Clinically significant body dissatisfaction: Prevalence and association with depressive symptoms in adolescent boys and girls

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Body dissatisfaction is distressing and a risk factor for adverse consequences including eating disorders. However, data pertaining to the prevalence of body dissatisfaction in adolescence, a key period for its emergence, are lacking. This is a substantial barrier to tailored assessment and early intervention. This study addresses this gap and provides the prevalence of body dissatisfaction and associations with depressive symptoms and body change strategies. Adolescent boys (n = 367; Mage = 12.8, SD = 0.7) and girls (n = 368; Mage = 12.7, SD = 0.7) completed measures of body dissatisfaction and depressive symptoms with established cut-off levels. They also completed measures of dietary restraint and strategies to increase muscle size. Of boys and girls, 37.9% and 20.7%, respectively experienced moderate, and 6.8% and 19.6% experienced clinically significant body dissatisfaction, with higher rates among girls than boys and among adolescents aged 13 and 14 than aged 12. More than one-quarter of boys (26.70%) and one-third of girls (33.15%) reported subthreshold depressive symptoms or possible, probable or major depressive episodes. Girls revealed a higher prevalence of possible-, probable-, or major-depressive episode than boys. Relative to those with no or low body dissatisfaction, adolescents with clinically significant body dissatisfaction were 24 times more likely to also report possible-, probable-, or major-depressive episodes. Among boys and girls, clinically significant body dissatisfaction was associated with higher levels of dietary restraint and engagement in strategies to increase muscle size. Greater attention to identification and early intervention for body dissatisfaction is needed, especially for girls.

Keywords: body dissatisfaction; clinically significant; depressive symptoms, prevalence; adolescent; boys; girls

Body dissatisfaction, characterized by negative evaluation of physical appearance [1], is recognized as a serious health concern [2] with onset typically occurring in early adolescence [3]. Numerous negative health consequences of body dissatisfaction in adolescents have been identified, such as depressive symptoms [4,5], use of unhealthy body change behaviours [6,5], and development of clinical eating disorders [7]. Adolescence is a key period for development of body dissatisfaction due to the impact of developmentally relevant factors such as changes in body shape at puberty, peer and media pressures to conform to appearance ideals, and the important role of body image in identity development at this time [8]. Despite recognition of the serious impact of body dissatisfaction and the importance of the period of adolescence for its emergence, current and valid data pertaining to the prevalence of clinically significant body dissatisfaction during adolescence are lacking, particularly for boys. Indeed, we are only aware of three studies that reflect on prevalence of *clinically significant* body dissatisfaction in girls [9,10] and in boys [11]. Information regarding the rates at which impairing levels of body dissatisfaction are experienced by adolescents is crucial to inform appropriate intervention, specifically, the respective needs for universal versus targeted approaches to prevention across age and gender cohorts. Targeted approaches are more appropriate for populations who already present with high levels of body dissatisfaction and associated impairment and can include early intervention content to address distress and unhealthy body change behaviors. Universal prevention may be ineffective if implemented among cohorts who have already developed clinically significant body dissatisfaction and targeted prevention and early intervention is likely to be inappropriate for those who have low body image concerns and who do not engage in unhealthy behaviors. In addition, both depressive symptoms and body change behaviors have been identified as important co-occurring concerns in adolescents with body dissatisfaction [12], and better understanding how these concerns cluster together with clinically significant body dissatisfaction is also critical for tailoring assessment and intervention efforts and resources. Although body dissatisfaction, depressive symptoms, and body change behaviors are known to occur across genders [13], they are most frequent and severe among female adolescents, with these differences persisting into adulthood [12]. Characterizing the onset of these disparities during early adolescence is also important to inform intervention efforts. However, to our knowledge, no studies have examined this issue among girls and boys. Thus, the aim of the present study was to examine the prevalence of clinically significant body dissatisfaction in early adolescent boys and girls, and to examine associations between body dissatisfaction and two important comorbidities of body dissatisfaction, depressive symptoms and body change behaviors.

Body image is an important issue for young people. In annual surveys of large samples of young

Australians (n > 20,000), body image has been consistently identified as one of the highest issues of concern over several years [14-16]. However, data on prevalence of body dissatisfaction, that is, distressing negative thoughts and feelings related to the body and its appearance, in adolescents are scarce and variously affected by measurement issues and lack of currency. Early prevalence research among adolescents identified a high frequency of desire for a different body size; with up to 76.8% of girls and 83.4% of boys desiring a body size different from their current size [13]. More recent research among Swedish adolescent girls revealed lower rates of reported desire to be thinner [36.8%; 17]. However, these discrepancies may be due to methodological inconsistencies more than decreases in prevalence of concerns over time. Particular interest, however, lies in clinically significant levels of body dissatisfaction that impart psychological distress, impair functioning, and are associated with maladaptive eating and body control behaviors [18]. Rates of these more significant concerns may be most relevant in terms of orienting intervention efforts and resource allocation, yet relevant data are scarce and necessitate the use of more rigorous assessment tools than the figure rating scales and single-item measures employed in the studies mentioned above. Thus, research examining the prevalence of body dissatisfaction with reference to established cut-off values from psychometrically validated measures is needed.

Prevalence estimates obtained through assessment with the Eating Disorder Examination – Questionnaire [EDE-Q; 19] overcome some measurement limitations. Scores on the EDE-Q have been shown to be reliable and valid in adolescent samples, and the weight and shape concern subscales have been identified as appropriately assessing evaluation of physical appearance [20]. In addition, scores on the subscales of the EDE-Q have been identified as reflecting clinically significant body dissatisfaction. Carter et al. [9] have stated that scores of equal to or above 4 on the EDE-Q are of "clinical severity" (p. 627). Indeed, using such a cut-off, Carter et al. [9] found that 13% and 20% of 12-14-year-old girls from the UK had scores in the clinically significant range on these subscales, respectively. Prevalence estimates for mild and moderate levels of body dissatisfaction were not reported. Although the extant data on body image concerns are scarce, related data on overvaluation of shape or weight among Australian adolescent boys and girls exist. Using a score of ≥ 5 on either of the two questions in the EDE-Q assessing this construct [21], in boys, prevalence of overvaluation of weight or shape was 4.5% and 5.8% in 12-15 and 16-18 year-olds, respectively [11]. Higher prevalence was found for girls, with 19.8% and 30.0% of 12-15 and 16-18 year-olds, respectively, experiencing overvaluation of weight or shape [11]. These data highlight both the existence of clinically significant body image concerns among adolescents, as well as robust gender differences such that these concerns are higher among girls. Nevertheless, data that provide a detailed picture of the proportions of early adolescent boys and girls

experiencing body dissatisfaction across the spectrum of severity are lacking. The present study will address these limitations and use equivalent cut-off levels for body dissatisfaction for boys and for girls to enable gender comparison.

In addition to investigating the presence of body dissatisfaction itself, it is necessary to consider important correlates of these concerns to obtain a fuller picture of the associated impairment and presentation in early adolescents. Two important correlates that have been identified are depressive symptoms and body change behaviors. These relationships during pre- and early-adolescence have been successfully conceptualized through theoretical models that focus on gendered societal expectations related to appearance. These theoretical frameworks highlight how appearance ideals differ by gender, with girls experiencing strong pressures towards thinness, while boys describe pressures towards a lean-and-muscular ideal [13]. These different appearance ideals likely afford adolescent girls and boys different experiences related to body image as they transition through puberty, as boys may perceive themselves to become closer to muscular male appearance ideals, while girls may perceive themselves as moving further away from the very slender and youthful female appearance ideal [22]. In addition, adolescence has been described as a critical developmental period for girls when sexualization and objectification increase, and they become aware of society's expectations for women's bodies to be contained and docile, and the policing that ensures this [23]. Gender differences are also perceived in the value and importance placed upon appearance, with a growing recognition among adolescent girls of the ways in which women's social value is more tightly anchored to their appearance than men's [24,25]. Furthermore, this awareness of body-related social norms and expectations is accompanied by an increasing awareness of other aspects of gender bias and limitations in terms of social roles [26]. These differences in the experience of male and female adolescents and the different pressures they perceive related to appearance have been described as underpinning the higher rates of body dissatisfaction and depressive symptoms documented among adolescent girls [22]. In addition, the pursuit of different ideals may lead adolescent girls and boys to differentially engage in body change behaviors such as those aiming to control weight and increase muscularity [13].

Consistent with these theories, past research has shown that body dissatisfaction is associated with depressive symptoms in adolescent girls [27] and predicts depressive symptoms in prospective studies with adolescent girls and boys [28], although directionality of effects has been found to differ among different age groups [12,4,29]. Body dissatisfaction also predicts engagement with strategies to reduce weight [17] and increase muscularity [30], with the former traditionally associated with concerns about thinness among girls and

the latter with concerns about lack of muscularity among boys [13]. More recently it has been recognized that the pursuit of leanness and a degree of muscularity are characteristics of both genders [31,32]. Although the relationships between body dissatisfaction and negative consequences are reasonably well established, less attention has been given to the extent to which clinically significant levels of body dissatisfaction pose a risk for depressive symptoms and use of body change behaviors and is thus a focus of the present study.

In summary, the present study aims to fill the gap in available data regarding the proportions of adolescent girls and boys experiencing body dissatisfaction across levels of severity, as well as to examine gender differences in two important correlates of body dissatisfaction – depressive symptoms and body change behaviors. Thus, a primary aim was to report the proportions of girls and boys aged 12, 13, and 14 experiencing an absence of or low body dissatisfaction, moderate body dissatisfaction, and clinically significant body dissatisfaction. In addition, consistent with theory and previous research, it was expected that 1) greater numbers of girls compared to boys would report clinically significant levels of body dissatisfaction as well as high levels of depressive symptoms and body change behaviors, and that increases in these concerns with age would be most pronounced among adolescent girls; and 2) that higher body dissatisfaction in both genders would be associated with greater depressive symptoms and higher engagement in body change behaviors.

Method

Participants

Participants were 766 adolescent boys and girls aged between 11-15 years recruited from five state and three independent schools from diverse locations in metropolitan Melbourne, Australia. Participants were recruited from schools that agreed to take part in a body dissatisfaction prevention trial [33]. Data presented in the current study are from the baseline assessment. The small number of girls and boys aged 11 (n = 13) and 15 (n = 6) years and who did not specify their gender (n = 8) were excluded from the present analysis due to low frequencies. Thus, the sample size for analyses was 735. The majority of participants (83.1%) were born in Australia, 8.7% in East and South East Asian and 3.9% in European countries. Smaller proportions were born in other countries (4.3%). Mothers and fathers of participants were also predominantly born in Australia (62.8%, 62.5%, respectively). Smaller proportions of mothers and fathers were born in East and South Asian (18.3%, 16.7%, respectively) and European (9.6%, 11.1%, respectively) countries, and elsewhere (9.3%, 9.7%). The majority of participants (79.6%) resided in areas of high relative socio-economic advantage (deciles 7-10) and few resided in mid-relative advantage areas (8.4%; deciles 5-6) or low-relative disadvantage areas (12.0%; deciles 1-4). The five state schools from which participants were recruited were ranked 23rd, 40th, 44th, 45th and

62nd percentile on the index of community socio-educational advantage for Australian schools [34]. The three independent schools from which students were recruited were ranked 95th, 95th, and 98th percentile on this index.

Measures

Demographics. Information on age, gender, and postcode, from which SES was computed was collected.

Body dissatisfaction The 12-item weight and shape concerns subscale of the Eating Disorders Examination – Questionnaire [EDE-Q; 19] assessed levels of body dissatisfaction. Items are assessed on a 7-point response scale according to frequency of occurrence (i.e., "Have you had a strong desire to lose weight?"; 0 = *no days*, 6 = *every day*) or intensity of experience (i.e., "How dissatisfied have you been with your shape?"; 0 = *not at all*, 6 = *markedly*). An average of the 12 items is computed to create a scale score with higher scores reflecting greater body dissatisfaction. Scores on the EDE-Q have demonstrated good psychometric properties in previous research in adolescent samples [35,36] and scores from the weight and shape concerns scale are frequently combined to form one scale [36]. Cut-off scores were applied to create groups experiencing an absence of, or low levels of body dissatisfaction (hereafter referred to as "low"), moderate levels, and clinically significant levels of body dissatisfaction. Low and moderate groups were created using norms for the EDE-Q in young Australian adolescents [11] whereby the cut point between the two groups was the gender relevant mean score for weight and shape concerns (low body dissatisfaction ≤ 2.14 for girls; ≤ 0.73 for boys). Moderate body dissatisfaction reflected scores above the mean but less than clinically significant levels ($> 2.14 < 4.0$ for girls; $> 0.73 < 4.0$ for boys). The cut-off for clinically significant body dissatisfaction (> 4.0 for girls and boys) was based on levels identified in research with adolescent girls [10,9] and used in previous research with samples of Australian adolescent girls and boys [36]. Cronbach's alpha in the present study was high for boys ($\alpha = .95$) and girls ($\alpha = .97$).

Depressive symptoms Nine items from the 10-item Centres for Epidemiological Studies Depression Scale Revised [37] assessed depressive symptoms. One item ("I wished I were dead") was omitted due to ethical concerns as is common in research with early adolescents [e.g., 38]. Participants responded to items such as "I felt sad" on a 5-point scale from 0 (*not at all*) to 4 (*nearly every day for 2 weeks*). A total score was calculated from the sum of item responses with higher scores reflecting higher depressive symptomology. Psychometric evaluation of scores on the scale support construct validity and internal consistency reliability among adolescent boys and girls [37]. Categories of increasing severity of depressive symptoms were created following criteria defined by Haroz et al. [37] and five categories were created; no clinically significant symptoms, subthreshold

symptoms, possible major depressive episode, probable major depressive episode, and major depressive episode. The five categories were used for descriptive purposes but due to low frequencies the last three categories were collapsed for some analyses. Cronbach's alpha in the present study was high for boys (α = .89) and girls (α = .90).

Body change strategies. The 10-item Restraint subscale of the Dutch Eating Behavior Questionnaire [39] assessed frequency of dietary restraint. Participants responded to items such as "Do you deliberately eat less in order not to become heavier?" on a 5-point scale from 1 (*never*) to 5 (*very* often). Mean responses on items were computed to form a total score with higher scores reflecting higher dietary restraint. Scores on the restraint subscale has previously demonstrated good psychometric properties in adolescent boys and girls [40]. Cronbach's alpha in the present study was high for boys (α = .93) and girls (α = .96).

The 6-item Strategies to Increase Muscle Size subscale from the Body Change Inventory [41] was used to examine frequency of strategies to increase muscularity. Participants responded to items such as "How often do you change your levels of exercise to increase the size of your muscles" on a 5-point scale from 1 (*never*) 5 (*always*). Mean responses on items were computed to form a total score with higher scores reflecting higher engagement in strategies to increase muscle size. Scores on this scale have previously demonstrated good psychometric properties in adolescent boys and girls [41]. Cronbach's alpha in the present study was high for use of strategies to increase muscles for boys (α = .92) and girls (α = .92).

Procedure

Ethics approval for the study was granted by the [blinded for review] University Human Ethics Committee (HEC17-020) and the study was conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. Approval to conduct the study was also received from the Victorian Department of Education and Training. Active informed parental consent and assent from adolescents was required for participation. Data collection took place in classroom settings and was supervised by a researcher and a teacher. Participants completed surveys on the online survey platform Qualtrics. Data collection took place from November 2017 through February 2019.

Data Analysis

All analyses were conducted with SPSS-26. Frequencies of participants falling into body dissatisfaction and depression categories were examined with descriptive statistics. For inferential analyses, categories for body dissatisfaction and depressive symptoms were created based on cut-off scores described in the Method. Categories of possible depressive episode, probable depressive episode, and major depressive episode were

collapsed due to small cell counts. Loglinear analyses, used to test relationships among categorical variables, examined proportions of participants within categories of body dissatisfaction (3 levels; low; moderate; clinically significant) and depression (3 levels; no symptoms, subthreshold symptoms, possible- probable-, and major-depressive episode) according to gender (2 levels; boys, girls) and age groups (3 levels; 12, 13, 14 years). Post-hoc examination of adjusted residuals from follow-up chi-square analyses was performed to interrogate significant interaction effects with odds ratios presented in text for key significant comparisons involving clinically significant body dissatisfaction and possible, probable, or major depressive episode to reflect effect sizes. Odds ratios for all comparisons are shown in Online Resource 2. Due to positive skewness in outcome variables, non-parametric analyses with Mann-Whitney U Tests were used to examine differences in levels of dietary restraint and strategies to increase muscles between participants with and without clinically significant body dissatisfaction.

Results

Prevalence of Body Dissatisfaction and Gender and Age Comparisons

Figure 1 shows the proportions of adolescent boys and girls who had moderate and clinically significant body dissatisfaction, for each age group. Considerable proportions of boys (44.7%) and girls (40.2%) experienced some level of body dissatisfaction, either moderate or at clinically significant levels. Prevalence by age, gender, and for the total sample are shown in Online Resource 1. Visual inspection of the distribution of body dissatisfaction (Figure 1) shows changing patterns across age and gender that were examined with loglinear analysis. In addition, examination of the cell sizes when considering the data stratified by gender and age group revealed that only one cell count was below 5, thus the data were suitable for loglinear analysis [42].

Three-way loglinear analysis testing relationships between age (3 levels), gender (2 levels), and body dissatisfaction (3 levels) produced a final model that retained one-way and two-way effects, with likelihood ratio χ^2 (4) = 6.24, p = .182. Removing the three-way interaction did not significantly affect the fit of the model. The two-way interaction was significant, χ^2 (8) = 63.24, p < .001 and each of the two way interactions, age x body dissatisfaction, χ^2 (4) = 14.01, p = .007, gender x body dissatisfaction, χ^2 (2) = 45.53, p < .001, and age x gender, χ^2 (2) = 7.16, p = .028, significantly affected the model. Adjusted residuals in follow-up chi-square analyses were examined to identify the significant gender and age x body dissatisfaction effects. For gender x body dissatisfaction effects, inspection of adjusted residuals indicated that the proportion of boys with moderate body dissatisfaction was significantly higher than the proportion in girls, p < .001. In contrast, the proportion of girls with clinically significant body dissatisfaction was significantly higher than the proportion in boys, p <

.001. An odds ratio was calculated to reflect this effect and the odds of having clinically significant body dissatisfaction were 3.33 times higher for girls than for boys. The proportion of participants with low body dissatisfaction did not significantly differ between girls and boys, $p = .667$. Inspection of adjusted residuals for the age x body dissatisfaction follow-up chi-square analysis indicated that the proportion of participants with low body dissatisfaction was significantly higher in 12-year-olds than other age groups, $p = .009$, and lower in 13-year-olds than other groups, $p = .034$. The proportion of participants with clinically significant body dissatisfaction was significantly lower in 12-year-olds than in the 13- and 14-year-olds, $p = .006$. Odds ratios showed that the odds of having clinically significant body dissatisfaction were 1.86 times higher for 13-year-olds and 2.42 times higher for 14-year-olds than for 12-year-olds. There were no other significant findings for age across levels of body dissatisfaction. See Online Resource 2 for odds ratios for all comparisons.

Prevalence of Depressive Symptomatology and Gender and Age Comparisons

The proportions of participants experiencing different levels of depressive symptoms is shown in Figure 2. Prevalence rates for no clinically significant symptoms and the total sample are shown in Online Resource 1. For further analyses, categories of possible, probable and major depressive episodes were collapsed due to low frequencies. Once collapsed, when stratified by gender and age group, again only one cell count was below 5, thus the data were suitable for loglinear analysis [42]. Three-way loglinear analysis testing relationships between age (3 levels), gender (2 levels), and depression (3 levels) produced a final model that retained one-way and two-way effects, with likelihood ratio χ^2 (18) = 19.51, $p = .361$. Removing the three-way interaction did not significantly affect the fit of the model. The two-way interaction was significant, χ^2 (11) = 30.51, $p = .006$, and the gender x depression interaction, χ^2 (4) = 20.66, $p < .001$ and age x gender interaction, χ^2 (2) = 6.44, $p = .040$ significantly affected the model. The age x depression interaction, χ^2 (8) = 6.29, $p = .615$, did not significantly affect the model. Adjusted residuals in a follow-up chi-square analysis were examined to identify the significant gender x depression effects. These showed that a significantly higher proportion of boys than girls had no clinically significant depressive symptoms, $p < .001$. In contrast, a significantly higher proportion of girls had possible, probable, or major depressive episode, $p < .001$. Odds ratios showed that the odds of having possible, probable, or major depressive episode were 2.55 times higher for girls than for boys. There were no gender differences for subthreshold depressive symptoms. Odds ratios for all gender and age by depression comparisons are shown in Online Resource 2.

Co-occurrence of Body Dissatisfaction and Depressive Symptoms

Figure 3 shows the proportions of boys and girls for which there was a correspondence between levels of body

dissatisfaction and depressive symptom categories. For clarity and consistency with above analyses, possible-, probable-, and major-depressive episode categories were collapsed together. A changing pattern of depressive symptoms across different levels of body dissatisfaction was apparent whereby low body dissatisfaction was characterized by the absence of depressive symptoms and in contrast, clinically significant body dissatisfaction was dominated by the presence of depressive symptoms. Of note, almost half of girls (47%) and an only slightly lower proportion of boys (40%) with clinically significant body dissatisfaction also experienced possible-, probable-, or major-depressive episodes.

Three-way loglinear analysis was conducted to test relationships between gender (2 levels), body dissatisfaction (3 levels), and depression (3 levels). Age was not included due to low cell frequencies and lack of age effects for the depression model examined above. The analysis produced a final model that retained one-way and two-way effects, with likelihood ratio χ^2 (4) = 2.04, p = .728. Removing the three-way interaction did not significantly affect the fit of the model. The two-way interaction was significant, χ^2 (8) = 271.90, p < .001. The body dissatisfaction x depression interaction, χ^2 (4) = 148.88, p < .001, gender x body dissatisfaction interaction, χ^2 (2) = 34.99, p < .001, and the gender x depression interaction, χ^2 (2) = 10.84, p = .004, significantly affected the model. Adjusted residuals in a follow-up chi-square analysis were examined to identify the significant body dissatisfaction x depression effects. The presence of low body dissatisfaction was associated with significantly higher proportions of participants without depressive symptoms, p < .001, and lower proportions of subthreshold, p < .001, and possible, probable, or major depressive episode, p < .001. Moderate body dissatisfaction was associated with significantly lower proportions of participants without depressive symptoms p = .006, and higher proportion of subthreshold depressive symptoms, p = .003. Clinically significant body dissatisfaction was associated with significantly lower proportions of participants without depressive symptoms, p < .001, and higher proportions of subthreshold depressive symptoms, p = .009, and possible-, probable-, or major-depressive episodes, p < .001. An odds ratio was calculated to reflect the latter effect and the odds of participants having possible-, probable-, or major-depressive episodes was 24.25 times higher if participants had clinically significant body dissatisfaction than if they had low body dissatisfaction. Odds ratios for all comparisons are shown in Online Resource 2. The gender x body dissatisfaction and gender x depression interactions were not explored further, as they had been examined above.

Differences in Dietary Restraint and Use of Strategies to Increase Muscles

Differences in dietary restraint between participants with and without clinically significant body dissatisfaction were examined with Mann-Whitney U Tests. Summary statistics are shown in Table 1. Both girls and boys with

clinically significant body dissatisfaction had significantly higher levels of dietary restraint than their counterparts who did not meet threshold for clinically significant body dissatisfaction. Effect sizes of differences were large for girls (r = .56) and medium for boys (r = .36). Similarly, significantly higher levels of engagement with strategies to increase muscles were observed for both girls and boys with clinically significant body dissatisfaction relative to participants without clinically significant body dissatisfaction. Effect sizes were medium for girls (r = .38) and small for boys (r = .28).

Discussion

This study aimed to examine prevalence of body dissatisfaction and depressive symptoms and their co-occurrence, along with differences in engagement with body change strategies across levels of body dissatisfaction for adolescent boys and girls. Our findings showed a striking prevalence of clinically significant body dissatisfaction in ~~both boys and~~ girls (19.6%), and to a lesser extent among boys (6.8%)~~with 44.7% and 40.2% respectively, experiencing moderate or clinically significant body dissatisfaction~~. Similarly, considerable proportions of boys and girls experienced sub-threshold depressive symptoms or possible-, probable-, or major-depressive episodes (boys 26.7%, girls 33.1%). Gender and age differences in body dissatisfaction and depression were also observed, with greater prevalence of more severe clinically significant body dissatisfaction and possible-, probable-, or major-depressive episodes among girls compared with boys, and greater prevalence of clinically significant body dissatisfaction among older than younger participants. A notable finding was the correspondence between presence of body dissatisfaction and depressive symptoms. Having moderate body dissatisfaction was associated with a higher proportion of subthreshold depressive symptoms and having clinically significant body dissatisfaction was associated with a higher proportion of subthreshold depressive symptoms as well as possible-, probable-, or major-depressive episodes. The effect size for this latter finding was large, such that adolescents with clinically significant body dissatisfaction were 24 times more likely to have possible-, probable-, or major-depressive episodes than adolescents with low body dissatisfaction. The presence of body dissatisfaction was also found to correspond with higher engagement with dietary restraint and strategies to increase muscles for both boys and girls.

The observations presented in this study provide updated prevalence rates for body dissatisfaction in adolescent girls and boys. The rates demonstrate some similarity to prevalence of overvaluation of weight and shape observed in an earlier study of Australian adolescents [11], with the proportion of girls having clinically significant body dissatisfaction being very close in the present study (19.6%) to that found in the previous (19.8%) study for 12-15-year-old girls, although proportions of boys with the clinically significant body

dissatisfaction are slightly higher in the present study (6.8%) than for 12-15-year-old boys (4.5%) in Mond et al. [11]. However, differences in focus, namely on body dissatisfaction in the present study and on overvaluation of weight and shape in Mond et al. [11] make direct comparisons difficult. In addition, our findings were drawn from a non-representative sample, with relatively high socioeconomic status, so generalisability to other populations is uncertain. Previous research has shown that body image satisfaction was lower among adolescents with lower socioeconomic status [43], thus further exploration of this factor is warranted to understand the implications of sample diversity on prevalence of body dissatisfaction. It is also difficult to compare prevalence of body dissatisfaction observed in the present study with past studies that used figure rating scales or single items to assess body dissatisfaction [13,17]. The present findings extend understanding of the extent of experiences of different levels of body dissatisfaction, from low, to moderate, to clinically significant, beyond what can be understood from earlier work with limited measures of body dissatisfaction.

Furthermore, the present study, in which almost half of boys and girls experienced moderate or clinically significant body dissatisfaction, quantifies the extent of concern acknowledged by young people who consistently identify body image as one of the top issues of concern to them [e.g., 16]. However, it should be noted that the cut-off for moderate body dissatisfaction was based on norms and may not correspond to a level of moderate distress or impairment. Although young people recognize that body image is an important issue, and our findings show that the intensity of body dissatisfaction in a community sample is worryingly high, levels of help-seeking for these concerns (in the context of eating disorder symptomatology) among adolescents is low [44]. Taken together, these findings suggest that specific interventions to enhance key elements in the pathway to receiving care, namely identification of experiences of body dissatisfaction, understanding the seriousness of its occurrence, and promoting help-seeking through actions such as reducing stigma, are needed. In addition, effective assistance in reducing body dissatisfaction needs to be available.

Study findings revealed that depressive symptoms, across different levels of severity, were common in this adolescent sample, and more prevalent among girls than boys. There were no age differences in occurrence. Prevalence of depressive symptoms was somewhat higher in the current study than in a previous study of a national sample of adolescents with mean age 14.5 from the United States from which we derived our classification of depressive categories [37]. For instance in our study, 66.9% of participants had no clinically significant symptoms relative to 78.7% of participants in Haroz et al. [37]. At each category of depression, higher prevalence rates were seen in the present sample (major depressive episode 5.2% vs 1.8%; possible depressive episode 3.7% vs 0.9%; subthreshold symptoms 21.7% vs 16.5%), although the prevalence rates for

probable depressive episode (2.5% vs 2.0%) were relatively similar. Our findings of gender differences in depressive symptoms, with higher levels in girls than boys have also been reported previously [45]. Similar to our observations, in the representative sample of adolescents from the United States, girls more frequently met criteria for major depressive episode and probable and possible depressive episodes [37]. These indicate that girls, relative to boys carry a higher burden for depressive symptoms as for body dissatisfaction.

Body dissatisfaction and depressive symptomatology were found to coincide in the present study, such that adolescents with low levels of body dissatisfaction also tended to be categorized as having no clinically significant depressive symptoms. Correspondingly, adolescents with moderate and clinically significant body dissatisfaction also tended to experience depressive symptoms of increasing severity. This association was shown rather starkly with odds ratios demonstrating that adolescents with clinically significant body dissatisfaction relative to those with no- or low-body dissatisfaction were 24 times more likely to also have possible-, probable-, or major-depressive episodes. Gender differences in both body dissatisfaction and depressive symptoms showed that in our sample, and consistent with previous findings [22], girls experience these problems at greater levels than boys. Given the co-occurrence of these two problems, it appears that adolescent girls experience a double burden of body dissatisfaction and depressive symptoms. This burden is concerning, not only due to the considerable distress it engenders, but also due to the potential impact of depressive symptoms and body dissatisfaction on development of disordered eating and eating disorders [22]. Indeed, co-curring body disatisfaction and depressive symptoms have been posited and found to characterize adolescents at highest risk for developing disordered eating and eating disorders [46,5,47]. Taken together, our findings therefore provided added support for gendered pathways of the development of body image concerns and depressive symptoms among adolescent girls, that highlight the ways in which adolescent girls are disproportionally targeted by sexualization, objectification, and appearnace-based culture [23,25].

The presence of clinically significant body dissatisfaction, relative to low and moderate body dissatisfaction was also found to be associated with greater levels of dietary restraint and engagement in strategies to increase muscle size. That body dissatisfaction was associated with pursuit of muscular ideals for both boys and girls indicates the relevance of muscularity related concerns for females as well as for males [32]. These findings also point to the potential of body dissatisfaction to contribute to the emergence of disordered eating behavior and subsequently eating disorders, although due to the cross-sectional nature of data in this study, conclusions about temporal direction cannot be drawn. It is possible, although inconsistent with theoretical models and some [5,48,28] but not all [12] empirical findings, that body dissatisfaction occurs

following, rather than preceding depressive symptoms, dietary restraint, and strategies to increase muscle size. Analyses with prospective data are needed to shed light onto questions of temporal direction.

Findings of the present study have implications for early intervention and treatment. First, they suggest that action is needed to intervene to address mental health difficulties currently experienced by young adolescents pertaining to clinically significant body dissatisfaction with concurrent depressive symptoms. However, the needs of those with clinically significant body dissatisfaction are likely to differ from those with low levels of body dissatisfaction due to both the distress and functional impairment that accompany clinically significant body dissatisfaction and the co-occurrence of other problems, including depressive symptoms and unhealthy body change behaviors, as demonstrated in the present study. As such, early intervention and treatment, rather than universal or selective prevention, may be indicated for those with more severe symptoms. Second, addressing body dissatisfaction and depression concurrently, and through a gendered lens, could be highly valuable for improving outcomes for adolescents. Third, the timing of intervention is informed by these findings. Interestingly, increases in body dissatisfaction across age groups occurred for girls between ages 12 and 13, but for boys between ages 13 to 14. This pattern also seemed to repeat for depressive symptoms suggesting there may be a need to intervene earlier for girls than for boys.

Implementation of universal and selective prevention can also be informed by the present findings. Although co-educational interventions are more practical for school-based delivery, the different needs of boys and girls within the same age group suggest that co-educational delivery may not best address the circumstances of adolescent boys and girls. Finally, the high prevalence of body dissatisfaction, and associations with depressive symptoms and engagement with body change behaviors indicate the seriousness of body dissatisfaction. Public health interventions to increase identification of body dissatisfaction and perceptions of its seriousness [e.g., 49] are needed.

This study has several strengths including the large sample size of both girls and boys and use of validated measures of body dissatisfaction and depressive symptoms with established cut-off levels. The study also has several limitations that need to be considered. As mentioned above, the data are cross-sectional, and temporal, or causative conclusions cannot be drawn. Data were also self-report and drawn from a non-representative sample, with low sample sizes in the 14-year-old age groups for both boys and girls, and participants generally resided in high socioeconomic areas, although schools from which participants were recruited reflected a diverse range of socio-educational advantage. The non-representative sample limits generalisability of findings. It is possible that prevalence of levels of body dissatisfaction and depression may

have differed in a sample that provided better representation of cultural and socio-economic diversity and future research is required to examine this contention. Lack of availability of empirically derived thresholds for moderate and low levels of body dissatisfaction that correspond to clinical impairment, or lack thereof, is an important limitation and resulted in a mixed approach whereby thresholds for moderate levels of body dissatisfaction and for clinically significant body dissatisfaction were based on different criteria, namely norms and distress/impairment, respectively. Future research to establish empirically derived thresholds that reflect graded levels of impairment are needed to ensure that consistent cut-off levels can be used to establish prevalence. Measurement of body dissatisfaction for boys also needs to be considered, as the EDE-Q does not provide items that directly pertain to muscularity concerns. In addition, the cut-off for moderate body dissatisfaction were based on mean scores for girls and boys from data collected in 2012 [11], and the cut-off score for boys is quite low. It is possible that body image has become more relevant for boys in the intervening years, and the norms may require updating. Furthermore, provision of norms and cut-off criteria from measures more relevant to muscularity concerns would advance research in this area. Modifications to the assessment measure for depressive symptoms were also required in this study. Due to ethical concerns, one item assessing suicidal ideation had to be omitted for use with this young sample. However, this would likely have had very little impact in this age group, and if anything, would have created a more conservative assessment of depressive symptoms. Ethical considerations also required that provision of height and weight data was not compulsory. Consequently, height and weight data were missing for a substantial proportion of participants which precluded BMI from being included in analyses for the total sample. Further, we preferred not to introduce further bias into the sample by restricting analyses only to the portion of the sample who had provided height and weight data. Finally, while the analytic strategy allowed for examination of standardized odds ratios across categories and their interactions, it did not account for the ordinal nature of data, and models able to better reflect growth in concerns, as opposed to categorical belonging would provide additional understanding.

In summary, findings from this paper have demonstrated concerningly high prevalence of ~~moderate and~~ clinically significant body dissatisfaction among adolescents, particularly for girls, and have shown a very high risk of having possible-, probable-, or major-depressive disorder for adolescents with clinically significant body dissatisfaction. These observations highlight the need for more attention to be given to body dissatisfaction in adolescence in regard to identification, help-seeking, prevention, and early intervention.

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Table 1. Summary statistics for Mann-Whitney U tests examining differences in dietary restraint and strategies to increase muscles between girls and boys with and without clinically significant body dissatisfaction

	Clinically significant body dissatisfaction						
	No		Yes				
	M	*n*	*M*	*n*	U	*z*	*r*
Dietary restraint							
Girls	1.56	288	3.60	72	18736.0	10.62	.56***
Boys	1.40	333	3.40	25	7590.0	6.85	.36***
Strategies to increase muscles							
Girls	8.0	288	16.0	71	15698	7.11	.38***
Boys	10.0	335	17.0	25	6798.5	5.25	.28***

*** $p < .001$

Figure captions

Fig.1 Percent of adolescent boys and girls with moderate and clinically significant body dissatisfaction

Fig.2 Percent of adolescent boys and girls with subthreshold depressive symptoms, possible and probable major depressive episode, and major depressive episode

Fig.3 Percent of adolescent boys and girls with no depressive symptoms, subthreshold depressive symptoms, and possible and probable major depressive episode and major depressive episodes corresponding to low, moderate, and clinically significant body dissatisfaction

Online Resource Captions

Table S.1 Prevalence of body dissatisfaction by age and gender, and for the total sample

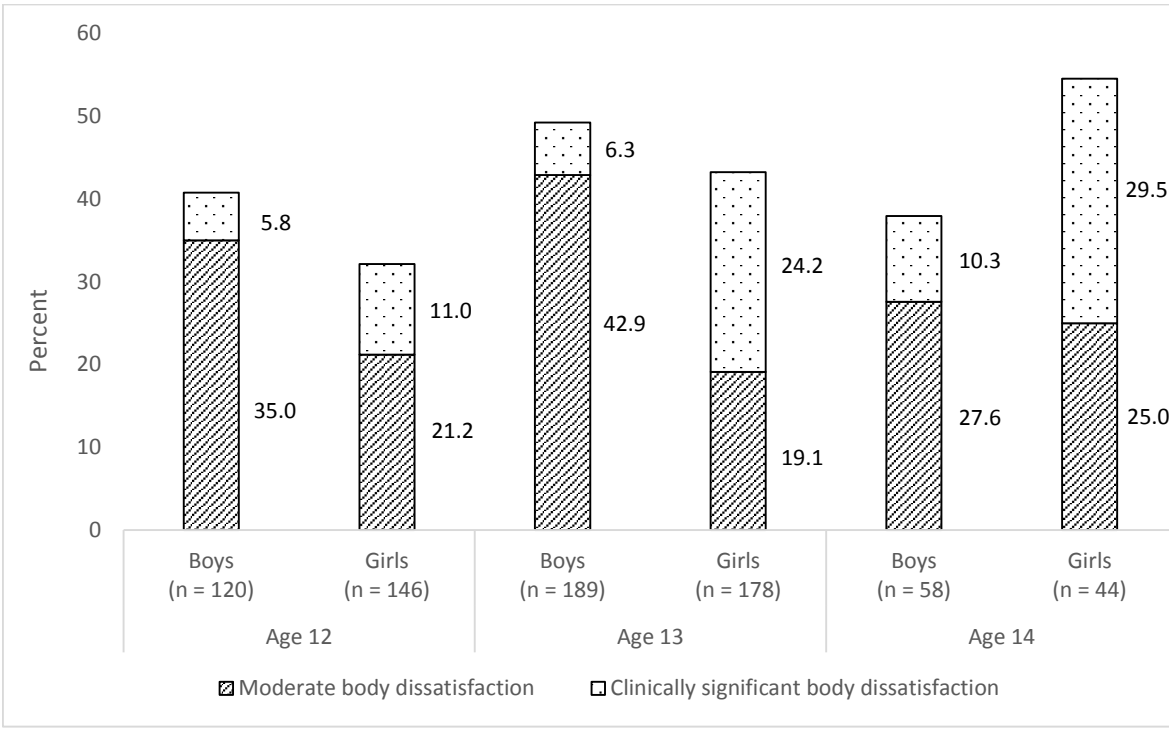
Table S.2 Prevalence of depressive symptoms by age and gender, and for the total sample

Effect Sizes: Odds Ratios for Prevalence of Body Dissatisfaction and Depressive Symptomatology

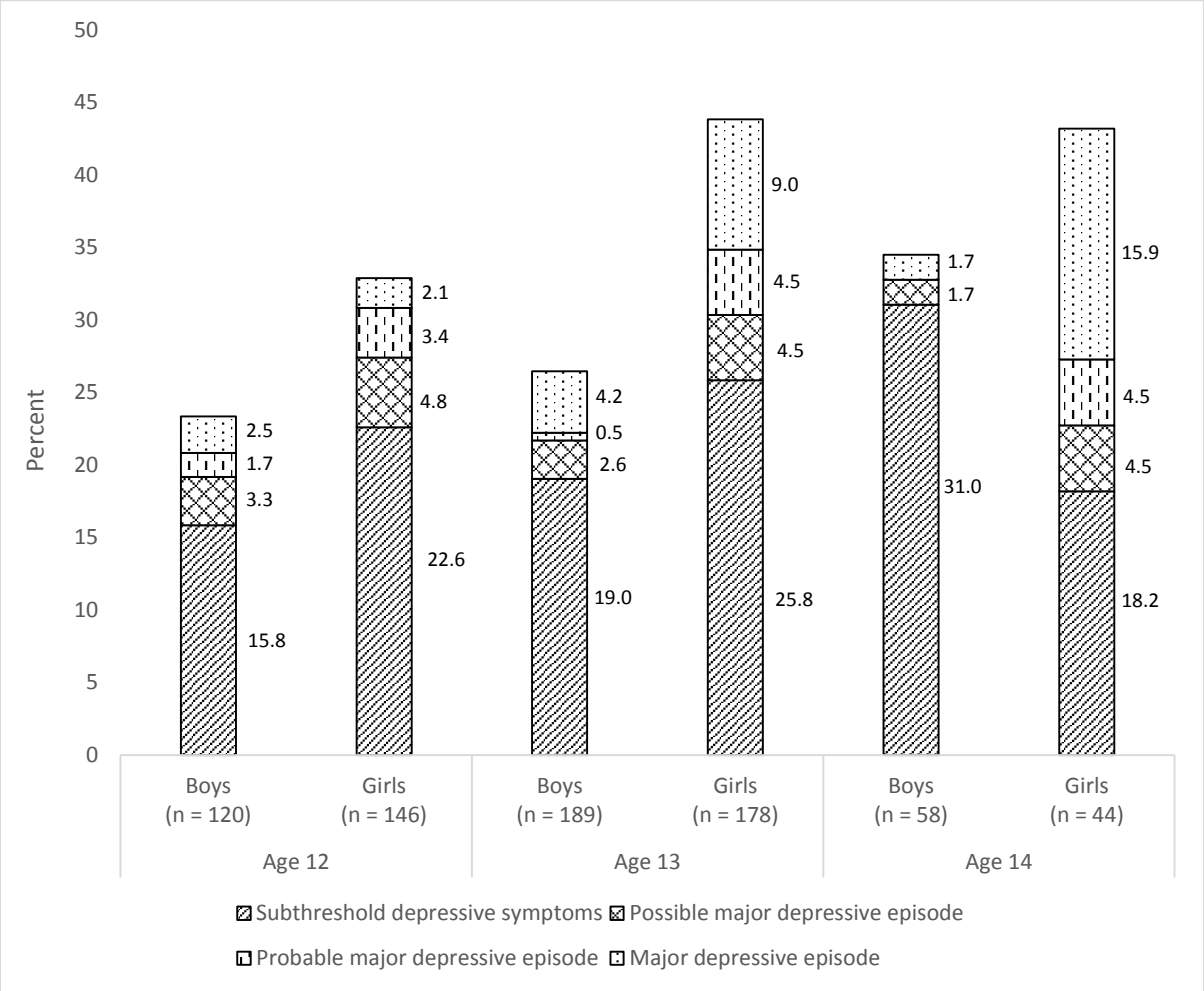
Figure

Prevalence of body dissatisfaction

1



Figure



Note. Percent of boys aged 14 with probable major depressive episode was 0.0

Figure

Prevalence of body dissatisfaction

1