

Alma Mater Studiorum Università di Bologna
Archivio istituzionale della ricerca

Weight-based teasing, body dissatisfaction, and eating restraint: Multilevel investigation among primary schoolchildren

This is the final peer-reviewed author's accepted manuscript (postprint) of the following publication:

Published Version:

Guardabassi, V., Tomasetto, C. (2022). Weight-based teasing, body dissatisfaction, and eating restraint: Multilevel investigation among primary schoolchildren. *HEALTH PSYCHOLOGY*, 41(8), 527-537 [10.1037/hea0001213].

Availability:

This version is available at: <https://hdl.handle.net/11585/892972> since: 2022-08-24

Published:

DOI: <http://doi.org/10.1037/hea0001213>

Terms of use:

Some rights reserved. The terms and conditions for the reuse of this version of the manuscript are specified in the publishing policy. For all terms of use and more information see the publisher's website.

This item was downloaded from IRIS Università di Bologna (<https://cris.unibo.it/>).
When citing, please refer to the published version.

(Article begins on next page)

This is the final accepted manuscript of:

**Guardabassi, V, & Tomasetto, C. Weight-based teasing, body dissatisfaction, and eating restraint: Multilevel investigation among primary schoolchildren. *Health Psychology*.
<https://doi.org/10.1037/hea0001213>**

Manuscript accepted for publication on 05/09/2022.

Please be aware that the present preprint may differ in part from the postprint edited version of the article.

Available at: <https://doi.org/10.1037/hea0001213>

WEIGHT-BASED TEASING IN PRIMARY SCHOOL

**Weight-based teasing, body dissatisfaction, and eating restraint: Multilevel investigation among
primary schoolchildren**

Veronica Guardabassi and Carlo Tomasetto

Department of Psychology, University of Bologna

Author note

We have no conflicts of interest to disclose.

All data, analysis code, and research materials are available at [stable link]

Correspondence concerning this article should be addressed to Veronica Guardabassi,
Department of Psychology - University of Bologna, Piazza Aldo Moro, 90, I-47521 Cesena (FC) –
ITALY, email: veronica.guardabassi@unibo.it

Abstract

Objective. Weight-based teasing is a form of weight-based stigmatization that is especially prevalent in middle childhood, and is associated with undesired health outcomes, including body dissatisfaction and eating restraint. To date, this relation has been mainly investigated at individual level only. This study aimed to examine whether body dissatisfaction and eating restraint among primary schoolchildren relate not only to personal experiences of weight-based teasing, but also to the prevalence of weight-based teasing episodes in the classroom.

Method. A sample of 744 primary schoolchildren (52.04% girls; $M_{\text{age}} = 9.82 \pm 0.95$) from 84 classes completed a survey regarding weight-based teasing, body dissatisfaction and eating restraint.

Parent-reported anthropometric data were used to compute zBMI.

Results. Multilevel structural equation models highlighted that, at the individual level, weight-based teasing is indirectly associated with body dissatisfaction and eating restraint through weight-based teasing. A contextual effect of weight-based teasing at the classroom level also emerged in relation to eating restraint, but not to body dissatisfaction. Specifically, the prevalence of weight-based teasing in the classroom is associated with children's eating restraint — above and beyond personally experienced teasing episodes.

Conclusions. Findings showed that weight-based teasing may be negatively associated with health and psychological wellbeing not only among children who experience weight-based teasing episodes, but also among other members of a class in which weight-based teasing is more prevalent. Programs to reduce weight-based stigma in middle childhood should consider the classroom as a primary target of intervention.

Keywords: weight-based teasing, obesity stigma, body dissatisfaction, eating restraint, classroom

**Weight-based teasing, body dissatisfaction, and eating restraint: Multilevel investigation
among primary schoolchildren**

Obesity is a health condition that affects about 124 million children and adolescents worldwide (NCD Risk Factor Collaboration, 2017), and is associated with low psychological well-being and an increased risk of health problems and mortality (Sharples et al., 2019; Sutin et al., 2015). Obesity is also a highly stigmatized condition (Rubino et al., 2020) and children with obesity are likely to experience stigmatizing behaviors in a variety of forms, including bullying (Janssen et al., 2004), social rejection from peers (De la Haye et al., 2017), and weight-based teasing (Puhl et al., 2013). Above and beyond the consequences of excess weight *per se*, weight-based teasing is associated with negative health outcomes (e.g., weight gain over time; Schvey et al., 2019; Puhl et al., 2020) and reduced psychological well-being (for reviews see Pont et al., 2017; Puhl & Latner, 2007; Puhl & Lessard, 2020), including body dissatisfaction and eating restraint (Madowitz et al., 2012; Menzel et al., 2010).

To date, associations between weight-based teasing, body dissatisfaction and eating restraint have been mostly investigated at the individual level only. However, a firm tenet of influential models of human development, such as the social learning theory (Bandura & McClelland, 1977) or the bioecological model (Bronfenbrenner & Morris, 1998), is that an individual's developmental outcomes should be better understood as the result of constant interactions between individual processes and the contexts in which an individual develops. The classroom environment, for instance, is one of the most influential proximal environments in a child's life (Bronfenbrenner & Ceci, 1994), and is – at the same time - a context in which episodes of weight-based teasing are highly likely to occur (Gray et al., 2009; Puhl et al., 2011). Accordingly, in the present study we adopted a multilevel modeling approach to examine whether body dissatisfaction and eating restraint among primary school children are related not only to personal experiences of weight-based teasing, but also to the prevalence of weight-based teasing episodes at the classroom level.

Body dissatisfaction and eating restraint in middle childhood

Body dissatisfaction and eating restraint may already appear among primary schoolchildren, especially those with obesity (Costa et al., 2016; Vander Wal & Thelen, 2000). Dohnt and Tiggemann (2005; 2006), for example, found evidence of dissatisfaction with one's body size and appearance among European Australian girls aged 5-to-8 years, and large-scale studies document that between 30% and 65% of European American and European preadolescent boys and girls aspire to a thinner body shape (Dion et al., 2016; Evans et al., 2013). Although less prevalent than in adolescence, dysfunctional eating attitudes and unhealthy dietary restraints are also documented from as early as age 5 among European, European Australian, European American and Asian children (Damiano et al., 2015; Evans et al., 2013; Ricciardelli & McCabe, 2001), and are consistently related to body weight in Latino girls aged as young as 9 (Shunk & Birch, 2004).

Body dissatisfaction and eating restraint in middle childhood may represent a risk factor for subsequent unhealthy eating behaviors (Stice, 2002). Prospective associations have been found, for example, between body dissatisfaction in middle childhood and eating disorders in adolescence (e.g., Davison et al., 2003; Evans et al., 2017) in samples of Europeans and European Americans.

Weight-based teasing, body dissatisfaction, and eating restraint: individual level associations

Experiences of weight-based stigmatization are associated with body dissatisfaction among European Australian children (Kostanski & Gullone, 2007) and Latino preadolescent girls (Amaya-Hernández et al., 2019), while unhealthy weight control behavior (Madowitz et al., 2012), eating pathology (Eddy et al., 2007) and weight gain (Juvonen et al., 2017) are found to be related to weight-based teasing among American children. In addition, weight-based teasing prospectively predicts body image concerns and mediates the relation between body weight and body dissatisfaction among pre- and early American adolescents (Sinton et al., 2012). Likewise, Jendryca and Warschburger (2016) found that experience of weight-based stigma predicted body dissatisfaction and restrained eating one year later among European girls aged 6-to-11 years (see also Gardner et al., 2000).

Weight-based teasing, body dissatisfaction, and eating restraint in the classroom context

Environmental influences are strongly implicated in the development of children's body image perception, as well as their eating attitudes and behaviors (Evans et al., 2013; Thompson & Stice, 2001). Therefore, not only personal stigma experiences, but also classroom characteristics should be taken into account. Belonging to a class in which weight-based teasing is frequent leads children to believe that this behavior is legitimate in a given context (Rimal & Read, 2003), and highlights the level of weight bias in the classroom environment (Lampard et al., 2014). Frequent (i.e., normative) weight-based teasing episodes in the classroom may indirectly prompt children to believe that body weight is "policed" (Lessard & Juvonen, 2020). Consequently, children could be more concerned about their own body image, and adopt unhealthy eating behaviors so as not to deviate from normative expectations (Silva et al., 2018; Sutin et al., 2020).

Social discrimination may also have a negative impact on children's health and health-related behaviors also through merely observing other people in the same environment being mistreated (i.e., vicariously; Wofford et al., 2019). For example, living in an American neighborhood with high prevalence of ethnic discrimination is associated with depressive symptoms among African American and Asian youths, over and above children's personally experienced discrimination (Heard-Garris et al., 2018; Simons et al., 2002). Similarly, two longitudinal studies with Asian and African mothers and children who lived in the United Kingdom show that maternal experiences of racial discrimination impact upon children's socio-emotional problems (Bécares et al., 2015) and risk of obesity (Kelly et al., 2013), regardless of children's personal victimization. Interestingly, Eisenberg et al. (2017) found that weight-related teasing toward characters with excess weight in popular TV shows is associated with body dissatisfaction in a multi-ethnic sample of American adolescent girls.

Only a handful of studies have examined the role of contextual levels of weight-related teasing in the school environment. For example, Garnett et al. (2014) showed that students attending 9th–to-12th grades in the US display an increased likelihood of deliberate self-harm and suicide ideation when their school context is characterized by high levels of racial and weight-based

discrimination. Similarly, Juvonen et al. (2019) found that the wellbeing of American adolescents with high body weight is reduced in schools in which victimization is strongly associated with body weight. Notably, by adopting a multilevel analytical approach, Lampard and colleagues (2014) showed that a higher prevalence of weight-based teasing at the school level is associated with lower self-esteem and greater body dissatisfaction in adolescent American girls, and with depression in American boys, even if personally experienced weight-based teasing episodes do not occur.

The present study

The present study aimed at examining the role of weight-based teasing in the relations between excess weight, body dissatisfaction and eating restraint. By taking into account both the individual and the classroom levels of analysis, this study expanded previous research in several directions. First, despite the fact that middle childhood is a critical period with frequent episodes of weight-based teasing (Puhl et al., 2011) and with important lifelong implications (Eccles, 1999), there is a paucity of studies in literature focusing on primary schoolchildren. Second, consistent evidence suggests that weight-based teasing is a key mediating mechanism to explain the relation between excess weight and its psychological outcomes (Bang et al., 2012; Guardabassi et al., 2018; Kohlmann et al., 2018; Zuba & Warschburger, 2017). Thus, it was hypothesized that body weight is indirectly associated with body dissatisfaction, on the one hand, and eating restraint, on the other, through weight-based teasing. Third, to better understand how social environments can contribute to the impact of weight stigma (see Lessard & Juvonen, 2020), and to account for the non-independence among children nested within their classroom contexts, this study focused on the classroom as a key environmental level of analysis. For instance, as Italian schoolchildren spend between 24 and 40 hours per week with the same classmates, the classroom represents a relevant context for their development (Bronfenbrenner & Ceci, 1994). Therefore, a multilevel modeling approach was adopted to disentangle the indirect effect of body weight through weight-based teasing not only at the individual (body dissatisfaction H1a; eating restraint H1b), but also at the classroom level (body dissatisfaction H2a; eating restraint H2b). Fourth, and most important, the study aimed at

determining the contextual effect of weight-based teasing at the classroom level on individual students' outcomes, over and above personally experienced teasing episodes. In other terms, the study tested the hypothesis that classroom levels of weight-based stigmatization are directly associated with children's body dissatisfaction (H3a) and eating restraint (H3b), regardless of their personal experience of weight-based teasing.

In addition to previous studies, this work adopted a latent approach to model weight-based teasing frequency at the classroom level (Preacher et al., 2010). Computing contextual-level variables as mere aggregates (i.e., sums or averages) of individual's observed responses, in fact, may result in biased estimates of the effects at the upper level of analysis. This may be especially troublesome in the case of mediation models (Lüdtke et al., 2008), because measurement and sampling error at the upper level of analysis (in this case, at the classroom level; Morin et al., 2014) cannot be controlled. To overcome these limitations, the procedure outlined by Preacher et al. (2010) was adopted to decompose the variance of all observed indicators into two individual-level (L1) and classroom-level (L2) latent variables.

Method

Transparency and Openness

In this article, we report how we collected and analysed data according to the APA Journal Article Reporting Standards (JARS) for correlational studies. All data, analysis code, and research materials are available at [*stable link to repository*]. Data were analyzed using Mplus 8.4 software (Muthén & Muthén, 2019).

Participants and procedure

Data were collected as part of a larger investigation on body weight and psychological functioning in middle childhood. Study procedures were approved by the Ethical Committee of the University of Bologna, and participation was subjected to schools' approval and to parents' signed consent.

A sample of 1292 children attending the 3th, 4th, and 5th grade of primary school completed a

paper-and-pencil questionnaire in their classroom during the regular school time, and received a questionnaire for parents to be returned to schools in sealed envelopes. Parents' questionnaires were used to obtain children's anthropometric measurements. As 297 parents failed to provide information to compute children's standardized BMI (i.e., body weight, height, and date of birth) these participants could not be included in subsequent analyses. In addition, in one of the schools involved in the study, the principal did not allow items regarding eating restraint to be included. In order to conduct all the analyses on the same sample, children from this school were not included in the final dataset. Thus, the analyses were carried out on a sample consisting of 744 children (52.04% girls) from 84 classes ($M_{\text{cluster size}} = 8.607$) situated in different Italian regions. Specifically, 360 children (48.4%) lived in Northern Italy, 99 children in regions located in Central Italy (13.3%), and 285 children in Southern Italy (38.3%). The majority of children were born in Italy ($n = 731$; 98.3%), 8 in other European countries (1.1%), 4 in Asia (0.5%) and 1 in Africa (0.1%). The parents' birthplace had a similar distribution. The majority of mothers ($n = 666$; 89.5%) and fathers ($n = 661$; 88.8%) were born in Italy. The remaining parents reported other countries of birth in Europe (45 mothers, 6%, and 26 fathers, 3.5%), Africa (9 mothers, 1.2%, and 11 fathers, 1.5%), America (6 mothers, 0.8%, and 1 father, 0.1%), and Asia (7 mother, 0.9%, and 7 father, 0.9%).

Measures

Parents' level of education

Parents' level of education was indexed as an indirect measure of social economic status (Hoff & Laursen, 2019), and was operationalized as the number of years of education attended to the highest earned degree. Specifically, values ranged from 5 (elementary school) to 21 (doctoral degree).

Body weight

Based on children's age and sex and on parent-reported measures of children's weight and height, an age- and sex-adjusted standardized BMI (zBMI) was computed according to the World Health Organization [WHO] computation formula (Onis et al., 2007). Based on zBMI, children below

the 5th percentile are considered as underweight, those between the 5th and the 84th percentile as average weight, those between the 85th and the 94th percentile as overweight, and those above the 95th percentile as with obesity.

Weight-based teasing

Six items regarding personal experiences of weight-related teasing (e.g. “People called you names like ‘Fatso’”) from the Perception of Teasing Scale (POTS; Thompson et al., 1995) were used to assess children’s experiences of weight-based teasing. Children reported how often each of the listed experiences occurred with their classmates on a 5-point Likert scale, ranging from *never* (1) to *very often* (5). The scale had a satisfactory reliability ($\alpha = .749$).

Body dissatisfaction

Children’s Body Image Scale (Truby & Paxton, 2002) was used to assess children’s body image dissatisfaction. Participants were presented with 7 pictures of a White child with levels of adiposity ranging from *underweight* (1) to *obese* (7). The children’s task was to point at the silhouette which best represented their actual body size, and at the one they would like to resemble. The level of body dissatisfaction was calculated as the difference between the two choices (i.e., actual minus ideal), with higher values indicating more dissatisfaction.

Eating restraint

To assess eating restraint behaviors, 9 items from the dieting subscale of the Children Eating Attitudes Test 26 (Ch-EAT-26; Smolak & Levine, 1994) were used. Children indicated how often their behavior reflected the one indicated in the item (e.g., “Eat diet foods”) on a scale from *never* (0) to *always* (5). The reliability for this scale was satisfactory ($\alpha = .861$).

Data Analyses

Two different models were performed which included zBMI and weight-based teasing as direct predictors of body dissatisfaction (Model a) and eating restraint (Model b). In addition, indirect relations between zBMI and the specified outcomes through weight-based teasing were also estimated. Parameter estimates for the two models were computed before and after accounting for

children's age and gender and for parental education. The Full Information Maximum Likelihood (FIML) approach was used to handle missing data. The Maximum Likelihood Robust (MLR) estimation method was used to account for non-normally distributed observations. A multilevel structural equation modelling approach was used to test our hypotheses, with the individual participant (L1) and the classroom (L2) as the two levels of analysis. All variables were measured at the individual level, and were treated as manifest indicators of the corresponding latent construct at both the individual and the classroom level (1-1-1 model; Preacher et al., 2010). In the first step of analysis, an intercept-only model (i.e., with no individual- nor classroom-level predictors) was estimated, in order to ascertain variability across classrooms for each outcome. In detail, the Intraclass Correlation Coefficient (ICC) was used to determine the proportion of variability in the outcome variables that was accounted for by children's being nested within classrooms, and the Design Effect index (DEF; Muthén & Satorra, 1995) to determine the effect of ignoring data clustering. In the second step, two random-intercept models were estimated, one for body image dissatisfaction and one for eating restraint. In each model, the variability of the outcomes across classrooms was freely estimated, and direct and indirect paths among the model variables were computed at both levels of analysis. At this stage, the contextual direct effect of weight-based teasing at the classroom level (L2) on individual-level body dissatisfaction and eating restraint (L1) was also estimated by subtracting the effect of weight-based teasing at the individual level from the effect of weight-based teasing at the classroom level (Nagengast & Marsh, 2012).

Results

Preliminary analyses

Descriptive statistics and zero-order correlations are reported in Table 1. Participants' age ranged between 8 and 12 years ($M_{age} = 9.82$ years; $SD = 0.95$). Children's zBMI had a mean value equal to 0.37 ($SD=1.43$) with 14.2% children identified as underweight, 387 (52%) average weight, 166 (22.3%) overweight, and 85 (11.4%) with obesity. Mothers' average level of education ($n = 714$) was 13.50 years ($SD= 3.80$), whereas fathers' level of education ($n = 701$) was on average 12.44 years

($SD = 3.65$). Bivariate associations of medium-to-large size are evident among zBMI, weight-based teasing, body dissatisfaction and eating restraint (r_s between .28 and .49). As evident from Table 1, distributions of the study variables and bivariate associations were strikingly similar in size and direction among boys and girls. No significant difference based on gender emerged for weight-based teasing, $t(738) = 1.690$; $p = .091$, body dissatisfaction, $t(721) = 0.335$; $p = .738$, and eating restraint, $t(707) = 0.316$; $p = .752$. The rate of missingness was fairly low across variables, ranging from 0.5 % (weight-based teasing) to 4.8 % (eating restraint).

Multilevel model of body dissatisfaction

Results of the intercept only model revealed that variability in body dissatisfaction was significantly different from zero at the individual level ($\sigma^2 = 1.853$ [95%CI: 1.597/2.109]), but not at the classroom level ($\tau_{00}^2 = 0.022$ [95%CI: -0.044/0.087]). The ICC was therefore very low (ICC = .011), as well as the DEF index (DEF = 1.090). Although the ICC value lower than .05 and DEF values lower than 2 are commonly considered as indicative of negligible clustering effects, it has been suggested that even a proportion of variance as small as 1% at the L2 level may result in effects that are hidden at the individual level (Bliese, 1998; Lai & Kwok, 2014). We proceeded therefore to estimate the random-intercept model to test our hypothesis at both levels of analysis. The model displayed an adequate fit to the data according to the conventional indices ($\chi^2_{(3)} = 0.434$, $p = 0.933$; CFI = 1.000; NNFI = 1.000; RMSEA = 0.000; $SMSR_{L1} = 0.001$; $SMSR_{L2} = 0.081$).

At the L1 level, estimates from the random-intercept model (see Table 2) indicate that body dissatisfaction was higher among children with higher zBMI, and that personally experienced weight-based teasing episodes were associated with increased body dissatisfaction. As expected (H1a), higher zBMI was associated with more frequent weight-based teasing experiences and, indirectly, with higher body dissatisfaction. Such an indirect effect accounts for approximately 19% of the total observed effect of zBMI on body dissatisfaction. At the L2 level, no association emerged between classroom average zBMI and the prevalence of weight-based teasing, nor between the classroom-level estimates of weight-based teasing and body dissatisfaction (H2a). The contextual effect of

weight-based teasing at the classroom level on body dissatisfaction at the individual level (H3a) was also not significant. A significant association emerged between zBMI and classroom-level body dissatisfaction, meaning that in classrooms where the average BMI was higher, the average level of body dissatisfaction among students was also proportionally higher (see Figure 1). The overall pattern of results did not change when participants' age and gender and parental education were included as covariates at the L1 level, and gender ratio in the classroom, grade, and parental education were included as covariates at the L2 level (see Supplemental Table A1).

Multilevel model of eating restraint behaviors

Variability in children's scores was significantly different from zero at the individual level ($\sigma^2 = 0.733$ [95%CI: 0.609/0.856]), as expected, but also at the classroom level ($\tau_{00}^2 = 0.216$ [95%CI: 0.131/0.301]). The ICC value (ICC = .282 [95%CI: .027/.113]) indicated that more than 28% of the variability in children's eating restraint behaviors was related to classroom-level factors. The DEF index (DEF = 2.786), also confirmed that ignoring children being nested within classrooms resulted in biased estimates of the model parameters. The random-intercept model displayed an adequate fit to the data ($\chi^2_{(3)} = 0.855$, $p = 0.836$; CFI = 1.000; NNFI = 1.000; RMSEA = 0.000; SMSR_{L1} = 0.000; SMSR_{L2} = 0.054).

Parameter estimates (Table 2) indicated that at the L1 level, children's zBMI was related to children's reports of eating restraint, as well as to experienced weight-based teasing. As predicted (H1b), zBMI had an indirect effect on eating restraint behaviors through weight-based teasing experiences. The indirect path through weight-based teasing experiences accounted for 35% of the total observed relation between zBMI and eating restraint. A significant between-classes effect also emerged, indicating that overall levels of eating restraint behaviors at the L2 level were related to the overall classroom-level frequency of weight-based teasing (H2b). As predicted (H3b), the contextual effect linking classroom-level weight-based teasing with individual levels of eating restraint was also significant. This means that children belonging to classes in which weight-based teasing episodes were more prevalent display higher levels of eating restraint behaviours, even after

accounting for the contribution of personally experienced episodes of teasing (see Figure 1). The pattern of results did not change when age, gender, and parental education were included as covariates in the model (see Supplemental Table A2).

Discussion

The present study investigated the role of weight-based teasing episodes in the classroom in relation to body dissatisfaction and eating restraint in middle childhood.

Consistent with previous evidence, personal experiences of weight-based teasing were associated with body dissatisfaction (Amaya-Hernández et al., 2019; Jendryca & Warschburger, 2016; Juvonen et al., 2017; Kostanski & Gullone, 2007; Rosewall et al., 2019; Sinton et al., 2012), on the one hand, and eating restraint (Eddy et al., 2007; Gardner et al., 2000; Madowitz et al., 2012; Rosewall et al., 2019), on the other. Moreover, weight-based teasing experiences accounted for approximately 19% of the association between BMI and body dissatisfaction, and up to 35% of the link between BMI and eating restraint. Thus, experiencing weight-based teasing during childhood not only adds to the negative effects of excess weight *per se*, but also acts a key mechanism underlying the associations between excess weight and its dysfunctional correlates (Bang et al., 2012; Guardabassi et al., 2018; Kohlmann et al., 2018; Zuba & Warschburger, 2017).

By adopting a multilevel modeling approach, however, we found that the patterns of direct and indirect relations linking body weight and weight-based teasing with body dissatisfaction and eating restraint were not the same at the classroom level. For instance, the frequency of weight-based teasing in the classroom environment had no additional effect on children's body dissatisfaction. A possible explanation is that peer influences on body dissatisfaction may emerge later in adolescence, when teenagers become more sensitive to peer group relationships (Blakemore & Mills, 2014). Indeed, although peer experiences play a critical role in the development of adolescent body dissatisfaction (Lawler & Nixon, 2011), longitudinal research based on the tripartite influence model by Thompson et al. (1999) suggests that media internalization precedes the influence of social comparison with peers as a source of body image dissatisfaction (Rodgers et al.,

2015). It could therefore be plausible that, at least in middle childhood, cultural influences on body image are so widespread “in the air” (Steele, 1997) and deeply internalized (Klaczynski et al., 2004), that exposure to higher or lower levels of weight-based stigmatization in proximal environments, such as the classroom, does not add any meaningful contribution to children’s body dissatisfaction. To the contrary, a contextual effect emerged in relation to children’s eating restraint, indicating that eating restraint behaviors at the individual level were associated with the overall frequency of weight-based teasing at the classroom level, above and beyond children’s reports of personally experienced episodes of teasing. This novel finding suggests that attending classrooms in which teasing episodes are more prevalent than in others has a significant impact in children’s eating restraint. Thus, it is not only the children targeted by teasing episodes who are more exposed to the negative effects of weight-based teasing, but all children belonging to those classes. These findings are important and parallel those from studies with other stigmatized social groups (e.g., ethnic minorities), which also suggest that a derogatory climate in one’s neighborhood or family environment may indirectly (i.e., vicariously) worsen children’s emotional well-being (Bécares et al., 2015; Heard-Garris et al., 2018; Kelly et al., 2014; McFarland et al., 2018; Simons et al., 2002), regardless of personal experiences of discrimination. Other mechanisms may also account for the observed contextual effect. Motivation to be accepted by peers may prompt children to conform to the group body-weight norms, which are made salient by the frequency of weight-based teasing episodes in the classroom (Lampard et al., 2014). Research suggests that the desire to avoid bullying and to be accepted by peers may motivate adolescents to lose weight through unhealthy eating behaviors, rather than through healthy eating habits (Silva et al., 2018; Sutin et al., 2020). Adopting restrained eating habits may represent a dysfunctional behavioral strategy to achieve this goal from as early as middle childhood.

Limitations and future directions

There are limitations in this research that should be discussed. First, the cross-sectional design of the study does not allow drawing conclusions about causality. However, both theoretical

accounts (e.g., the Cyclic Obesity/Weight-Based Stigma model; Tomiyama, 2014) and empirical evidence from longitudinal and experimental studies clarify that weight-based stigma worsens health and psychological well-being (Vartanian & Porter, 2016) as well as disordered eating behavior (Lowe et al., 2019) over time. Second, weight-based teasing was the unique index of weight-based stigmatizing behaviors used in this study. More severe forms of victimization toward children with excess weight, including social isolation, physical aggressions or cyber bullying, are also highly prevalent (Janssen et al., 2004; Puhl et al., 2011), and should be taken into account in future studies. Third, children's weight and height were not objectively measured, as the children's zBMI was computed based on parent-reported children body measurement. A subsample of children in this study ($n = 95$), however, were also involved in another investigation in which their weight and height were directly measured, and a strong correlation emerged between the instrumental and parent-reported measures of zBMI, $r(95) = .761, p = .000$. Thus, it appears that parents were sufficiently reliable informants on children's weight status (see also Weden et al., 2013). Fourth, no information about children's family socioeconomic status – except for parental level of education – was available for analysis, despite the fact that socioeconomic background can have a significant impact on children's wellbeing (Bradley & Corwyn, 2002). However, educational level may be regarded as a key component of a family's socioeconomic status (Hoff & Laursen, 2019). Lastly, the number of participants in this study did not allow performing multilevel analyses for girls and boys separately. Despite previous findings suggests that body dissatisfaction and eating restraint may differ according to gender (Girard et al., 2018; Jendryca and Warschburger, 2016; Papp et al., 2013; Thompson et al., 1999; Tylka, 2011), evidence on gender differences in children's body image, eating behaviors and weight-based teasing is nonetheless inconsistent in the literature (e.g. Austin et al., 2009; Calzo et al. 2012; Malet et al., 2013; Puhl & Lessard, 2020; Ricciardelli & McCabe, 2001; Schwartz & Brownell, 2004), and no significant gender and age difference emerged in the current study in terms of body dissatisfaction and eating restraint.

Future studies could overcome these limitations and expand research in new directions.

New research could elucidate the role of larger social environments beyond the classroom, such as the neighbourhood, which also represent relational contexts in which children may experience weight-based stigmatization both directly and vicariously. Multilevel approaches may also be adopted to expand the comprehension of other important correlates of weight-based stigma beyond body dissatisfaction and eating restraint. In addition, studies with larger samples may help clarify whether weight-based teasing contributes to undesired health outcomes through the same mechanism among boys and girls, and among children living in different cultural contexts.

Our findings also entail implications for health promotion in the school context. Research shows, in fact, that students often remain passive bystanders (Puhl et al. 2011) and teachers are less likely to intervene (Peterson et al., 2012) when witnessing episodes of weight-based teasing, as compared to other forms of students' victimization. Schools should therefore increase their efforts to promote awareness of weight-based stigma and increase the likelihood that both students and teachers intervene when weight-based teasing occurs. Lessard and Puhl (2021), for instance, found lower levels of weight-related bias among teachers and principals in schools whose anti-bullying policies explicitly acknowledged body weight as a possible cause for students' victimization. At the same time, schools should take care not to exacerbate weight-related stigma among their personnel and students through health promotion policies (Kenney et al., 2017) that focus on obesity prevention in ways that emphasize personal responsibility for weight maintenance (i.e., reducing calories intake and increasing calories expenditure). Finally, as recommended by the first international consensus statement for ending the stigma of obesity (Rubino et al., 2020), initiatives to eradicate weight-based stigmatization should be promoted at multiple levels, as interventions in classrooms and schools would be ineffective if weight-based stigmatizing discourse continued to be accepted in society at large.

In conclusion, the study showed that weight-based teasing may affect – directly or vicariously – all children attending the same classroom and suggests that psychological interventions should focus on the classroom environment as the core target of programs to address weight-based

teasing and to obtain beneficial effects for children with and without excess weight.

References

- Alleva, J. M., Karos, K., Meadows, A., Waldén, M. I., Stutterheim, S. E., Lissandrello, F., & Atkinson, M. J. (2021). "What can her body do?" Reducing weight stigma by appreciating another person's body functionality. *PloS one*, 16(5), e0251507.
<https://doi.org/10.1371/journal.pone.0251507>
- Amaya-Hernández, A., Ortega-Luyando, M., Bautista-Díaz, M. L., Alvarez-Rayón, G. L., & Mancilla-Díaz, J. M. (2019). Children with obesity: peer influence as a predictor of body dissatisfaction. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 24(1), 121-127.
<https://doi.org/10.1007/s40519-017-0374-0>
- Austin, S. B., Haines, J., & Veugelers, P. J. (2009). Body satisfaction and body weight: gender differences and sociodemographic determinants. *BMC public health*, 9(1), 1-7.
<https://doi.org/10.1186/1471-2458-9-313>
- Bandura, A., & McClelland, D. C. (1977). *Social learning theory* (Vol. 1). Prentice Hall: Englewood Cliffs.
- Bang, K. S., Chae, S. M., Hyun, M. S., Nam, H. K., Kim, J. S., & Park, K. H. (2012). The mediating effects of perceived parental teasing on relations of body mass index to depression and self-perception of physical appearance and global self-worth in children. *Journal of Advanced Nursing*, 68(12), 2646-2653. <https://doi.org/10.1111/j.1365-2648.2012.05963.x>
- Bécares, L., Nazroo, J., & Kelly, Y. (2015). A longitudinal examination of maternal, family, and area-level experiences of racism on children's socioemotional development: Patterns and possible explanations. *Social Science & Medicine*, 142, 128-135.
<https://doi.org/10.1016/j.socscimed.2015.08.025>
- Blakemore, S. J., & Mills, K. L. (2014). Is adolescence a sensitive period for sociocultural processing?. *Annual review of psychology*, 65, 187-207. <https://doi.org/10.1146/annurev-psych-010213-115202>
- Bliese, P. D. (1998). Group size, ICC values, and group-level correlations: A simulation. *Organizational*

- Research Methods*, 1(4), 355-373. <https://doi.org/10.1177/109442819814001>
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53(1), 371-399. <https://doi.org/10.1146/annurev.psych.53.100901.135233>
- Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nuture reconceptualized in developmental perspective: A bioecological model. *Psychological review*, 101(4), 568-596. <https://doi.org/10.1037/0033-295X.101.4.568>
- Bronfenbrenner, U., & Morris, P. A. (1998). *The ecology of developmental processes*. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (p. 993–1028). John Wiley & Sons Inc.
- Calzo, J. P., Sonnevile, K. R., Haines, J., Blood, E. A., Field, A. E., & Austin, S. B. (2012). The development of associations among body mass index, body dissatisfaction, and weight and shape concern in adolescent boys and girls. *Journal of Adolescent Health*, 51(5), 517-523. <https://doi.org/10.1016/j.jadohealth.2012.02.021>
- Costa, L. D. C. F., Silva, D. A. S., dos Santos Alvarenga, M., & de Vasconcelos, F. D. A. G. (2016). Association between body image dissatisfaction and obesity among schoolchildren aged 7–10 years. *Physiology & Behavior*, 160, 6-11. <https://doi.org/10.1016/j.physbeh.2016.03.022>
- Damiano, S. J., Paxton, S. J., Wertheim, E. H., McLean, S. A., Gregg, K. J. (2015). Dietary restraint of 5-year-old girls: Associations with internalization of the thin ideal and maternal, media, and peer influences. *International Journal of Eating Disorders*, 48, 1166-1169. <https://doi.org/10.1002/eat.22432>
- Davison, K. K., Markey, C. N., & Birch, L. L. (2003). A longitudinal examination of patterns in girls' weight concerns and body dissatisfaction from ages 5 to 9 years. *International Journal of eating disorders*, 33(3), 320-332. <https://doi.org/10.1002/eat.10142>
- De La Haye, K., Dijkstra, J. K., Lubbers, M. J., Van Rijsewijk, L., & Stolk, R. (2017). The dual role of friendship and antipathy relations in the marginalization of overweight children in their peer networks: The TRAILS Study. *PloS One*, 12(6). <https://doi.org/10.1371/journal.pone.0178130>

- Dion, J., Hains, J., Vacho, P., Plouffe, J., Laberge, L., Perron, M., . . . Leone, M. (2016). Correlates of body dissatisfaction in children. *The Journal of Pediatrics*, 171, 202-207.
<https://doi.org/10.1016/j.jpeds.2015.12.045>
- Dohnt, H. K., & Tiggemann, M. (2005). Peer influences on body dissatisfaction and dieting awareness in young girls. *British Journal of Developmental Psychology*, 23(1), 103-116.
<https://doi.org/10.1348/026151004X20658>
- Dohnt, H. K., & Tiggemann, M. (2006). Body image concerns in young girls: The role of peers and media prior to adolescence. *Journal of Youth and Adolescence*, 35(2), 135.
<https://doi.org/10.1007/s10964-005-9020-7>
- Eccles, J. S. (1999). The development of children ages 6 to 14. *Future of Children*, 9(2), 30-44.
<https://doi.org/10.2307/1602703>
- Eddy, K. T., Tanofsky-Kraff, M., Thompson-Brenner, H., Herzog, D. B., Brown, T. A., & Ludwig, D. S. (2007). Eating disorder pathology among overweight treatment-seeking youth: Clinical correlates and cross-sectional risk modeling. *Behaviour Research and Therapy*, 45, 2360-2371. <https://doi.org/10.1016/j.brat.2007.03.017>
- Eisenberg, M. E., Ward, E., Linde, J. A., Gollust, S. E., & Neumark-Sztainer, D. (2017). Exposure to teasing on popular television shows and associations with adolescent body satisfaction. *Journal of Psychosomatic Research*, 103, 15-21.
<https://doi.org/10.1016/j.jpsychores.2017.09.014>
- Evans, E. H., Adamson, A. J., Basterfield, L., Le Couteur, A., Reilly, J. K., Reilly, J. J., & Parkinson, K. N. (2017). Risk factors for eating disorder symptoms at 12 years of age: A 6-year longitudinal cohort study. *Appetite*, 108, 12-20. <https://doi.org/10.1016/j.appet.2016.09.005>
- Evans, E. H., Tovee, M. J., Boothroyd, L. G., Drewett, R. F. (2013). Body dissatisfaction and disordered eating attitudes in 7- to 11-year-old girls: Testing a sociocultural model. *Body Image*, 10, 8-15. <https://doi.org/10.1016/j.bodyim.2012.10.001>
- Gardner, R. M., Stark, K., Friedman, B. N., & Jackson, N. A. (2000). Predictors of eating disorder

- scores in children ages 6 through 14: A longitudinal study. *Journal of psychosomatic research*, 49(3), 199-205. [https://doi.org/10.1016/S0022-3999\(00\)00172-0](https://doi.org/10.1016/S0022-3999(00)00172-0)
- Garnett, B. R., Masyn, K. E., Austin, S. B., Miller, M., Williams, D. R., & Viswanath, K. (2014). The intersectionality of discrimination attributes and bullying among youth: An applied latent class analysis. *Journal of Youth and Adolescence*, 43(8), 1225-1239. <https://doi.org/10.1007/s10964-013-0073-8>
- Girard, M., Chabrol, H. & Rodgers, R.F. Support for a Modified Tripartite Dual Pathway Model of Body Image Concerns and Risky Body Change Behaviors in French Young Men. *Sex Roles* **78**, 799–809 (2018). <https://doi.org/10.1007/s11199-017-0850-z>
- Gray, W. N., Kahhan, N. A., & Janicke, D. M. (2009). Peer victimization and pediatric obesity: A review of the literature. *Psychology in the Schools*, 46(8), 720-727. <https://doi.org/10.1002/pits.20410>
- Guardabassi, V., Mirisola, A., & Tomasetto, C. (2018). How is weight stigma related to children's health-related quality of life? A model comparison approach. *Quality of Life Research*, 27(1), 173-183. <https://doi.org/10.1007/s11136-017-1701-7>
- Heard-Garris, N. J., Cale, M., Camaj, L., Hamati, M. C., & Dominguez, T. P. (2018). Transmitting Trauma: A systematic review of vicarious racism and child health. *Social Science & Medicine*, 199, 230-240. <https://doi.org/10.1016/j.socscimed.2017.04.018>
- Hoff, E., & Laursen, B. (2019). Socioeconomic status and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: Biology and ecology of parenting* (pp. 421–447). Routledge/Taylor & Francis Group. <https://doi.org/10.4324/9780429401459-13>
- Janssen, I., Craig, W. M., Boyce, W. F., & Pickett, W. (2004). Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics*, 113(5), 1187-1194. <https://doi.org/10.1542/peds.113.5.1187>
- Jendrzyca, A., & Warschburger, P. (2016). Weight stigma and eating behaviours in elementary school children: A prospective population-based study. *Appetite*, 102, 51-59.

<https://doi.org/10.1016/j.appet.2016.02.005>

Juvonen, J., Lessard, L. M., Schacter, H. L., & Enders, C. (2019). The effects of middle school weight climate on youth with higher body weight. *Journal of Research on Adolescence*, 29(2), 466-479. <https://doi.org/10.1111/jora.12386>

Juvonen, J., Lessard, L. M., Schacter, H. L., & Suchilt, L. (2017). Emotional implications of weight stigma across middle school: The role of weight-based peer discrimination. *Journal of Clinical Child & Adolescent Psychology*, 46(1), 150-158.

<https://doi.org/10.1080/15374416.2016.1188703>

Kelly, Y., Bécares, L., & Nazroo, J. (2013). Associations between maternal experiences of racism and early child health and development: findings from the UK Millennium Cohort Study. *Journal of Epidemiology and Community Health*, 67(1), 35-41. <http://dx.doi.org/10.1136/jech-2011-200814>

Kenney, E. L., Wintner, S., Lee, R. M., & Austin, S. B. (2017). Peer Reviewed: Obesity Prevention Interventions in US Public Schools: Are Schools Using Programs That Promote Weight Stigma?. *Preventing chronic disease*, 14. <https://doi.org/10.5888/pcd14.160605>.

Klaczynski, P. A., Goold, K. W., & Mudry, J. J. (2004). Culture, obesity stereotypes, self-esteem, and the "thin ideal": A social identity perspective. *Journal of Youth and Adolescence*, 33(4), 307-317. <https://doi.org/10.1023/B:JOYO.0000032639.71472.19>

Kohlmann, C. W., Eschenbeck, H., Heim-Dreger, U., Hock, M., Platt, T., & Ruch, W. (2018). Fear of being laughed at in children and adolescents: Exploring the importance of overweight, underweight, and teasing. *Frontiers in psychology*, 9, 1447.

<https://doi.org/10.3389/fpsyg.2018.01447>

Kostanski, M., & Gullone, E. (2007). The impact of teasing on children's body image. *Journal of Child and Family Studies*, 16, 307-319. <https://doi.org/10.1007/s10826-006-9087-0>

Lai, M. H., & Kwok, O. M. (2014). Standardized mean differences in two-level cross-classified random effects models. *Journal of Educational and Behavioral Statistics*, 39(4), 282-302.

<https://doi.org/10.3102/1076998614532950>

Lampard, A. M., MacLehose, R. F., Eisenberg, M. E., Neumark-Sztainer, D., & Davison, K. K. (2014).

Weight-related teasing in the school environment: Associations with psychosocial health and weight control practices among adolescent boys and girls. *Journal of Youth and Adolescence*, 43, 1770–1780. <https://doi.org/10.1007/s10964-013-0086-3>

Lessard, L. M., & Juvonen, J. (2020). Weight Stigma in the School Setting: The Role of Inclusive Weight Climate—A Commentary. *Journal of School Health*.

<https://doi.org/10.1111/josh.12898>

Lessard, L. M., & Puhl, R. M. (2021). Reducing Educators' Weight Bias: The Role of School-Based Anti-Bullying Policies. *Journal of school health*, 91(10), 796-801.

<https://doi.org/10.1111/josh.13068>

Lowe, M. R., Marmorstein, N., Iacono, W., Rosenbaum, D., Espel-Huynh, H., Muratore, A. F., ... & Zhang, F. (2019). Body concerns and BMI as predictors of disordered eating and body mass in girls: An 18-year longitudinal investigation. *Journal of Abnormal Psychology*, 128(1), 32-43.

<https://doi.org/10.1037/abn0000394>

Lüdtke, O., Marsh, H. W., Robitzsch, A., Trautwein, U., Asparouhov, T., & Muthén, B. (2008). The multilevel latent covariate model: A new, more reliable approach to group-level effects in contextual studies. *Psychological Methods*, 13(3), 203- 229.

<https://doi.org/10.1037/a0012869>

Madowitz, J., Knatz, S., Maginot, T., Crow, S. J., & Boutelle, K. N. (2012). Teasing, depression and unhealthy weight control behaviour in obese children. *Pediatric Obesity*, 7(6), 446-452.

<https://doi.org/10.1111/j.2047-6310.2012.00078.x>

Malete, L., Motlhoiwa, K., Shaibu, S., Wrotniak, B. H., Maruapula, S. D., Jackson, J., & Compher, C. W. (2013). Body image dissatisfaction is increased in male and overweight/obese adolescents in Botswana. *Journal of obesity*, 2013. <https://doi.org/10.1155/2013/763624>

McFarland, M. J., Taylor, J., & McFarland, C. A. (2018). Weighed down by discriminatory policing:

- Perceived unfair treatment and black-white disparities in waist circumference. *SSM-population health*, 5, 210-217. <https://doi.org/10.1016/j.ssmph.2018.07.002>
- Menzel, J. E., Schaefer, L. M., Burke, N. L., Mayhew, L. L., Brannick, M. T., & Thompson, J. K. (2010). Appearance-related teasing, body dissatisfaction, and disordered eating: A meta-analysis. *Body Image*, 7(4), 261-270. <https://doi.org/10.1016/j.bodyim.2010.05.004>
- Morin, A. J., Marsh, H. W., Nagengast, B., & Scalas, L. F. (2014). Doubly latent multilevel analyses of classroom climate: An illustration. *The Journal of Experimental Education*, 82(2), 143-167. <https://doi.org/10.1080/00220973.2013.769412>
- Muthén, B. O., & Satorra, A. (1995). Complex sample data in structural equation modeling. *Sociological methodology*, 25, 267-316. <https://doi.org/10.2307/271070>
- Muthén, L. K., & Muthén, B. (2019). *Mplus. The comprehensive modelling program for applied researchers: User's guide*, 5.
- Nagengast, B., & Marsh, H. W. (2012). Big fish in little ponds aspire more: Mediation and cross-cultural generalizability of school-average ability effects on self-concept and career aspirations in science. *Journal of Educational Psychology*, 104(4), 1033. <https://doi.org/10.1037/a0027697>
- NCD Risk Factor Collaboration (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128· 9 million children, adolescents, and adults. *The Lancet*, 390(10113), 2627-2642. [http://dx.doi.org/10.1016/S0140-6736\(17\)32129-3](http://dx.doi.org/10.1016/S0140-6736(17)32129-3)
- Onis, M. D., Onyango, A. W., Borghi, E., Siyam, A., Nishida, C., & Siekmann, J. (2007). Development of a WHO growth reference for school-aged children and adolescents. *Bulletin of the World health Organization*, 85, 660-667. <http://doi.org/10.2471/blt.07.043497>
- Peterson, J. L., Puhl, R. M., & Luedicke, J. (2012). An experimental investigation of physical education teachers' and coaches' reactions to weight-based victimization in youth. *Psychology of sport and exercise*, 13(2), 177-185. <https://doi.org/10.1016/j.psychsport.2011.10.009>

- Papp, I., Urban, R., Czegledi, E., Babusa, B., & Tury, F. (2013). Testing the Tripartite Influence Model of body image and eating disturbance among Hungarian adolescents. *Body Image, 10*(2), 232-242. <https://doi.org/10.1016/j.bodyim.2012.12.006>
- Pont, S. J., Puhl, R., Cook, S. R., & Slusser, W. (2017). Stigma experienced by children and adolescents with obesity. *Pediatrics, 140*(6), e2017-3034. <http://doi.org/10.1542/peds.2017-3034>
- Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods, 15*(3), 209-233. <http://doi.org/10.1037/a0020141>
- Puhl, R. M., & Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin, 133*(4), 557-580. <http://doi.org/10.1037/0033-2909.133.4.557>
- Puhl, R. M., & Lessard, L. M. (2020). Weight Stigma in Youth: Prevalence, Consequences, and Considerations for Clinical Practice. *Current Obesity Reports, 9*, 402–411. <https://doi.org/10.1007/s13679-020-00408-8>
- Puhl, R. M., Himmelstein, M. S., & Pearl, R. L. (2020). Weight stigma as a psychosocial contributor to obesity. *American Psychologist, 75*(2), 274–289. <https://doi.org/10.1037/amp0000538>
- Puhl, R. M., Luedicke, J., & DePierre, J. A. (2013). Parental concerns about weight-based victimization in youth. *Childhood Obesity, 9*(6), 540-548. <https://doi.org/10.1089/chi.2013.0064>
- Puhl, R. M., Luedicke, J., & Heuer, C. (2011). Weight-based victimization toward overweight adolescents: observations and reactions of peers. *Journal of School Health, 81*(11), 696-703. <https://doi.org/10.1111/j.1746-1561.2011.00646.x>
- Ricciardelli, L. A., & McCabe, M. P. (2001). Children's body image concerns and eating disturbance: A review of the literature. *Clinical Psychology Review, 21*(3), 325-344. [https://doi.org/10.1016/S0272-7358\(99\)00051-3](https://doi.org/10.1016/S0272-7358(99)00051-3)
- Rimal, R. N., & Real, K. (2003). Understanding the influence of perceived norms on behaviors. *Communication Theory, 13*, 184–203. <https://doi.org/10.1111/j.1468-2885.2003.tb00288.x>

Rodgers, R. F., McLean, S. A., & Paxton, S. J. (2015). Longitudinal relationships among internalization of the media ideal, peer social comparison, and body dissatisfaction: Implications for the tripartite influence model. *Developmental Psychology*, 51(5), 706–713.

<https://doi.org/10.1037/dev0000013>

Rosewall, J. K., Gleaves, D. H., & Latner, J. D. (2019). Psychopathology factors that affect the relationship between body size and body dissatisfaction and the relationship between body dissatisfaction and eating pathology. *Frontiers in psychology*, 9, 2768.

<https://doi.org/10.3389/fpsyg.2018.02768>

Rubino, F., Puhl, R. M., Cummings, D. E., Eckel, R. H., Ryan, D. H., Mechanick, J. I., ... & Dixon, J. B.

(2020). Joint international consensus statement for ending stigma of obesity. *Nature medicine*, 26, 485–497. <https://doi.org/10.1038/s41591-020-0803-x>

Schvey, N. A., Marwitz, S. E., Mi, S. J., Galescu, O. A., Broadney, M. M., Young-Hyman, D., ... &

Yanovski, J. A. (2019). Weight-based teasing is associated with gain in BMI and fat mass among children and adolescents at-risk for obesity: a longitudinal study. *Pediatric obesity*, 14(10), e12538. <https://doi.org/10.1111/ijpo.12538>

Schwartz, M. B., & Brownell, K. D. (2004). Obesity and body image. *Body image*, 1(1), 43-56.

[https://doi.org/10.1016/S1740-1445\(03\)00007-X](https://doi.org/10.1016/S1740-1445(03)00007-X)

Sharples, L., Sharma, V., Coleman, S., Nixon, J., Hamilton-Shield, J., Rutter, H., & Bryant, M. (2019).

Systematic Review and Meta-Analysis of Co-morbidities Associated with Child and Adolescent Obesity. *Obesity Reviews*. 20 (10), 1341-1349.

<https://doi.org/10.1111/obr.12904>

Shunk, J. A., & Birch, L. L. (2004). Girls at risk for overweight at age 5 are at risk for dietary restraint, disinhibited overeating, weight concerns, and greater weight gain from 5 to 9 years. *Journal of the American Dietetic Association*, 104(7), 1120-1126.

<https://doi.org/10.1016/j.jada.2004.04.031>

Silva, D. F. O., Sena-Evangelista, K. C. M., Lyra, C. O., Pedrosa, L. F. C., Arrais, R. F., & Lima, S. C. V. C.

- (2018). Motivations for weight loss in adolescents with overweight and obesity: a systematic review. *BMC Pediatrics*, 18(1), 1-8. <https://doi.org/10.1186/s12887-018-1333-2>
- Simons, R. L., Murry, V., McLoyd, V., Lin, K. H., Cutrona, C., & Conger, R. D. (2002). Discrimination, crime, ethnic identity, and parenting as correlates of depressive symptoms among African American children: A multilevel analysis. *Development and Psychopathology*, 14(2), 371-393. <https://doi.org/10.1017/s0954579402002109>
- Sinton, M. M., Goldschmidt, A. B., Aspen, V., Theim, K. R., Stein, R. I., Saelens, B. E., ... & Wilfley, D. E. (2012). Psychosocial correlates of shape and weight concerns in overweight pre-adolescents. *Journal of Youth and Adolescence*, 41(1), 67-75. <https://doi.org/10.1007/s10964-011-9686-y>
- Smolak, L., & Levine, M. P. (1994). Psychometric properties of the children's eating attitudes test. *International Journal of Eating Disorders*, 16(3), 275-282. [https://doi.org/10.1002/1098-108X\(199411\)16:3<275::AID-EAT2260160308>3.0.CO;2-U](https://doi.org/10.1002/1098-108X(199411)16:3<275::AID-EAT2260160308>3.0.CO;2-U)
- Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52(6), 613. <https://doi.org/10.1037//0003-066x.52.6.613>
- Stice, E. (2002). Risk and maintenance factors for eating pathology: a meta-analytic review. *Psychological Bulletin*, 128(5), 825-848. <https://doi.org/10.1037/0033-2909.128.5.825>
- Sutin, A. R., Stephan, Y., & Terracciano, A. (2015). Weight discrimination and risk of mortality. *Psychological science*, 26(11), 1803-1811. <https://doi.org/10.1177/0956797615601103>
- Sutin, A. R., Stephan, Y., Robinson, E., Daly, M., & Terracciano, A. (2020). Body-related discrimination and dieting and substance use behaviors in adolescence. *Appetite*, 104689. <https://doi.org/10.1016/j.appet.2020.104689>
- Thompson, J. K., & Stice, E. (2001). Thin-ideal internalization: Mounting evidence for a new risk factor for body-image disturbance and eating pathology. *Current Directions in Psychological science*, 10(5), 181-183. <https://doi.org/10.1111/1467-8721.00144>
- Thompson, J. K., Cattarin, J., Fowler, B., & Fisher, E. (1995). The perception of teasing scale (POTS): A

- revision and extension of the physical appearance related teasing scale (PARTS). *Journal of Personality Assessment*, 65(1), 146-157. https://doi.org/10.1207/s15327752jpa6501_11
- Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment, and treatment of body image disturbance*. American Psychological Association.
- Tomiya, A. J. (2014). Weight stigma is stressful. A review of evidence for the Cyclic Obesity/Weight-Based Stigma model. *Appetite*, 82, 8-15. <https://doi.org/10.1016/j.appet.2014.06.108>
- Truby, H., & Paxton, S. J. (2002). Development of the children's body image scale. *British Journal of Clinical Psychology*, 41(2), 185-203. <https://doi.org/10.1348/014466502163967>
- Tylka, T. L. (2011). Refinement of the tripartite influence model for men: Dual body image pathways to body change behaviors. *Body image*, 8(3), 199-207. <https://doi.org/10.1016/j.bodyim.2011.04.008>
- Vander Wal, J. S., & Thelen, M. H. (2000). Eating and body image concerns among obese and average-weight children. *Addictive Behaviors*, 25(5), 775-778. [https://doi.org/10.1016/S0306-4603\(00\)00061-7](https://doi.org/10.1016/S0306-4603(00)00061-7)
- Vartanian, L. R., & Porter, A. M. (2016). Weight stigma and eating behavior: A review of the literature. *Appetite*, 102, 3-14. <https://doi.org/10.1016/j.appet.2016.01.034>
- Weden, M. M., Brownell, P. B., Rendall, M. S., Lau, C., Fernandes, M., & Nazarov, Z. (2013). Parent-reported height and weight as sources of bias in survey estimates of childhood obesity. *American Journal of Epidemiology*, 178(3), 461-473. <https://doi.org/10.1093/aje/kws477>
- Wofford, N., Defever, A. M., & Chopik, W. J. (2019). The vicarious effects of discrimination: How partner experiences of discrimination affect individual health. *Social Psychological and Personality Science*, 10(1), 121-130. <https://doi.org/10.1177/1948550617746218>
- Zuba, A., & Warschburger, P. (2017). The role of weight teasing and weight bias internalization in psychological functioning: a prospective study among school-aged children. *European Child & Adolescent Psychiatry*, 26(10), 1245-1255. <https://doi.org/10.1007/s00787-017-0982-2>

Table 1*Descriptive statistics and bivariate correlations*

Variables					Bivariate Correlations						
	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	1	2	3	4	5	6	7
Total sample											
1. Age	9.82	0.95	8.00	12.00	-						
2. Mothers' Ed	13.50	3.80	5.00	21.00	-0.132**	-					
3. Fathers' Ed	12.44	3.65	5.00	21.00	-0.147**	0.495**	-				
4. zBMI	0.37	1.43	-6.47	3.72	0.026	-0.042	-0.085*	-			
5. Weight-based teasing	1.20	0.52	1.00	5.00	0.105**	-0.067	-0.102**	0.291**	-		
6. Body dissatisfaction	0.75	1.37	-4.00	6.00	0.119**	-0.074	-0.055	0.517**	0.379**	-	
7. Eating restraint	1.12	0.98	0.00	5.10	0.145**	-0.233**	-0.232**	0.360**	0.481**	0.481**	-
Boys											
1. Age	9.79	0.93	8.00	12.00	-						
2. Mothers' Ed	13.61	3.76	5.00	21.00	-0.148**	-					
3. Fathers' Ed	12.28	3.65	5.00	21.00	-0.179**	0.497**	-				
4. zBMI	0.57	1.51	-6.00	3.72	0.036	-0.005	-0.080	-			
5. Weight-based teasing	1.23	0.58	1.00	5.00	0.075	-0.090	-0.156**	0.305**	-		
6. Body dissatisfaction	0.77	1.39	-3.00	6.00	0.110*	-0.050	-0.101	0.550**	0.371**	-	
7. Eating restraint	1.13	1.01	0.00	4.90	0.154**	-0.234**	-0.254**	0.352**	0.501**	0.472**	-
Girls											
1. Age	9.83	0.96	8.00	12.00	-						
2. Mothers' Ed	13.39	3.84	5.00	21.00	-0.117*	-					
3. Fathers' Ed	12.60	3.64	5.00	18.00	-0.117*	0.496**	-				
4. zBMI	0.17	1.32	-6.47	3.36	0.020	-0.092	-0.08	-			
5. Weight-based teasing	1.17	0.45	1.00	4.67	0.147**	-0.044	-0.032	0.259**	-		
6. Body dissatisfaction	0.73	1.35	-4.00	5.00	0.129*	-0.099	-0.009	0.487**	0.394**	-	
7. Eating restraint	1.11	0.94	0.00	5.10	0.136*	-0.233**	-0.209**	0.376**	0.460**	0.491**	-

Note. zBMI, sex- and age-adjusted standardized body mass index; Ed, educational level

*Significant at the level of 0.05 (2-tailed) **Significant at the level of 0.01 (2-tailed).

Table 2

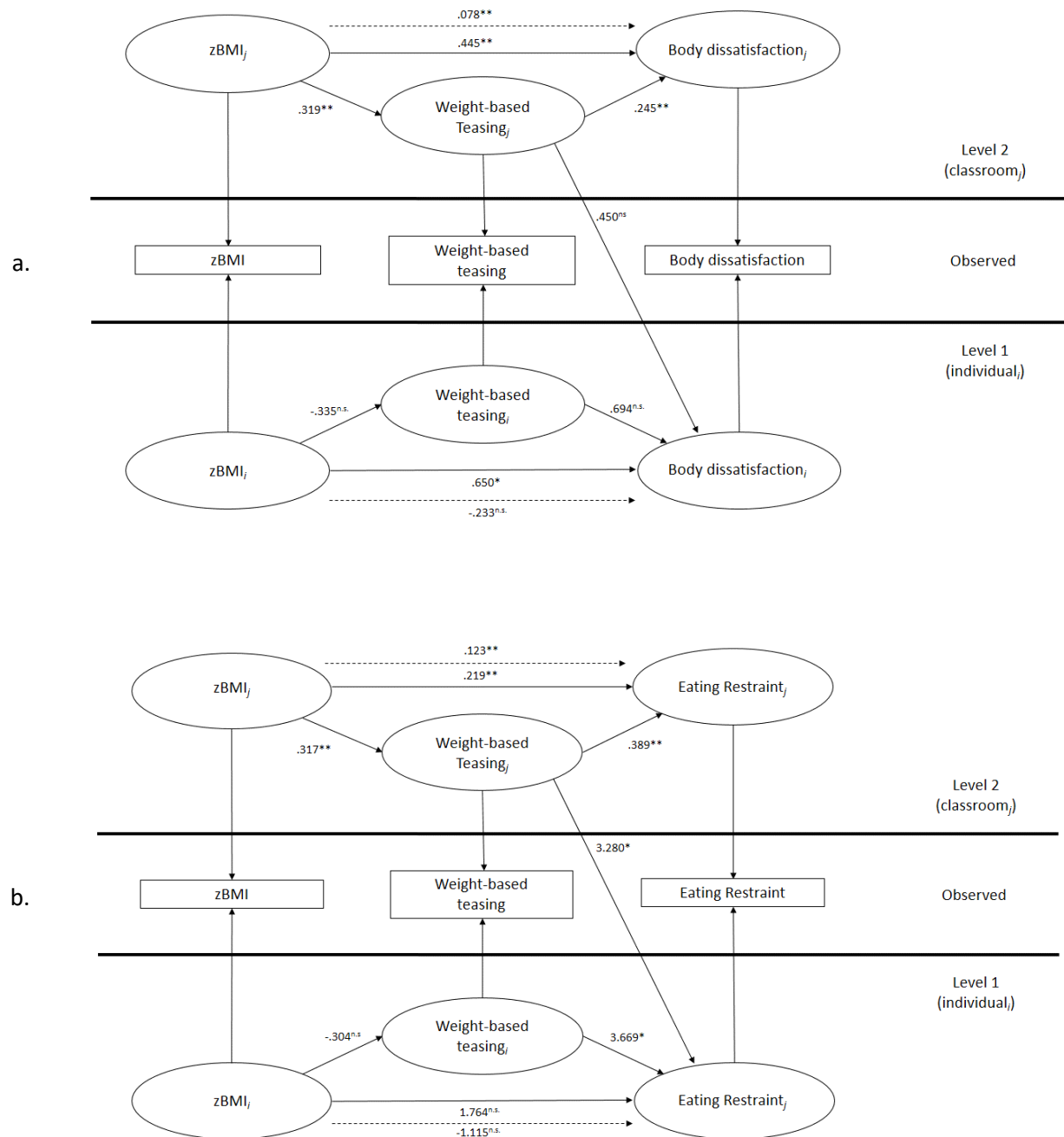
Multilevel path model estimates for paths linking body dissatisfaction and eating restraint behaviors to standardized BMI and weight-based teasing at the individual ($N_i = 744$) and the classroom level ($N_c = 84$)

Paths	Body dissatisfaction				Eating restraint			
	Estimate	SE	95%CI (lower/upper)	<i>p</i>	Estimate	SE	95%CI (lower/upper)	<i>p</i>
Individual level								
<i>Direct effects</i>								
zBMI → Weight-based teasing	0.319	0.049	0.222/0.415	0.000	0.317	0.048	0.222/0.412	0.000
Weight-based teasing → Outcome	0.245	0.048	0.151/0.338	0.000	0.389	0.041	0.308/0.470	0.000
zBMI → Outcome	0.445	0.049	0.355/0.534	0.000	0.219	0.031	0.157/0.280	0.000
<i>Indirect effect</i>								
zBMI → Weight-based teasing → Outcome	0.078	0.015	0.048/0.108	0.000	0.123	0.022	0.079/0.167	0.000
Classroom level								
<i>Direct effects</i>								
zBMI → Weight-based teasing	-0.335	0.345	-1.011/0.341	0.331	-0.304	0.269	-0.831/0.223	0.258
Weight-based teasing → Outcome	0.694	0.660	-0.599/1.988	0.293	3.669	1.456	0.816/6.522	0.012
zBMI → Outcome	0.650	0.323	0.017/1.282	0.044	1.764	1.108	-0.409/3.936	0.112
<i>Indirect effect</i>								
zBMI → Weight-based teasing → Outcome	-0.233	0.199	-0.622/0.157	0.242	-1.115	0.968	-3.013/0.782	0.249
Contextual effect								
Weight-based teasing (classroom level) → Outcome (individual level)	0.450	0.664	-0.852/1.752	0.498	3.280	1.470	0.399/6.162	0.026

Note. SE = Standard Error of the estimate. CI = Confidence Interval.

Figure 1

Multilevel model of body image dissatisfaction (a) and eating restraint (b)



Note. The continuous lines represent the direct effects. The dotted lines represent the indirect effects. The line connecting weight-based teasing at the classroom level (L2) to body dissatisfaction and eating restraint at the individual-level (L1) represents the contextual effect.

* $p < .05$. ** $p < .001$. ^{n.s.} $p > .05$.