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Misperception of Peer Weight Norms and Its Association with Overweight and Underweight Status among Adolescents

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Abstract

Previous research has revealed pervasive misperceptions of peer norms for a variety of behaviors among adolescents such as alcohol use, smoking, and bullying, and that these misperceptions are predictors of personal behavior. Similarly, misperception of peer weight norms may be a pervasive and important risk factor for adolescent weight status. Thus, the comparative association of actual and perceived peer weight norms is examined in relation to personal weight status. Secondary school students in 40 middle and high schools (n=40,328) were surveyed about their perceptions of the peer weight norm for same gender and grade within their school. Perceived norms were compared to aggregate self-reports of weight for these same groups. Overestimation of peer weight norms by more than 5% occurred among 26% of males and 20% of females (by 22 and 16 pounds on average, respectively). Underestimation occurred among 38% of males as well as females (by 16 and 13 pounds on average, respectively). Personal overweight status based on body mass index (BMI) was much more prevalent among respondents who overestimated peer weight norms as was personal underweight status among respondents who underestimated norms. Perception of the peer norm was the strongest predictor of personal BMI among all personal and school variables examined for both male and female students. Thus, reducing misperceived weight norms should be given more attention as a potential avenue for preventing obesity and eating disorders.

Keywords

Perceived norms; Social norms; Misperceptions; BMI; Adolescents; School

Nationally representative studies have documented an alarming prevalence of overweight, obesity, and weight-related behaviors among youth in the USA (Neumark-Sztainer et al., 2012; Ogden, Carroll, Kit, & Flegal, 2012). In addition to well-studied sociodemographic and contextual risk factors, conformity to peer norms may also affect weight status. Adolescents may eat fattening foods, decide to diet, or worry (or not be concerned) about their weight depending upon peer weight-related norms. Furthermore, individual perception

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of peer norms, as distinguished from actual norms, may also be influential in determining weight-related outcomes. Adolescents may engage in weight-related behaviors or accept certain norms if they think that their peers also do the same regardless of whether their peers actually do so. Importantly, researchers have shown the predictive importance of perceived norms for other health issues among youth, and behavior change has been achieved when perceptions are altered through interventions (H. W. Perkins 2003).

Although many adolescents frequently think of themselves as individuals in their actions, research on adolescents and young adults' health and well-being has documented considerable peer influence in regard to risk behaviors such as alcohol, tobacco, and other drug use. Other studies, however, have documented dramatic discrepancies between objective norms (what actually is most prevalent) and subjective norms (what is perceived as most typical) and the potential influence of both actual and perceived norms (Kilmer et al., 2006; Linkenbach & Perkins, 2003; H. W. Perkins, 2007; H. W. Perkins & Craig, 2003; H. W. Perkins, Haines, & Rice, 2005; H. W. Perkins, Meilman, Leichliter, Cashin, & Presley, 1999; H. W. Perkins & Craig, 2012; Wambeam, Canen, Linkenbach, & Otto, 2013). The consistent tendency is to overestimate the extent or prevalence of more permissive attitudes and problem behaviors than exist, even in peer contexts where substance use is actually relatively high. Similarly, adolescent and young adult misperceptions of norms have been identified for other concerns including bullying and victimization (H. W. Perkins, Craig, & Perkins, 2011), sexual behavior (Martens et al., 2006), body image (Clemens, Thombs, Olds, & Gordon, 2008; Grossbard, Neighbors, & Larimer, 2011) and food/drink consumption (Lally, Bartle, & Wardle, 2011; J. M. Perkins, Perkins, & Craig, 2010a).

Many of these studies on actual and perceived social norms have highlighted the perception of peer norms as one of the strongest correlates of personal behavior, and have shown that overestimation of peer problem behavior, and most youth's failure to accurately see healthy peer behavior and attitudes as the norm, to be a "reign of error" producing substantial harmful consequences (H. W. Perkins, 2007; H. W. Perkins et al., 2005; H. W. Perkins & Craig, 2012). Much of the harm done by negative peer influences may occur through the significantly distorted impressions youth develop of peer norms. Moreover, several intervention studies regarding alcohol, tobacco, and other drug use have shown that when adolescents and young adults are exposed to information about actual norms, their misperceptions and actual problem behavior can be reduced (DeJong et al., 2006; Haines, Barker, & Rice, 2003; Haines & Spear, 1996; Hansen & Graham, 1991; Linkenbach & Perkins, 2003; Mattern & Neighbors, 2004; Perkins & Craig, 2006; H. W. Perkins, et al., 2010; Turner, Perkins, & Bauerle, 2008). Elsewhere it is discussed how misperceptions are produced by psychological attribution errors, social conversation and cultural influences (entertainment, advertising, news media) giving undue emphasis on the extremes (H. W. Perkins, 1997, 2002; H. W. Perkins & Craig, 2003).

Norms and Weight Status

Some studies have considered the potential influence of objective norms on personal weight-related behavior. At the school level, one study found that a higher proportion of underweight girls at one's school substantially increased girls' reports of their trying to lose

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weight and higher proportions of overweight girls at the school decreased such reports (Mueller, Pearson, Muller, Frank, & Turner, 2010). Similarly, the school-wide prevalence of girls' dieting was marginally associated with personal unhealthy weight control behavior among average and overweight girls (Eisenberg, Neumark-Sztainer, Story, & Perry, 2005). At the friendship level, some studies have demonstrated that personal dieting, disordered eating and muscle enhancement behaviors were related to friends' behaviors regarding these issues (Eisenberg et al., 2012; Mackey & La Greca, 2007). Another study showed that personal body image concern and unhealthy eating behaviors were associated with friendship group norms (Paxton, Schutz, Wertheim, & Muir, 1999). Finally, a nationally representative study found that friends' average sports, exercise, and food consumption behaviors were associated with personal weight status (Ali, Amialchuk, & Heiland, 2011).

Other studies have examined the potential association of subjective norms (what is perceived as typical) with personal weight concerns. For example, perception of friends' dieting behavior was associated with personal unhealthy weight control behavior among average weight and overweight girls (Eisenberg et al., 2005), and perception of peer weight control behaviors was related to personal weight control behavior (Clemens et al., 2008). Two studies found that individual perception of peers' sugar-sweetened beverage consumption was positively associated with personal intake (Lally et al., 2011; J. M. Perkins et al., 2010a). Finally, only one study to date has specifically investigated misperception of peer weight norms. It demonstrated extensive misperceptions among students in one borough of Greater London in England and also found the perceived norm to be a strong predictor of personal body mass independent of actual local peer norms (J. M. Perkins, Perkins, & Craig, 2010b). Thus, for this study, we hypothesized that across a diverse array of schools and a large number of students in the USA, many adolescents would misperceive their peer weight norm at school and that varying perceptions of the norm would be associated with personal weight status (BMI percentile) independent of any association between the actual peer weight norm and personal weight status.

Methods

Study Sample

Data were drawn between 2004 and 2012 from middle schools and high schools located in Arizona, Colorado, Idaho, Indiana, Iowa, New Jersey, New York, and Maine. Participating schools chose to have their students participate in an anonymous survey of student health, social behaviors, and perceived norms, and contacted the researchers for survey administration. Schools most often surveyed all grades in the school, but in some instances, the survey was administered to only specific grades depending upon local circumstances and the grade range represented in the school. Some schools chose to participate in the survey in multiple years. We refer to a local school sample collected at one time period as a cohort. All cohorts achieving at least a 50% response rate for the student population comprising the targeted grades were selected for this study. Therefore, the sampling frame was comprised of all students (N = 53,759) in the targeted grades 5 to 12 who were part of 78 cohorts across 40 schools (7 in cities, 20 in suburbs, 4 in towns, and 9 in rural areas) in 8 states. Response rates for the survey in these cohorts ranged from 50% to 98% (average response of 77%)

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representing 41,048 students. We further reduced the sample to 40,418 by including only students who were not missing grade or gender designations.

Comparing school cohort characteristics provided by local schools with self-reported demographic characteristics of students completing the survey in each school cohort indicated that the resulting samples provided a good representation of the framed population's basic demographic characteristics. The percent reporting female in the survey of the school cohort differed in absolute value from the institution's records, on average, by only 2.9% (s.d. of differences = 2.0%). Likewise, on average, the absolute value of the difference between the percent representing each grade in the survey for each school cohort and the percent registered in that grade at the local school was only 2.6% (s.d. of differences = 3.0%). Furthermore, the percent identifying as white in the school survey cohort differed in absolute value from the percent white in local school population records by 5.4% (s.d. = 3.2%) on average. (Slightly greater variation for the racial make-up is no doubt introduced by potential ambiguity in self-identification using racial categories.)

Because the focus in this study is upon same-sex weight norms within the student's own school and class year (defined as the student's peer group), we required that more than half of all respondents within each particular gender and grade cohort (GGC) had to have provided personal weight in responding to the survey. This allowed weight norm estimates for each GGC to be calculated representing at least the majority of students in each group, and reduced the number of GGC groups from 534 to 508 GGC groups. It only slightly reduced the overall sample size to 40,328 students representing 78 cohorts from 40 schools. For regression analyses, any case that was missing data on any variable included in the model was excluded.

Surveys

In group settings in school, students were provided with general information about the survey and told that the survey was voluntary and anonymous. The surveys were conducted using an online instrument in most cases (a few schools chose to use a paper version if computer facilities were not available). For the online administration, no personal computing accounts were used. Every student in a specific group session was publicly provided with the same password-protected url address in order to assure students of their anonymity in completing the survey. However, the password was changed between sessions so that no student could access the survey and submit additional responses after leaving the survey session. A monitor was present to make sure that students did not interact while taking the survey. Survey responses were subsequently checked to screen out submissions with intentionally provided erroneous or random answers. The small number of respondents who submitted multiple answers that were clearly outside of possible ranges or who answered sets of questions with contradictory responses was eliminated.

Measures

Students were asked to self-report weight (pounds) and height (feet and inches). BMI percentile was calculated using the Centers for Disease Control (CDC 2011a) growth charts and SAS code program (CDC 2011b). This process also identified 191 implausible BMI

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values, which were recoded as missing (along with the associated weight values). These cases along with respondents who did not provide weight or height data and the few students whose reported weight were recoded as missing in the cleaning process because they indicated their weight as implausibly low (e.g., <50 lb) or implausibly high (e.g., >399 lb) resulted in 11 % of the sample with missing BMI data. Students' weight status was classified according to CDC standards (CDC): Obese (BMI-percentile-for-age ≥ 95), Overweight (85 ≤ BMI percentile < 95), Healthy weight (5 ≤ BMI percentile < 85), and Underweight (BMI percentile <5). An additional category was created—at risk for underweight (5 ≤ BMI percentile < 15) – as used previously (Brener, Eaton, Lowry, & McManus, 2004). We estimated the 'actual peer weight norm' by calculating the average self-reported weight within the respondent's GGC. We also estimated the 'actual peer BMI percentile norm' by calculating the average BMI percentile based on the self-reported weight, height and age of each student within the respondent's GGC. (In calculating this latter measure the respondent's own BMI was excluded because the measure is used to predict personal BMI percentile.)

Individuals' 'perceived peer weight norm' was obtained by asking respondents to indicate what they thought was the average weight (in pounds) for males and females separately in their grade at their school. Although these estimates representing students' perceptions ranged widely, there was no indication that the wildly errant estimates were intentionally provided as erroneous. (Recall the initial creation of each school database of survey responses included "cleaning" or elimination of survey responses in the few cases where erroneous responses were intentionally submitted based on the overall pattern of responses in each submission.) Among legitimate cases, any perception under 50 lb or over 399 lb was recoded as missing given that any of the self-reported weights under 50 or over 399 lb were recoded as missing. Thus, although there remained extreme estimates of the peer weight norm, the values represented the students' perceptions, and as such, they were within the possibility of plausible personal weight range (albeit grossly misperceived as norms).

A race/ethnicity question had students indicate a choice of American Indian/Alaskan Native, Asian, Black/African American, Hispanic/Latino, White/Caucasian, and Other. Because there were very few American Indians/Alaskan Natives, they were collapsed into the Other category. The question about race was not included in the surveys until 2006. Therefore, we included a "Missing" race category in order to retain the students who participated in surveys prior to 2006 (n = 8,852) as well as those who did not respond to the race question in later surveys (n = 1,178). Students were asked to respond (yes/no) regarding participation in school sports and, likewise, regarding school clubs/student government. The dataset did not include individual-level socioeconomic status variables. However, three school-level variables were obtained from the National Center for Education Statistics ("Data Tools," 2008) – the percent of students eligible for free school lunch, percent White/Caucasian, and student body size. The regional location of schools (dichotomized as West/Mountain including Arizona, Colorado, and Idaho versus Midwest/Northeast including Indiana, Iowa, New Jersey, New York, and Maine) was also included.

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Statistical Analyses

The prevalence of type of weight norm perceiver (accurate, over, and under) was shown by calculating misperception (perceived minus actual peer weight norm) and categorizing students as over- or under-estimators if they incorrectly estimated the actual weight norm for their GGC by more than five percent; otherwise, they were classified as accurate. Sensitivity analyses using a threshold of ten percent for accuracy were also conducted. The distribution of students' peer weight norm misperceptions was analyzed and the distribution of personal weight status was examined contingent upon perceptions of the peer weight norm.

Multilevel linear regression analyses were conducted to determine the comparative predictive capability of perceived peer weight norm and actual GGC BMI percentile norm on personal BMI percentile along with the predictive power of other individual variables (race/ethnicity, sport participation, and student activity participation) and school characteristics (percent eligible for free lunch, racial composition, total size and region), stratified by gender. For these analyses, we used the actual GGC BMI percentile norm instead of the actual GGC weight norm because the latter norm was highly correlated with age. (Also, recall the actual BMI percentile norm excluded the respondent's personal BMI percentile from the group average.) Although age per se is not a direct predictor given the use of BMI percentile, we, nevertheless, controlled for grade level effects by employing dummy variables. We also controlled for the year the survey was taken. Finally, for this analysis, the perceived norm and actual norm variables were centered around the overall student mean and the continuous school variables were centered around the overall school mean.

Two-level random intercept models by gender estimated BMI percentile (continuous measure) for a student i studying in school j with a random intercept per school to account for clustering of individual's BMI percentile within schools. Given that some schools participated in the survey on more than one occasion from 2004 to 2010, some students would have had the opportunity to take the survey more than once. Therefore, we also estimated the same models using a reduced sample where only one grade cohort set of responses was included. The results from both samples were comparable. Thus, we present the full sample results, which give the most robust analysis distinguishing variation among cohorts for the multilevel analysis, and add key findings from the reduced-sample analysis to confirm results.

Results

Student and School Characteristics, Weight Profiles, and Perceived Norms

Schools ranged in size from 49 to 1863 students, percent White from 1% to 99%, and percent eligible for free school lunch from 0% to 81%. Twenty-seven schools were in the Midwest/Eastern part of the United States and the other 13 schools were in the Western part of the United States. Table 1 presents respondent characteristics and associated BMI percentile averages. Among students reporting race/ethnicity, the composition included 67% Whites, 5% Blacks, 10% Latino/Hispanics, 7% Asians, and 11% Others. Average BMI percentile ranged from 49.7 to 54.6 among students aged 9 to 20 in grades 5 through 12.

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(There were only 3 students who were 9 years old and 68 students who were 19 or 20 years old after exclusion criteria were applied.)

The prevalence rates of overweight and obese within the entire sample were 12.9% and 8.5% among males, and 7.9% and 3.6% among females. The prevalence rates of at risk for underweight and underweight were 6.5% and 4.5% among males, and 8.2% and 5.1% among females. In terms of perception types, 26% of males and 20% of females overestimated peer weight norms, and 38% of both males and females underestimated peer weight norms. On average, males who overestimated the average weight of their same-sex peers did so by 22 (*s.d.* = 23) pounds and overestimating females did so by 16 (*s.d.* = 18) pounds; likewise, males who underestimated the weight norm did so by 16 (*s.d.* = 10) pounds and underestimating females did so by 13 (*s.d.* = 7) pounds, on average.

Weight Profiles Among Perception Types

Among male students who overestimated the peer weight norm, 37% were either obese or overweight (Figure 1). In contrast, only 19% of males who accurately estimated the peer weight norm and 13% who underestimated the peer norm fell into an overweight category. Among males who underestimated the peer weight norm, 17% were underweight or at risk for underweight whereas only 8% of males who accurately estimated it and 6% who overestimated it were personally in an underweight category.

Among female students who overestimated the actual peer weight norm, 20% were in an overweight category (also Figure 1). In contrast, only 10% of the accurately estimating females and 9% of those underestimating the norm were in an overweight category. Among females who underestimated the actual peer weight norm, 19% were underweight or at risk for underweight whereas only 10% of the accurately estimating females and 8% of the overestimating females were underweight or at risk for underweight.

Thus, overestimating the peer weight norm was associated with about double the likelihood of being overweight or obese for both males and females as compared to accurately estimating or underestimating it. Underestimating the peer weight norm was similarly associated with the likelihood of being underweight. The pattern of results was the same using a threshold of up to ten percent error in estimates to define accurate perceptions. For males who overestimated the peer weight norm at this higher threshold level, 37% were overweight or obese as compared with 16% of others who either accurately or underestimated the norm. Likewise, 20% of females who overestimated the peer weight norm at the higher threshold level were overweight or obese as compared with 9% of others who either accurately or overestimated the norm. Among students who underestimated the same-sex peer weight norm at the higher threshold, 7% of males and 8% of females were underweight as compared to 3% of both males and females who either accurately or underestimated the peer weight norm.

Predicting BMI Percentile

Table 2 presents the results of the gender-stratified multilevel regression analyses predicting BMI percentile. For males, the perceived norm stood out as the single most important variable with a large standardized coefficient of 0.44 predicting personal BMI percentile. In

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contrast, the actual local norm for the males' GGC provided a very small and statistically insignificant standardized coefficient (−0.005). Although some of the other demographic, behavioral, and school variables were associated with BMI percentile, their predictive power was also quite small compared to the predictive power of perceived weight norms. The overall pattern for females in Table 2 was very similar with the perceived norm being a more important predictor (standardized coefficient of 0.29) in comparison with all other independent variables, including the actual norms (insignificant standardized coefficient of 0.02). By looking at the unstandardized coefficient in Table 2 we see that for every one pound difference in the perception of the peer norm, a corresponding difference of 0.4 personal BMI percentile units was predicted for both genders. The intraclass correlation coefficients indicated that the school-level variance contributed approximately 0.8% and 1.2% (males and females respectively), and individual-level variance contributed 99.2% and 98.8% to BMI percentile variance in the adjusted models. Using only data from non-repeated cohorts indicated the same pattern regarding the strength of the perceived norm coefficient: 0.45 for males and 0.29 for females, both significant at the $p < 0.001$ level.

When the analyses are stratified by race, the standardized prediction for the perceived norm remained quite large and significant at $p<0.001$ in each instance. Among females, the perceived norm coefficient was 0.30 for Whites, 0.26 for Blacks, 0.20 for Hispanics and 0.33 for Asians, and for males, the perceived norm coefficient was 0.47 for Whites, 0.36 for Blacks, 0.44 for Hispanics, and 0.47 for Asians. In contrast, the actual norm coefficient was insignificant and quite small (less than 0.09 in absolute value) for all eight racial-gender groups.

For middle school females and males, as well as high school males, the perceived norm coefficient remained equally strong (ranging from 0.25 to 0.31 at $p<0.001$). For high school females, the coefficient for the perceived norm was comparatively less (0.15 with significance at $p<0.001$) than the coefficient in the full model. However, the perceived norm was still much more important than other predictors including the insignificant actual norm (0.03 and $p> 0.05$).

Discussion

The data revealed substantial misperception regarding peer weight norms. Students who overestimated their peer norm were more likely to be overweight or obese and those who underestimated their peer norm were more likely to be at risk for underweight or underweight. Further, results illustrated that the perceived peer weight norm was a far stronger predictor of personal BMI percentile than the actual norm or other individual and contextual predictors. Although previous research has demonstrated the importance of often misperceived peer norms in predicting personal risk behaviors such as substance abuse, only one other study to date has demonstrated this phenomenon specifically with regard to perceived peer weight norms and personal weight (J. M. Perkins, Perkins, & Craig, 2010b). That study conducted in the United Kingdom was limited to 2,100 secondary school students in one neighborhood of London. The current research represents the first US study to demonstrate the relative importance of perceived peer weight norms as compared to actual weight norms and their association with students' personal BMI percentile. Moreover, the

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current study based on more than 40,000 students investigates a wide range of secondary school contexts across diverse regions of the United States. Thus, these results, coupled with the previously cited research, suggest the possibility that peer weight norm misperceptions may contribute significantly to unhealthy weight-related behaviors and perpetuate unhealthy weight across different cultural settings. If so, public health researchers and medical personnel concerned with promoting well-being among students may wish to consider initiatives to reduce misperceptions and provide more realistic views of peer weight norms. The findings of this study suggest that interventions to reduce misperceptions, which have proven successful in other arenas, could be an important prevention initiative regarding concerns about adolescent weight status. Furthermore, it may be useful to similarly explore the pattern of perceived norms and personal weight in other national contexts where related prevention initiatives could be developed.

Limitations

First, the use of self-reported height and weight in this study suggests caution. Some students, especially younger students, may not be able to accurately report their weight and height. Previous studies have found, however, a high degree of correlation (at least 0.87) between self-reported and objectively measured weight-related status (DeJong et al. 2006; Haines and Spear 1996; Hansen and Graham 1991; Linkenbach and Perkins 2003; Neighbors et al. 2004, 2006; Perkins 2003; Perkins and Craig 2006; H.W. Perkins et al. 2010; Turner et al. 2008). One study found that high school students over-reported their height by 2 inches and underreported their weight by 3 pounds (Brener et al., 2003). Therefore, if such a bias exists, in our sample it could be that there are a few more students who are actually overweight or obese and a few less students who are actually underweight than are identified by self-report information. Thus, there could be a few less students overestimating the actual peer weight norm and, in turn, a few more students underestimating it. However, this amount of bias is relatively small compared to the overall extent of students' misperceptions. Moreover, the strong association between variation in perceived peer weight norms and personal BMI percentile would not change. Furthermore, recall that when the threshold for determining accurate perception of the peer weight norm based on self-reports was widened from within 5% of the measured mean to within 10% of the measured mean, the same pattern of results was found regarding the relationship of misperception to personal weight. This expansion of the threshold can also be understood as a way to indirectly look at what would be the pattern of results if objective actual norms for weight were somewhat higher or lower than what the norms calculated from the self-reports demonstrated. Thus, even if the true norms were somewhat different, the fundamental conclusions would not be altered. Nevertheless, we also acknowledge that some bias in who is more likely to inaccurately report their own weight could be associated with the degree to which students misperceive the peer norm, which could, in turn, have some influence on the strength of the correlation between perceived norms and personal BMI percentile based on self-reported weight and height. Thus, future research collecting objective measures of BMI percentile along with perceptions of peer weight norms will be needed to more precisely establish the degree of association.

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Second, although 11% of the sample is missing BMI information, these students are not likely to be all obese or all underweight. Again, the strong positive correlation between perceived norm and personal BMI percentile would most likely remain if all data were available. Third, although there is a likelihood of finding some significant results with such large samples, the size of associations is not small and the perceived norm is the most powerful predictor. Fourth, we cannot generalize from these results to all U.S. secondary students. Yet, we do provide a picture of the pattern of misperceived norms from a wide range of students attending demographically diverse schools in several states. Moreover, a high response rate from the entire population of the schools' target grades provides confidence in the representativeness of results for these schools. In addition, the regression analyses conducted separately for each demographic category (Male, Female, Black, White, Hispanic, Asian, Middle School students, and High School students) indicated a strong and consistent relationship between the same-sex perceived peer weight norm with personal bmi percentile across all demographic categories. Thus, it is not likely that the main findings of this paper would change substantially based on a nationally representative sample with a somewhat different distribution of these demographic characteristics.

Finally, no causal conclusions can be drawn. On the one hand, erroneous perceptions of weight norms may encourage adolescents to engage in unhealthy eating and physical activity patterns leading to unhealthy weight status. On the other hand, one's own weight status may serve as the basis to construct a view of normal weight. Thus, for some people, personal weight may be the cause of accurate or inaccurate perceptions. But even in this latter circumstance, if inaccurate perceptions can be challenged and potentially altered, creating a cognitive dissonance between one's own unhealthy weight and the perceived norm, then this situation may introduce the circumstance needed for adolescents with unhealthy weight to consider changing their consumption behavior and lifestyle. It is perhaps most plausible that causal effects run in both directions. Nevertheless, research on other topics regarding perceived norms and personal behavior has demonstrated a causal effect of perceived norms on personal behavior through longitudinal experiments and case studies that provide normative feedback and campaigns to correct misperceptions as interventions (DeJong et al. 2006; Haines and Spear 1996; Hansen and Graham 1991; Linkenbach and Perkins 2003; Neighbors et al. 2004, 2006; Perkins 2003; Perkins and Craig 2006; H.W. Perkins et al. 2010; Turner et al. 2008). Longitudinal data are needed to more conclusively determine the degree to which perceived weight norms ultimately influence personal BMI percentile.

Future Research

Future research will need to give attention to possible interventions addressing pervasive misperceptions of peer weight norms. Providing messages based on true weight-related norms must be done with care, however, because simply supplying such information does not account for students' height, and many adolescents may not understand the BMI percentile measure. Perhaps more personalized information on peer weight norms (i.e. actual weight norms among same gender and grade with the same height) would be better offered to students in feedback sessions, such as meetings with school nurses or general family doctors or in online interactive programs. Information on whether the actual local norms are healthy should also be provided. One previous study on college women found that providing

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information about misperceived norms about disordered eating was associated with positive changes related to body image and dieting for women who compared themselves to peers (Mutterperl and Sanderson, 2002).

Future research should also explore whether students evaluate their assessment of the perceived norm as overweight, healthy, or underweight because what people think of as a healthy weight (even if it is not) may increasingly support an accepted “culture of obesity.” Indeed, future research should consider whether misperceptions about a variety of weight-related behaviors and attitudes exist, and if so, implement interventions targeting the correction of body image misperceptions (Bergstrom and Neighbors, 2006). A similar question is whether students who are more likely to overestimate their peer weight norm, and are heavy individuals themselves, tend to self-assess their personal weight status as healthy compared to those with more realistic perceptions.

Research is needed on what may create pervasive misperceptions. Misperceptions may reflect, in part, a process of “false consensus” where those who are already underweight or overweight may tend to see most others as similar to themselves to reduce cognitive dissonance about their current state and reduce feelings of pressure to change. Further, misperceptions may be reflecting distorted images provided by media about body weight with repeated types of certain body images altering what people believe to be normal. Misperceived norms may also arise as students disproportionately notice the more extreme examples and begin to think of them as normal.

In addition, misperceptions of what is normative may depend on what parents perceive to be normal and how that is communicated to their children. Similarly, some youth may gain impressions of what is normative from the apparent weight of close friends who in some instances may represent extremes of the weight spectrum. Other research has shown clustering of people by weight status (Christakis and Fowler, 2007), which may indicate how individuals with heavy or underweight friends may change their ideas about weight and subsequently become heavier or underweight. However, the change regarding what they think is normal may stem more from changing their perception of the norm to meet their friends’ perception of the norm rather than changing to look more or act more like their friends. Indeed, the power of close friends’ actual weight norm versus the perceived norm of these friends’ weights needs exploration as does the potential importance of the larger peer group actual and perceived norms in the given context. Data that allow for the determination of causal order and relative effects of these different types of perceptions and actual norms are needed.

However generated and maintained, ultimately these misperceptions may perversely perpetuate or exacerbate risky personal conditions of over- and underweight among youth. If misperceptions are as pervasive among youth in general as the current research suggests, and if situations perceived as real are real in their consequences (Thomas and Thomas, 1928), then misperceived peer weight norms should be given much more research attention as a public health issue. Sensitive efforts to include information on what represents a normative range of healthy weight within sub-classifications of at least age, height, and gender may represent a method to prevent unhealthy weight outcomes and related behaviors.

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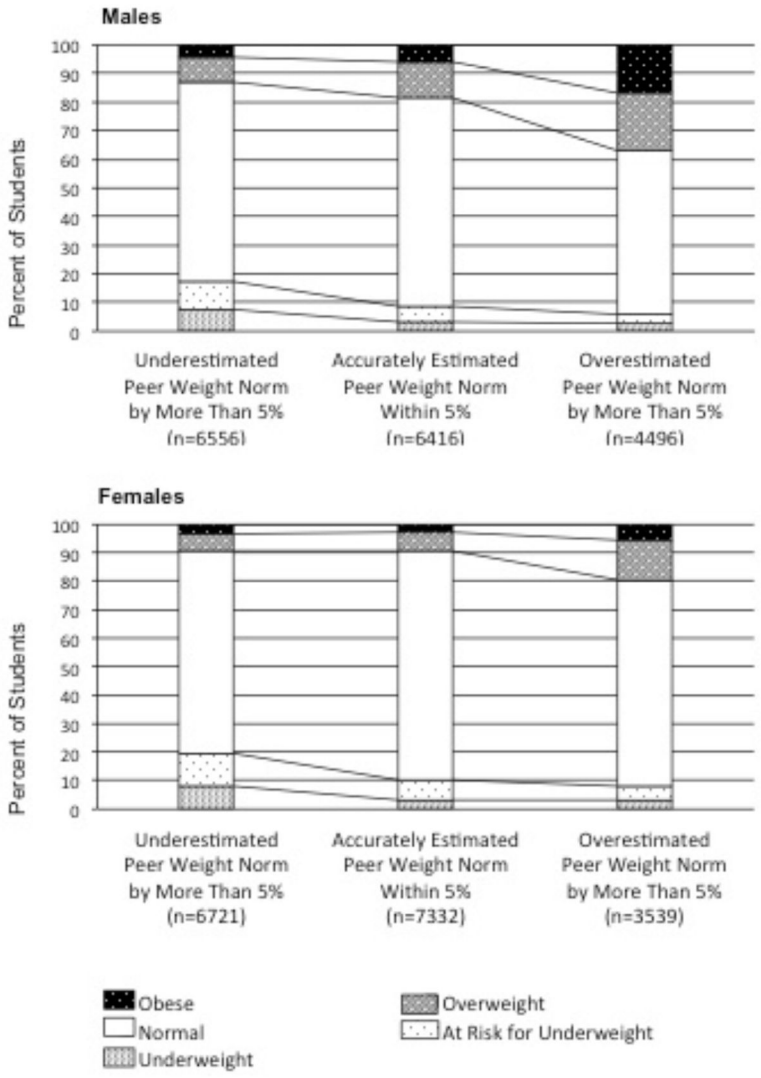

Figure 1.
Personal weight categories by perception of peer weight norm for male and female students.

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Table 1

Student Demographic Characteristics, School Activity Participation, and Associated BMI Percentile Averages

Demographic Variables	n	%	Mean BMI Percentile	SD BMI Percentile
Gender				
Female	19854	49.2	56.4	28.9
Male	20474	50.8	49.4	27.2
Age				
9–11 years old[a]	3605	8.9	49.7	31.2
12–13 years old	10738	26.6	51.1	29.4
14–15 years old	13019	32.3	54.6	27.1
16–17 years old	11227	27.8	53.5	27.5
18–20 years old[a]	1605	4.0	52.6	28.8
Race/Ethnicity[b]				
White	20310	50.4	51.3	27.8
Black	1377	3.4	63.8	27.9
Latino/Hispanic	2979	7.4	59.7	28.7
Asian	2231	5.5	48.7	29.0
Other	3401	8.4	52.0	30.4
Missing	10030	24.9	54.4	27.6
School sport participant				
Yes	21880	54.3	52.7	27.3
No	18448	45.7	53.1	29.5
School club or student government participation				
Yes	11647	28.9	52.3	27.7
No	28681	71.1	53.1	28.6

[a]There were only 3 students who were 9 years old and 68 students who were 19 or 20 years old after exclusion criteria were applied.

[b]The race/ethnicity question was not included in the survey administered at approximately one-third of the schools. In order to retain data from these schools in the analyses, the 'Missing' category was included representing primarily those who were not asked about their race/ethnicity. Excluding this category the percentage distribution of race/ethnicity is as follows: 67% Whites, 5% Blacks, 10% Latino/Hispanics, 7% Asians, and 11% Others.

Note: Percentages for categories may not add to 100% because of a small number of missing values.

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Table 2

Unstandardized (B) and Standardized (β) Mutually Adjusted Multilevel Regression Coefficients Predicting BMI Percentile Among Male (N = 17,462) and Female (N = 17,592) Secondary Students

	Males			Females		
Covariates	**B**	**(SE)**	**β**	**B**	**(SE)**	**β**
Intercept	50.10	(1.83)	0.04	49.26	(1.85)	0.09
Perceived mean weight of gender-grade-cohort[b]	0.41	(0.01)	0.44***	0.40	(0.01)	0.29***
Actual mean weight of gender-grade-cohort[a, b]	−0.02	(0.06)	−0.005	0.07	(0.06)	0.02
Black (vs. White)	6.13	(1.11)	0.04***	9.91	(1.28)	0.06***
Hispanic or Latino (vs. White)	8.39	(0.85)	0.08***	7.88	(0.81)	0.07***
Asian (vs. White)	1.98	(0.97)	0.02*	−3.10	(0.92)	−0.03***
Other (vs. White)	1.72	(0.77)	0.02*	0.52	(0.76)	0.01
Missing (vs. White)	1.44	(2.29)	0.02	2.38	(2.38)	0.04
Participation in athletics	−0.38	(0.44)	−0.01	−2.50	(0.40)	−0.05***
Participation in school club/student government	−1.52	(0.51)	−0.02**	−0.23	(0.45)	−0.004
% of students eligible for free school lunch[c]	0.11	(0.05)	0.04*	0.12	(0.05)	0.05*
% of student body that is White[c]	0.02	(0.03)	0.01	−0.003	(0.04)	−0.002
Total population of school[c]	−0.001	(0.001)	−0.01	−0.001	(0.001)	−0.02
Western/Mountain (vs. Midwest/Northeast)	−6.02	(1.30)	−0.10***	−4.14	(1.38)	−0.08**
Intraclass Correlation Coefficient (complete model)		.008			.012	

*p<.05; **p<.01; ***p<.001

[a]For the regression analyses only, the respondent's personal weight was removed from the calculation of the actual peer weight norm.

[b]The perceived norm and actual norm were centered around the mean of these observations among students for ease of interpreting the average student represent by the intercept.

[c]The continuous school-level variables were centered around the mean of the observations among the schools for ease of interpretation of the average student at the average school as represented by the intercept.