an under-representation of the frequency of purging and dietary restriction behaviours due to the wording of the instrument. Due to the improved reliability and validity of the use of clinical assessments delivered face to face by a trained interviewer,<sup>25 26</sup> it is recommended that future research in this area use gold-standard measurement such as a semistructured clinical interview (eg, EDE)<sup>23</sup> or diagnosis from trained clinicians to verify the reported symptom prevalence and severity. Due to this limitation, it is important that the data be interpreted as an indicator of the prevalence of self-reported disordered eating symptoms rather than the prevalence of eating disorders within this population. Even with this significant limitation, the results of this study remain relevant as it gives insight into the prevalence of subclinical as well as clinical disordered eating within this sample; the data also

give us an indication of potential emerging eating disorders in this population. Another relevant limitation of the study is that it only presents the data of participants at one time point. An important area for future research will be to complete a longitudinal study which examines the prevalence and severity of disordered eating symptoms of young people presenting to headspace centres or similar community youth mental health services over time to observe the impact of early intervention approaches to mental health to help young people overcome their disordered eating practices and ideally also to reduce the likelihood of full-threshold eating disorders emerging in later adolescence and early adulthood. Further, our data were limited to demographic information and symptoms of disordered eating and poor body image, thus, it will be important for future research to investigate the relationships between disordered eating and body image concerns with other measured variables of interest including suicidality, deliberate self-harm, substance use, physical health, social and occupational functioning and overall severity of mental health symptoms within a sample of young people seeking help from headspace centres. Finally, the dataset only captures a snapshot of the young people who presented at this service due to the requirement of the young people having completed the whole Innowell multidimensional assessment and also consenting to research; this may have led to a self-selected subsample of the whole headspace Camperdown population who are more likely to be experiencing disordered eating symptoms. This may be due to particular cognitive patterns, or schemas, associated with eating disorders that might make these young people more likely to complete an assessment as requested compared with young people who may have opted not to complete the assessment, that is, people who have eating disorders have been found to be more likely to have underlying core beliefs of unrelenting high standards (perfectionism) and tendency to self-sacrifice (to do things to please others regardless of own personal wants/needs).<sup>27</sup> For this reason, there is a chance that the data over-represent the true prevalence of disordered eating symptoms of the young people attending the centre. It is advised that future research in this area aims to capture a truly representative sample of the whole population of interest.

### SUMMARY AND CONCLUSION

A total of 530 young people presenting at headspace Camperdown over a 22-month period completed a comprehensive online assessment. Our results found that 44% of participants reported regularly engaging in at least one disordered eating practice which included 32% of participants reporting binge eating at least weekly, 8% reporting they have regularly used purging behaviours as a way to control their shape or weight, and 25% have regularly engaged in dietary restriction methods as a way to control their shape or weight in the 3 months prior to survey completion. In addition, we found that



47% of participants reported that their body shape and weight have influenced how they think about themselves as a person, with 21% stating that their body weight and shape are extremely important and have influenced how they think about themselves as a person. We also observed that those who identified as either female or gender diverse were particularly vulnerable. The high prevalence of disordered eating symptomatology and body image concerns in a treatment seeking sample at a community youth primary care mental health service emphasises the importance of assessing for eating disorder symptoms and body image concerns in adolescents and young adults who might not be presenting for treatment of an eating disorder. Early intervention of eating disorders is important<sup>24</sup> and young people may not disclose eating and body image concerns to their treating clinicians without prompting due to the shame and stigma associated with these behaviours as well as the often ego-syntonic nature of eating disorders. Early detection of the presence of these symptoms and behaviours will likely lead to reduced number of full-threshold disorders developing via the successful early intervention treatment of the disordered eating behaviours and body image concerns with effective psychological therapies such as cognitive-behavioural therapy.<sup>28</sup>

Based on the results of this study, we conclude that responsible clinical practice in this vulnerable cohort requires assertive assessment for the presence of disordered eating behaviours and body image concerns to be standard practice in any youth mental health service, even when the young person does not self-identify as presenting with concerns about their eating. A valid and reliable screening tool for eating disorder symptoms should be included as part of a comprehensive youth mental health assessment in order to facilitate the best possible mental healthcare for young people, and to have the opportunity to provide early intervention treatment to prevent a full-threshold eating disorder from emerging.

**Acknowledgements** We acknowledge the Gadigal people of the Eora nation, upon whose ancestral lands this research was conducted. We pay our utmost respect to elders past and present. We particularly acknowledge all First Nations Australians, in their ongoing struggles for sovereignty and justice. We also acknowledge and thank the young people who participated in this research. Special thanks to Tegan Cox, Chief Operating Officer of the Brain and Mind Centre, for her unwavering support of this project and of headspace Camperdown. We acknowledge all of the staff and clinicians of headspace Camperdown who assisted in the data collection. We particularly thank Eva Castaldi, Donna Fowler and Imogen Tracy for their role in ensuring the young people presenting for care at headspace received an invitation to the online questionnaire. We thank Frances Lai who contributed to this research by assisting to clean and transpose the data.

**Contributors** ALB and BH designed the research question and conducted the data analysis. ALB and BH drafted the manuscript. ALB prepared the manuscript for submission for publication. IBH, FI, HMLM and EMS were involved in the protocol development, design of the larger Project Synergy and Innowell trial that this study is a part of. ALB is responsible for the overall content as the guarantor. All authors read and reviewed the final manuscript.

**Funding** This research was conducted on behalf of the Australian Government Department of Health (DOH) as part of Project Synergy (2017–2020). Funding is secured. Innowell was formed as a joint venture between the University of

Sydney and PwC (Australia) to deliver the \$A30 million Australian Commonwealth Government-funded Project Synergy.

**Competing interests** At the time of data collection, ALB was the clinical lead at headspace Camperdown. BH is the Clinical Services Manager at headspace Camperdown. ALB and BH have no other potential competing interests to declare. IBH is the Co-Director, Health and Policy at the Brain and Mind Centre (BMC) University of Sydney. The BMC operates an early-intervention youth services at Camperdown under contract to headspace. He is the Chief Scientific Advisor to, and a 5% equity shareholder in, Innowell. Innowell is a joint venture between the University of Sydney (45% equity) and PwC (Australia; 45% equity), originally created to deliver the \$30 million Australian Commonwealth Government-funded Project Synergy (2017–2020, a 3-year programme for the transformation of mental health services) and to lead transformation of mental health services internationally through the use of innovative technologies. EMS is Principal Research Fellow at the BMC, The University of Sydney. She is Discipline Leader of Adult Mental Health, School of Medicine, University of Notre Dame, and a Consultant Psychiatrist. She was the Medical Director, Young Adult Mental Health Unit, St Vincent's Hospital Darlinghurst until January 2021. She has received honoraria for educational seminars related to the clinical management of depressive disorders supported by Servier and Eli-Lilly pharmaceuticals. She has participated in a national advisory board for the antidepressant compound Pristiq, manufactured by Pfizer. She was the National Coordinator of an antidepressant trial sponsored by Servier.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not required.

**Ethics approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the Northern Sydney Local Health District Human Research Ethics Committee, and with the 1964 Helsinki Declaration and its later amendments (Project Code: HREC/7/HAWKE/480; RESP/17/349). Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available upon reasonable request. Data will be made available upon reasonable request to the corresponding author.

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#### ORCID iDs

Amy Leigh Burton <http://orcid.org/0000-0002-6641-6442>

Frank Iorfino <http://orcid.org/0000-0003-1109-0972>

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## Prevalence of disordered eating in young Australians presenting for mental health care at a headspace centre: Supplementary Material A

### Correlations

Pearson's  $r$  correlations were run to examine the relationship between the scores on the ED items. Significant inter-correlations were observed between the four ED items,  $ps < .01$ . Results are reported in Table A.

Table A.

*Correlations between the scores on the ED items*

	Binge Eating	Purging Behaviours	Dietary Restriction	Shape/Weight Concerns
Binge Eating	-	.25**	.33**	.44**
Purging Behaviours	.25**	-	.36**	.28**
Dietary Restriction	.33**	.36**	-	.46**
Shape/Weight Concerns	.44**	.28**	.46**	-

\*\* = Correlation is significant at  $p < .01$  level, \* = Correlation is significant at  $p < .05$  level.

### Details of between group analyses

#### Binge eating (Q1)

One-way ANOVAs were used to investigate if there were differences in binge eating frequency (Q1) based on participants' demographic groups such as gender, sex-at-birth, sexuality, living situation, relationship status and level of education. Due to the uneven sample size Levene's Test for Equality of Variance was used to assess whether the data satisfies the assumption of the homogeneity of variance for the interpretation of the ANOVA results. The data for the Binge Eating item (Q1) met the assumption of homogeneity of variance (Levene's test non-significant) and so the  $F$  results and Bonferoni post-hoc analyses are reported. A significant main effect of gender was observed for binge eating,  $F(2, 527) = 4.07, p = .018$ . Contrast analyses identified that female gendered participants ( $n = 341$ ) scored significantly higher on the binge eating item than male gendered participants,  $F(1, 498) = 7.78, p < .01$ , the scores of other gendered participants ( $n = 30$ ) were not found to differ significantly from the scores of male gendered participants ( $p > .05$ ) or female gendered participants ( $p > .05$ ) for the binge eating item.

A similar pattern of results were identified when groups were based on sex-at-birth (male or female) whereby female-sex-at-birth participants ( $n = 367$ ) scored significantly higher than male-sex-at-birth ( $n = 163$ ) participants for binge eating frequency,  $F(1, 528) = 10.24, p < .01$ . There were no significant differences in binge eating frequency observed between groups based on sexuality, living situation, relationship status, or level of education ( $ps > .05$ ).

#### Purging Behaviours (Q2)

Kruskal-Wallis tests were used to investigate if there were differences in the response to the purging behaviours item (Q2) based on participants' demographic groups such as gender, sex-at-birth, sexuality, living situation, relationship status and level of education. A significant main effect of gender was

observed for the purging behaviours item,  $H(df = 2, N = 530) = 7.59, p = .023$ . Post-hoc pair-wise comparisons identified that there were significant differences in scores observed between female and male gendered participants ( $ps < .05$ ) but no significant differences observed between other gendered participants and female gendered participants ( $ps > .05$ ), or between other gendered participants and male gendered participants ( $ps > .05$ ) for the purging behaviours item

Similarly, results from Pearson Chi-Square tests identified a significant difference between groups based on sex-at-birth (male or female) whereby female-sex-at-birth participants ( $n = 367$ ) were more likely than male-sex-at-birth ( $n = 163$ ) participants to endorse engaging in purging behaviours,  $\chi^2 = 7.61, p < .01$ . There were no significant differences in response to the purging behaviours item between groups based on sexuality, living situation, relationship status, or level of education ( $ps > .05$ ).

### Dietary Restriction (Q3)

Kruskal-Wallis tests were used to investigate if there were differences in the response to the dietary restriction item (Q3) based on participants' demographic groups such as gender, sex-at-birth, sexuality, living situation, relationship status and level of education. A significant main effect of gender was observed for dietary restriction,  $H(df = 2, N = 530) = 10.57, p < .01$ . Post-hoc pair-wise comparisons identified that there were significant differences in scores observed between female and male gendered participants ( $ps < .05$ ) but no significant differences observed between other gendered participants and female gendered participants ( $ps > .05$ ), or between other gendered participants and male gendered participants ( $ps > .05$ ) for dietary restriction.

Similarly, results from Pearson Chi-Square tests identified a significant difference between groups based on sex-at-birth (male or female) whereby female-sex-at-birth participants ( $n = 367$ ) were more likely than male-sex-at-birth ( $n = 163$ ) participants to endorse engaging in dietary restriction,  $\chi^2 = 11.92, p < .01$ . There were no significant differences in response to the dietary restriction item between groups based on sexuality, living situation, relationship status, or level of education ( $ps > .05$ ).

### Shape/Weight Concerns (Q4)

One-way ANOVAs were used to investigate if there were differences in shape and weight concerns (Q4) based on participants' demographic groups such as gender, sex-at-birth, sexuality, living situation, relationship status and level of education. Due to the uneven sample size, Levene's Test for Equality of Variance was used to assess whether the data satisfies the assumption of the homogeneity of variance for the interpretation of the ANOVA results. The data for the Shape/Weight Concerns item (Q4) met the assumption of homogeneity of variance (Levene's test non-significant) and so the  $F$  results and Bonferoni post-hoc analyses are reported for these items. A significant main effect of gender was observed for Shape/Weight Concerns,  $F(2, 527) = 13.05, p < .01$ . Contrast analyses identified that female gendered participants ( $n = 341$ ) scored significantly higher than male gendered participants for Shape/Weight Concerns,  $F(1, 498) = 25.16, p < .01$ , the scores of other gendered participants ( $n = 30$ ) were not found to differ significantly from the scores of male gendered participants ( $ps > .05$ ) or female gendered participants ( $ps > .05$ ) for Shape/Weight Concerns.

A similar pattern of results were identified when groups were based on sex-at-birth (male or female) whereby female-sex-at-birth participants ( $n = 367$ ) scored significantly higher than male-sex-at-birth ( $n = 163$ ) participants for shape/weight concerns,  $F(1, 528) = 26.15, p < .01$ . There were no significant differences observed on shape/weight concerns between groups based on sexuality, living situation, relationship status, or level of education ( $ps > .05$ ).

*Analyses by sex-at-birth:* A similar pattern of results were identified when groups were based on sex-at-birth (male or female) whereby female-sex-at-birth participants ( $n = 367$ ) scored significantly higher than male-sex-at-birth ( $n = 163$ ) participants for on the eating behaviours & body image items ( $ps < .05$ ). Refer to Table B for the group means and standard deviations (SDs) and see Supplementary Materials A for more detail.

Table B.

Means and SDs of self-reported ED symptom experienced organised by groups based on participant's self-reported sex-at-birth

Subgroup based on sex-at-birth	Binge Eating	Purging Behaviours	Dietary Restriction	Shape/Weight Concerns
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Male, $n = 163$	0.84 (1.05)	0.03 (0.17)	0.15 (0.36)	2.65 (1.97)
Female, $n = 367$	1.17 (1.12)	0.10 (0.30)	0.29 (0.46)	3.59 (1.95)