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## Short Communication

# The association between weight perception and weight intention in middle school Appalachian students

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## ABSTRACT

**Objectives:** This study examines the relationships among self-reported body mass index (BMI), weight perception, and weight intention of rural Appalachian middle school students in southwest Virginia where there are higher rates of health disparities influenced by culture, economic distress, and geographic barriers.

**Study design:** This was a cross-sectional observational study.

**Methods:** Sixth and seventh grade students (n = 492) in seven, rural, southwest Appalachian Virginia middle schools participated in this study in the spring of 2015.

**Results:** A relatively high percentage of students classified as overweight/obese based on self-reported BMI (n = 196, 39.8%), yet only 29.3% (n = 144) of students believed themselves to be overweight. More boys (48.3%) than girls (29.8%) were classified based on self-reported BMI to be overweight, yet 44.9% of girls indicated the desire to lose weight.

**Conclusions:** Distinct differences between sexes were found, where more boys were classified as overweight/obese and more girls wanted to lose weight. Previous studies have shown that perspectives of overweight/obese differ in Appalachian communities. These results emphasize the need for both region-specific and sex-specific programs for healthy body weights particularly in rural Appalachian United States.

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## Objective

The purpose of this study was to examine the relationship between self-reported body mass index (BMI), weight

perception, and weight intention of rural Appalachian middle school students in southwest Virginia by gender. Appalachia is a disparate and often isolated region of the United States with high poverty and obesity rates coupled with poor health

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outcomes.<sup>1</sup> Previous work has found that individuals living in Appalachia are less likely to acknowledge that health behaviors are related to obesity which can create barriers to lifestyle changes such as positive dietary behaviors or increasing physical activity.<sup>1</sup> Overweight/obesity rates are particularly high among children in southern Appalachia as well: 46.4% of adolescents in southern Appalachia were classified as overweight/obese relative to the United States average of 29.9% at the time of this study data collection in 2015. Additionally, child obesity rates are higher in rural areas when compared with urban areas, which comprises nearly half of the Appalachian region.<sup>2</sup> Previous studies have found a higher acceptance of high body weight in Appalachian youth, but few studies have examined weight perception and weight intention in Appalachian youth.<sup>3</sup>

## Methods

Sixth and 7th grade students in seven, rural, southwest Appalachian Virginia middle schools with greater than or equal to 50% free/reduced price National School Meal Program eligibility were recruited to participate in this cross-sectional observational study in spring of 2015. To minimize impact on the school day, principals selected approximately two classrooms each of 6th and 7th grade students to complete the survey based on teacher availability and classroom activities that day. Sample size was determined based on previously published work and feasibility of data collection given the isolated nature of the schools included.<sup>4</sup>

Students were administered written questionnaires, which included questions on demographic information, school lunch participation, dietary intake, and weight perception, weight intention, and self-reported weight and height. The dietary intake data are reported elsewhere.<sup>5</sup> Questions concerning weight perception, weight intention, self-reported height, and weight were acquired from the Centers for Disease Control and Prevention (CDC) Youth Risk Behavior Surveillance Survey: ‘How do you describe your weight?’ and ‘Which of the following are you trying to do about your weight?’.<sup>6</sup> Response options for ‘How do you describe your

weight?’ included five choices: ‘very underweight’, ‘slightly overweight’, ‘about the right weight’, ‘slightly overweight’, and ‘very overweight’ (see Table 1).

Weight perceptions were collapsed from five response options into three primary categories: underweight, about the right weight, and overweight. Response options for ‘Which of the following are you trying to do about your weight?’ included four choices: ‘lose weight’, ‘gain weight’, ‘stay the same weight’, and ‘I am not trying to do anything about my weight’. Similarly, weight intention was categorized from four response options into lose weight, stay the same/maintain, and gain weight. BMI was calculated from self-reported height and weight and using the CDC BMI children's tool for schools.<sup>6</sup> Self-reported BMI, hereafter referred to as ‘BMI’, was then classified as underweight ( $\leq 5$ th percentile), normal weight (6th to 85th percentile), or overweight/obese ( $\geq 85$ th percentile). Calculated self-reported BMI was omitted if responses exceeded plausible values and were excluded from this analysis. Of 562 respondents, 12.4% were not valid BMIs or incomplete, leaving 492 viable data points from students who completed the entire survey. Average 6th–7th grade enrollment per school was 106 students (standard deviation [SD] 11.7). Of all students enrolled in 6th or 7th grade at all schools, 33.3% completed viable surveys. In the sample, 54.3% of respondents were boys, average participant age was 12.2 years (range 11–15 years, SD 0.76), and 94.9% white (SD 0.05%). Implied consent was provided by all participants. All data collected were anonymous with no personal, identifying information collected. The Virginia Polytechnic Institute and State University Institutional Review Board approved this study (protocol 13-1136). Statistical significance between BMI, weight perception, and weight intention groups was determined using a Chi-squared analysis on SPSS, version 24.0.0, (IBM Corporation).

## Self-reported weight perceptions and weight intentions

Of 492 viable data points, 39.8% ( $n = 196$ ) of students classified as overweight/obese, whereas 29.2% ( $n = 144$ ) of students

**Table 1 – Self-reported BMI by weight perception and weight intention in Appalachian middle school students by sex.**

|                   |                        | Gender      |             | Total       | $\chi$ (chi) <sup>2</sup> (P) |
|-------------------|------------------------|-------------|-------------|-------------|-------------------------------|
|                   |                        | Boys        | Girls       |             |                               |
| BMI               | Number of participants | 267 (54.3%) | 225 (45.7%) | 492         | 20.159 (P < 0.0001)           |
|                   | Underweight            | 15 (62.5%)  | 9 (37.5%)   | 24 (4.9%)   |                               |
|                   | Normal weight          | 123 (45.2%) | 149 (54.8%) | 272 (55.3%) |                               |
| Weight perception | Overweight/Obese       | 129 (65.8%) | 67 (34.2%)  | 196 (39.8%) | 9.373 (P = 0.009)             |
|                   | Underweight            | 48 (70.6%)  | 20 (29.4%)  | 68 (13.8%)  |                               |
|                   | About the right weight | 140 (50.0%) | 140 (50.0%) | 280 (56.9%) |                               |
| Weight intention  | Overweight             | 79 (54.9%)  | 65 (45.1%)  | 144 (29.3%) | 12.759 (P = 0.002)            |
|                   | Lose weight            | 89 (46.8%)  | 101 (53.2%) | 190 (38.6%) |                               |
|                   | Stay the same/maintain | 152 (56.5%) | 117 (43.5%) | 269 (54.7%) |                               |
|                   | Gain weight            | 26 (78.8%)  | 7 (21.2%)   | 33 (6.7%)   |                               |

BMI, body mass index.

believe themselves to be overweight/obese based on self-reported BMI. Overall, most (55.3%) students' BMI fell into the normal weight category. When students were asked to describe their own weight, 56.9% believed they were the 'correct' weight and 29.3% believed themselves to be overweight. The majority reported the intention to remain the same weight or maintain (54.7%) with 38.6% desiring to lose weight and 6.7% desiring to gain weight.

Of all the participants, about two-thirds of participants (323 of 492) were accurate when comparing BMI to their weight perception ( $\chi^2 = 166.7$ ,  $P < 0.0001$ ), where of 272 students with a BMI classification of normal, most (71.7%) also believed themselves to be about the right weight. Agreement was also shown between perceptions of overweight and BMI classification of overweight/obese, where 196 (39.8%) participants had a BMI classification of overweight/obese and 144 (29.3%) perceived themselves to be overweight/obese. Of the 33 students who reported intending to gain weight, 66.7% were normal weight per BMI, and the highest proportion of the 190 students intending to lose weight was overweight students (63.2%) ( $\chi^2 = 73.8$ ,  $P < 0.0001$ ).

### Comparisons of BMI, weight intention, and weight perceptions by sex

When results were examined by sex, more boys than girls were classified as overweight/obese based on BMI ( $\chi^2 = 20.2$ ,  $P < 0.0001$ ), see Table 1. Despite this, far more boys perceived themselves as underweight ( $\chi^2 = 9.4$ ,  $P = 0.009$ ). More girls than boys wanted to lose weight, and though more boys classified as overweight/obese, more boys intended to gain weight.

### Implications for middle school students in Appalachia

Relative to similar studies in Appalachia, the prevalence of overweight/obese students in this study (39.8%) are similar, but lower than objectively measured overweight/obese (46.4%). Both are higher than the 2015 national average of 29.9%.<sup>6</sup> Previous research has demonstrated cultural differences in Appalachia, where a general acceptance of higher body weight may be more common and therefore support larger weights and create barriers to healthy lifestyles.<sup>3</sup> This is not the first study to show higher BMIs in Appalachian communities relative to non-Appalachian communities.<sup>1</sup> It is likely that obesity rates are actually higher than presented here, as self-reported BMI data tend to lead to underestimations for prevalence of overweight/obese and overestimations of underweight.<sup>7</sup> If this is the case shown with these data, the overweight rates presented here would be greater.

Similar to previous studies, girls were more likely than their male counterparts to believe themselves to be overweight.<sup>7,8</sup> This is especially interesting given that more boys were classified as overweight based on BMI. Far more boys wanted to gain weight (78.8%) relative to girls, where 53.2% of girls wanted to lose weight.

In this study, girls were more likely to have a desire to lose weight, even though more males classified as overweight/

obese than girls. These results could reflect body dissatisfaction tendencies in girls in particular, emphasizing the importance of teaching proper nutrition, within the context of positive body image.

There are limitations to this study. First, the sample size completion rates for the survey were low and question representativeness of Appalachia as a whole, a highly disparate region of the United States. This study utilized only self-reported BMI, a subjective assessment. In similar populations, this assessment has resulted in overestimations of BMI in females and underestimations of BMI in males.<sup>9</sup> Yet this study poses interesting insight into a largely understudied population.

Future research studies should evaluate regionally specific programs to address these weight differences, particularly in light of the differences between male and female perceptions and intentions of weight. Programs should focus on both the promotion of a health body image, while teaching students the importance of healthy weight maintenance by engaging in physical activity and limiting the consumption of foods containing high levels of solid fats and added sugars. It appears that in this region, nutritional standards are not enough to create a substantial change in snacking behavior, calling for additional programming and educational efforts.<sup>5</sup> Further, rural areas often lack access to health care, making possible chronic diseases as a result of obesity more detrimental to overall population health.<sup>10</sup> School wellness policies are required to include goals related to school wellness.<sup>11</sup> School-based health screenings could be an avenue to track progress toward these goals and improve the overall health of rural youth, particularly in remote areas. Screenings can be delivered by school nurses or trained community health advocates as a service to the community.<sup>12</sup> This model provides trusted community members to serve as health advocates, delivering culturally appropriate information to improve health outcomes.<sup>13</sup> It is especially important to consider the urgency of this matter as obesity rates continue to rise, and it is likely that the data presented here are underestimations of obesity rates in this area of Appalachia, where there is a general acceptance of higher than average body weight among youth.<sup>3,6</sup> Higher obesity rates can lead to higher incidence of chronic disease, reduction of life, and higher healthcare costs.<sup>6</sup>

### Author statements

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#### Ethical approval

The Virginia Polytechnic Institute and State University Institutional Review Board approved this study (protocol 13–1136).

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### Competing interests

None declared.

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