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Prevalence of disordered eating in young Australians presenting for mental health care at a headspace centre.

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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 to 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 to 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 other gendered participants (48% of females and 46% of other gendered participants compared to 35% of males) and overall scores across all of the eating disorder and body image items assessed were significantly higher for female participants compared to 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.

Keywords: youth mental health, eating disorder, prevalence, headspace, early intervention

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Strengths and Limitations:

- A large cross-sectional study of a clinical cohort of young people seeking help for mental health concerns
- Reports on the prevalence of disordered eating symptoms and behaviours in a vulnerable population
- Provides insight into the extent of eating related concerns for young Australians
- The results of this study highlight a role for using screening measures for early detection of disordered eating in young people seeking help for general mental health concerns

INTRODUCTION

Eating Disorders

Eating disorders are serious, deadly disorders that emerge in adolescence and early adulthood [1,2]. 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") [1]. 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) [1]. 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%; Hay et al., 2015). 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 [4-7]. 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 [8].

As these disorders are known to emerge in adolescence and early adulthood, and prevalence rates are increasing [9,10], early detection and early intervention are critical to changing the trajectory of these serious and often fatal conditions [2]. These conditions initially present as sub-clinical or sub-syndromal presentations and can be difficult to detect unless specifically assessed [2]. Sub-syndromal 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 [2]. Therefore, it is believed that early detection and early intervention in sub-clinical 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 [2].

Many people do not seek help due to the ego-syntonic nature of eating disorders and particular stigma associated with the disorders [11,12]. A study of Australian adolescents who met criteria for an eating disorder identified that only 10.1% of those suffering had sought help [11]. A study of college-aged females with eating disorder symptoms identified that 56% did not believe they needed treatment [12]. Due to high co-morbidity of eating disorders with symptoms of anxiety, depression, and other mental health concerns [1,3], eating disorders are

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often only identified when individuals seek help for other presenting concerns. This is supported by anecdotal reports from clinicians working at headspace centres (enhanced primary care youth mental health services offering accessible early intervention for young people with mild-to-moderate mental health conditions) which indicate that while young people rarely primarily present for assessment and treatment of an eating disorder, nevertheless many young people accessing headspace services appear to be struggling with body image and eating concerns. To date, no research has been conducted to confirm the clinical observations with regard to 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 [13]. Whilst 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 GP's), drug and alcohol intervention, and vocational and educational support [14,15,16]. headspace remains the largest international integrated primary mental health care initiative undertaken, and it has demonstrated the demand for mental health and associated services in young Australians [13, 16].

headspace Camperdown is a large inner-city headspace centre located at the Brain and Mind Centre, University of Sydney. headspace Camperdown sees on average 1,200 young people per year, of which around half are new patients, and who attend for around 6,000 occasions of service per year with a multi-disciplinary team (psychologists, GP's, 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+ [17]. Of the presentations of young people in 2020-2021 85.6% were for a primary mental health problem with 41.2% staged as 1a, 37.6% staged as 1b, and 15.6% staged as clinical stage 2 (see Ref. 18). Compared to national headspace averages, the Camperdown centre has an older cohort (average of 19.3 yrs vs. 17.3 yrs 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%) [17]. 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 SOFAS score of 65.4, with these scores being comparable to other headspace centres nationally [17]. 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 to national averages [17]. The next recorded category is significantly lower; 'thoughts that bother me' at 7.1%. The centre achieves high levels of patient satisfaction with a composite score of 4.3 of 5, slightly above the average of other centres (4.1)[17].

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 and online assessment prior to attending their intake appointment via the Innowell Platform. The online assessment via the Innowell Platform involves a multi-dimensional assessment comprising a series of socio-demographic 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 includes mood, anxiety, psychosis and eating disorders (see Ref 19 and 20 for a detailed description of the Innowell Platform, and see Ref 21 for the validation data on the Platform). 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 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 08/11/2018 to 08/09/2020 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 (see Ref 19 and Ref 20 for a detailed description of the Innowell Platform). 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 multi-dimensional assessment. The assessment comprised of a series of socio-demographic 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 includes 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 socio-demographic items and the eating disorder questions were extracted for analysis. Please note that all procedures performed in studies involving human participants were in accordance with the ethical standards of The University of Sydney and 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).

Patient and Public Involvement

No patient involved.

Measures

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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)[22] 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 [5,9,23]. The measure consists of four 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.

Table 1.
Eating Behaviours and Body Image Question Set used through the Innowell Platform.

Question No.	*Question Wording*
Q1.	Over the past three (3) months, how often have you overeaten or binge eaten? (i.e., 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 three (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 three (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 three (3) months, how important has your weight or your shape influenced how you think about yourself as a person? E.g., 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

Analysis

Data were cleaned prior to pooling for analysis. SPSS, version 24 (IBM, New York, USA) was used to analyse the data and to obtain descriptive statistics (means and standard deviations) and frequency data reporting the percentage of participants who endorsed particular items in the

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test battery. Pearson's correlations were used to assess the relationship between included variables. One-way ANOVAs, Kruskal-Wallis test (one-way ANOVA on ranks) and Chi-square 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-square test was employed.

Results

The summary demographics of the total sample are presented in Table 2.

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% other gender (other gender refer 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.

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 530 participants, 169 (32%) reported binge eating at least weekly in the three 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)

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Of the total of 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 three months prior to survey completion.

Dietary Restriction (Question 3)

Of the total of 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 three months prior to survey completion.

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 (i.e., at least weekly episodes for binge eating or purging and 'regular' use of dietary restriction as per the wording of Q3) over the three 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 of 'other' gender (6%) which represents 46% of all 'other' gendered 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, and 14 were of 'other' gender (6%) which represents 46% of all 'other' gendered participants included in our study. Table 3 summarises the total number of young people endorsing regularly experiencing these ED symptoms and the potential DSM-5 diagnostic groups that these symptoms clusters map onto.

Table 3.
Endorsement of regular eating disorder behaviours and possible associated DSM-5 diagnoses.

Q1. Binge Eating	Q2. Purging Behaviours	Q3. Dietary Restriction	*n*	% of *N*	Possible DSM-5 Feeding and Eating Disorder
✓	✓	✓	24	4.5%	Possible BN or AN (binge purge subtype)
✓	✓		6	1.1%	Possible BN
✓		✓	48	9.1%	Possible BED
	✓	✓	9	1.7%	Possible AN or OSFED (Atypical AN, purging disorder)
✓			91	17.2%	Possible BED
	✓		3	0.6%	Possible OSFED (purging disorder)
		✓	52	9.8%	Possible AN or OSFED (Atypical AN)

Please note that there was not enough information collected to arrive at a probable diagnosis.

Shape/Weight Concerns (Question 4)

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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 of 530 participants, 46.6% reported that their body shape and weight has influenced how they think about themselves as a person, with 21.1% stating that their body weight and shape is extremely important and has influenced how they think about themselves as a person.

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, *p*s <.01. Results are reported in Table 4.

Table 4.
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.

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 Supplementary Materials.

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*s > .05).

Analyses by gender: A significant main effect of gender was observed for all four items (*p*s <.05). Contrast analyses identified that female gendered participants (*n* = 341) scored significantly higher on the eating behaviours & body image items than male gendered participants (*n* = 159; *p*s < .05), the scores of other gendered participants (*n* = 30) were not found to differ significantly from the scores of male gendered participants (*p*s > .05) or female gendered participants (*p*s > .05). Refer to Table 5 for the group means and standard deviations (SDs) and see Supplementary Materials A for more detail.

Table 5.
Means and SDs of self-reported ED symptom experienced organised by groups based on participant's 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*)

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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*)
Other gender, *n* = 30	1.20 (*1.19*)	0.07 (*0.25*)	0.20 (*0.41*)	2.97 (*1.96*)

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 6 for the group means and standard deviations (SDs) and see Supplementary Materials A for more detail.

Table 6.
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 Mean (*SD*)	Purging Behaviours Mean (*SD*)	Dietary Restriction Mean (*SD*)	Shape/Weight Concerns 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*)

Discussion

This study aimed to ascertain the 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 three 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 [8]. Quick et al.[8] 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). Similar to our sample, Quick et al.[8] 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). These findings also confirm what had been anecdotally observed by the clinicians at our service (headspace Camperdown); 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 data set identifying that 69.4% of presentations to the centre are for the primary presenting concern of sadness/depression or anxiety [17]. These findings support the use of multidimensional assessments among young people presenting for care, since the needs of

young people span many areas of health and wellbeing which may be cause for concern and critical for effective early intervention [20].

Unsurprisingly, we found that the eating disorder symptoms were significantly inter-correlated, 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 were higher in female (47.5%) and other (46%) gendered participants compared to in 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 'other' gendered compared to male or female gendered participants, though this has likely been impacted by the comparatively small *n* of the 'other' gendered group. We also found that those who were female sex-at-birth endorsed more ED symptoms across all four ED items than male sex-at-birth participants, with a prevalence rate of 48% of female-sex-at-birth participants and 34% for male-sex-at-birth participants. These findings are consistent with previous observations of eating disorder symptoms being significantly higher in female-sex-at-birth participants than male-sex-at-birth participants [3-9]. There were no significant differences observed between ED symptoms scores based on other sexuality, relationship status, living situation, or level of education.

Limitations & 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 has 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). It is recommended that future research in this area use gold-standard measurement such as a semi-structured clinical interview (e.g., EDE)[22] or diagnosis from trained clinicians to verify the reported symptom prevalence. 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 sub-clinical as well as clinical disordered eating within this sample, the data also gives 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. 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 sub-sample 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 to young people who may have opted not to complete the assessment, i.e., 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) [24]. For this reason, there is a chance that the data over-represents 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 & Conclusion:

A total of 530 young people aged 14 to 26 years 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 three months prior to survey completion. In addition, we found that 47% of participants reported that their body shape and weight has influenced how they think about themselves as a person, with 21% stating that their body weight and shape is extremely important and has influenced how they think about themselves as a person. We also observed that those who identified as either female or other gendered 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 [22] 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 [25].

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 health care for young people, and to have the opportunity to provide early intervention treatment to prevent a full-threshold eating disorder from emerging.

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Contribution: Authors ALB and BAH designed the research question and conducted the data analysis. ALB and BAH drafted the manuscript. ALB prepared the manuscript for submission for publication. Authors IBH, FI, HML, and EMS were involved with the protocol development, design of the larger Project Synergy and Innowell trial that this study is a part of. All authors read and reviewed the final manuscript.

Ethics Approval: This study involves human participants and was approved by The University of Sydney and the Northern Sydney Local Health District Human Research Ethics Committee (Project Codes: HREC/7/HAWKE/480; RESP/17/349).

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Competing interests: At the time of data collection, author Dr Amy Burton was the clinical lead at headspace Camperdown. Dr Blake Hamilton is the Clinical Services Manager at headspace Camperdown. ALB and BAH have no other potential competing interests to declare. Professor Ian Hickie 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 Pty Ltd. Innowell is a joint venture between the University of Sydney (45% equity) and PwC (Australia; 45% equity), originally created to deliver the $30m Australian Commonwealth Government-funded Project Synergy (2017-20; a three-year program for the transformation of mental health services) and to lead transformation of mental health services internationally through the use of innovative technologies. A/Prof Elizabeth Scott is Principal Research Fellow at the Brain and Mind Centre, 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.

Data sharing statement: Data will be made available upon reasonable request to the corresponding author.

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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 (*p*s > .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, $H(\text{df} = 2, N = 530) = 7.59$, $p = .023$. Post-hoc pair-wise comparisons identified that there were significant differences in scores observed between female and male gendered participants (*p*s <.05) but no significant differences observed between other gendered participants and female gendered participants (*p*s >.05), or between other gendered participants and male gendered participants (*p*s >.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 (*p*s > .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, $H(\text{df} = 2, N = 530) = 10.57$, $p < .01$. Post-hoc pair-wise comparisons identified that there were significant differences in scores observed between female and male gendered participants (*p*s <.05) but no significant differences observed between other gendered participants and

female gendered participants (*p*s >.05), or between other gendered participants and male gendered participants (*p*s >.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 (*p*s > .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 (*p*s > .05) or female gendered participants (*p*s > .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 (*p*s > .05).

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.

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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.

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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.

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 to 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 to 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 to 35% of males) and overall scores across all of the eating disorder and body image items assessed were significantly higher for female participants compared to 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.

Keywords: youth mental health, eating disorder, prevalence, headspace, early intervention

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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 health care 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

INTRODUCTION

Eating Disorders

Eating disorders are serious, deadly disorders that emerge in adolescence and early adulthood [1,2]. 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") [1]. 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) [1]. 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%)[3]. 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 [3-7]. 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 [8].

As these disorders are known to emerge in adolescence and early adulthood, and prevalence rates are increasing [9,10], early detection and early intervention are critical to changing the trajectory of these serious and often fatal conditions [2]. These conditions initially present as sub-clinical or sub-syndromal presentations and can be difficult to detect unless specifically assessed [2]. Sub-syndromal 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 [2]. Therefore, it is believed that early detection and early intervention in sub-clinical 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 [2].

Many people do not seek help due to the ego-syntonic nature of eating disorders and particular stigma associated with the disorders [11,12]. A study of Australian adolescents who met criteria for an eating disorder identified that only 10.1% of those suffering had sought help [11]. A study of college-aged females with eating disorder symptoms identified that 56% did not believe they needed treatment [12]. Due to high co-morbidity of eating disorders with symptoms of anxiety, depression, and other mental health concerns [1,4], eating disorders are often only identified when individuals seek help for other presenting concerns. In addition to

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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 [13]. 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 [13]. Acknowledging the need for specific eating disorder intervention to be integrated into general youth mental health care settings, in recent years some headspace centres have trialled early intervention treatment programs for young people presenting with disordered eating concerns with promising results [14]. 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 [15]. Whilst 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 GP's), drug and alcohol intervention, and vocational and educational support [16,17,18]. headspace remains the largest international integrated primary mental health care initiative undertaken, and it has demonstrated the demand for mental health and associated services in young Australians [15, 18].

headspace Camperdown is a large inner-city headspace centre located at the Brain and Mind Centre, University of Sydney. headspace Camperdown sees on average 1,200 young people per year, of which around half are new patients, and who attend for around 6,000 occasions of service per year with a multi-disciplinary team (psychologists, GP's, 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+ [19]. Compared to national headspace averages, the Camperdown centre has an older cohort (average of 19.3 yrs vs. 17.3 yrs 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%) [19]. 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 SOFAS score of 65.4, with these scores being comparable to other headspace centres nationally [19]. 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 to national averages [19].

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 and online assessment prior to attending their

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intake appointment via the Innowell Platform. The online assessment via the Innowell Platform involves a multi-dimensional assessment comprising a series of socio-demographic 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 includes mood, anxiety, psychosis and eating disorders (see Ref 20 and 21 for a detailed description of the Innowell Platform, and see Ref 22 for the validation data on the Platform) [20-22]. 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 08/11/2018 to 08/09/2020 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 (see Ref 20 and Ref 21 for a detailed description of the Innowell Platform)[20-21]. 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 multi-dimensional assessment. The assessment comprised of a series of socio-demographic 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 includes 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 socio-demographic items and the eating disorder questions were extracted for analysis. Please note that 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).

Patient and Public Involvement

No patient involved.

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.

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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)[23] 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 [3,9,24]. 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 [25, 26].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.

Table 1.
Eating Behaviours and Body Image Question Set used through the Innowell Platform.

Question No.	*Question Wording*
Q1.	Over the past three (3) months, how often have you overeaten or binge eaten? (i.e., 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 three (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 three (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 three (3) months, how important has your weight or your shape influenced how you think about yourself as a person? E.g., 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

Analysis

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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, version 24 (IBM, New York, USA) was used to analyse the data and to obtain descriptive statistics (means and standard deviations) and frequency data reporting the percentage of participants who endorsed particular items in the test battery. One-way ANOVAs, Kruskal-Wallis test (one-way ANOVA on ranks) and Chi-square 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-square 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.

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 refer 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.

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 530 participants, 169

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(32%) reported binge eating at least weekly in the three 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 of 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 three months prior to survey completion.

Dietary Restriction (Question 3)

Of the total of 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 three months prior to survey completion.

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 (i.e., at least weekly episodes for binge eating or purging and 'regular' use of dietary restriction as per the wording of Q3) over the three 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 summarises the total number of young people endorsing regularly experiencing these ED symptoms.

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%

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 of 530 participants, 46.6% reported that their body shape and weight has influenced how they think about themselves as a person, with 21.1% stating that their body

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weight and shape is extremely important and has 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 Supplementary Materials.

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*s > .05).

Analyses by gender: A significant main effect of gender was observed for all four items (*p*s <.05). Contrast analyses identified that female gendered participants (*n* = 341) scored significantly higher on the eating behaviours & body image items than male gendered participants (*n* = 159; *p*s < .05), the scores of gender diverse participants (*n* = 30) were not found to differ significantly from the scores of male gendered participants (*p*s > .05) or female gendered participants (*p*s > .05). Refer to Table 4 for the group means and standard deviations (SDs) and see Supplementary Materials A for more detail and for analyses based on sex-at-birth.

Table 4.
Means and SDs of self-reported ED symptom experienced organised by groups based on participant's 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*)

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 three 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 [8]. 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) [8]. 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) [8]. 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 data set identifying that 69.4% of presentations to the centre are for the primary presenting concern of sadness/depression or anxiety [19]. These findings support the use of multidimensional assessments among young people presenting for care, since the needs of young people span many areas of health and wellbeing which may be cause for concern and critical for effective early intervention [21].

Unsurprisingly, we found that the eating disorder symptoms were significantly inter-correlated, 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 were higher in female (47.5%) and gender diverse (46%) participants compared to in 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 to 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 symptoms scores based on other sexuality, relationship status, living situation, or level of education.

Limitations & 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 has 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 [25, 26], it is recommended that future research in this area use gold-standard measurement such as a semi-structured clinical interview (e.g., EDE)[23] 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-

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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 sub-clinical as well as clinical disordered eating within this sample, the data also gives 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 was limited to demographic information and symptoms of disordered eating and poor body image, 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 sub-sample 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 to young people who may have opted not to complete the assessment, i.e., 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) [27]. For this reason, there is a chance that the data over-represents 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 & 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 three months prior to survey completion. In addition, we found that 47% of participants reported that their body shape and weight has influenced how they think about themselves as a person, with 21% stating that their body weight and shape is extremely important and has 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 [24] 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 [28].

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 health care for young people, and to have the opportunity to provide early intervention treatment to prevent a full-threshold eating disorder from emerging.

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Contribution: Authors ALB and BAH designed the research question and conducted the data analysis. ALB and BAH drafted the manuscript. ALB prepared the manuscript for submission for publication. Authors IBH, FI, HML, and EMS were involved with the protocol development, design of the larger Project Synergy and Innowell trial that this study is a part of. All authors read and reviewed the final manuscript.

Ethics Approval: This study involves human participants and was approved by the Northern Sydney Local Health District Human Research Ethics Committee (Project Code: HREC/7/HAWKE/480; RESP/17/349). Due to the age of the participants (14 years and older) and the nature of the study (online survey), it was determined that 14, 15, 16 and 17-year-old individual users of the Innowell Platform are sufficiently mature to decide for themselves whether to provide consent or to opt-out of participating in research. Therefore, parental consent was not required for participants aged between 14 years and 18 years of age. This decision was reviewed and approved by the Northern Sydney Local Health District Human Research Ethics Committees (Project Code: HREC/7/HAWKE/480; RESP/17/349).

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Competing interests: At the time of data collection, author Dr Amy Burton was the clinical lead at headspace Camperdown. Dr Blake Hamilton is the Clinical Services Manager at

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headspace Camperdown. ALB and BAH have no other potential competing interests to declare. Professor Ian Hickie 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 Pty Ltd. Innowell is a joint venture between the University of Sydney (45% equity) and PwC (Australia; 45% equity), originally created to deliver the $30m Australian Commonwealth Government-funded Project Synergy (2017-20; a three-year program for the transformation of mental health services) and to lead transformation of mental health services internationally through the use of innovative technologies. A/Prof Elizabeth Scott is Principal Research Fellow at the Brain and Mind Centre, 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.

Data sharing statement: Data will be made available upon reasonable request to the corresponding author.

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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, *p*s <.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 (*p*s > .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, $H(\text{df} = 2, N = 530) = 7.59$, $p = .023$. 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, $H(\text{df} = 2, N = 530) = 10.57$, $p < .01$. 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 Mean (*SD*)	Purging Behaviours Mean (*SD*)	Dietary Restriction Mean (*SD*)	Shape/Weight Concerns 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*)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-7
Bias	9	Describe any efforts to address potential sources of bias	*N/a self-report survey data only*
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	7
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-10
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	7-10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7-10
		(*b*) Report category boundaries when continuous variables were categorized	7-10
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	7-10
Discussion			
Key results	18	Summarise key results with reference to study objectives	10-11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11-12
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	10-13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.