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Original Article

Nothing alien about it: A comparison of weight bias in preschool-aged children's ratings of non-human cartoons and human figures

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ABSTRACT

Media exposes children to weight biased messaging by presenting overweight characters negatively. Although bias against human figures and human characters has been examined, children's bias against non-human animated characters is unstudied. Children's ($N = 60$; 4–6 years old) weight bias against human and non-human characters was measured. Children saw characters of different weights (thin, overweight), genders (girl, boy), and stimuli type (human-line drawing, human-photo, non-human cartoon), and rated them using positive and negative characteristics. ANOVAs and *t*-tests examined weight bias based on mean ratings of each character. Overweight figures were rated more negatively than non-overweight figures overall, regardless of gender or type of stimulus. Further, mean ratings of the non-human cartoon were significantly less positive than ratings of both the line drawings and photographs of human figures. However, there was no interaction of stimulus type and weight status, suggesting that bias is expressed equally against human and non-human overweight figures. Results indicated that children's negative weight bias extends to non-human cartoon figures. Implications for children's media are discussed.

1. Introduction

Considered one of the last acceptable forms of prejudice, weight bias occurs when individuals attribute negative characteristics to others based solely on their overweight status [1]. This bias manifests in acts of discrimination, including bullying. Children who are discriminated against for their weight show negative psychological outcomes including lowered self-esteem [2], increased depression [3], decreased academic achievement, and impaired social relationships [4]. In addition, weight bias appears very early in development [5,6]. Thus, understanding the etiology of this bias is very important.

Weight bias in children has many sources [7]. Along with well-supported evolutionary theories of weight bias, including disease avoidance, innate disgust, and evolutionary fitness [8–10], a growing literature indicates that weight bias is learned or strengthened socially [7]. Cultivation theory [11] posits that repeated exposure to biased portrayals cultivates biased beliefs, which over time may strengthen bias through desensitization and perceived acceptability. Attribution theory builds on this process by highlighting that the perceived causality and fixedness of a stigmatized condition (e.g., obesity) influence individual judgments towards the afflicted, such that higher personal responsibility and lower fixedness lead to increased stigma [12–14].

One frequent source of stereotyping and biased portrayals is children's media programming. Although media programming can take many forms, research has primarily focused on the use of books, television, and movies. Despite often using magical or supernatural elements in a whimsical manner [15], children's media has historically promoted gender, race, age, and weight-based stereotypes [16–20]. Characters who are overweight are subject to ridicule, are less socially involved [21], and have fewer romantic relationships than their normal-weight peers [22].

Although weight-based stereotyping is present in children's cartoons depicting non-human characters [20,21,24], research has not examined whether children express weight bias about non-human cartoons. Several studies suggest that non-human cartoon characters will elicit weight bias in children. For example, a study

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comparing photos and line drawings of people found that children hold biases against overweight figures regardless of the level of stimulus realism (i.e., how representational the visual photo image is of living human beings) [25]. In addition, research has found that young children (age 6–8) express stronger thin-ideal attitudes following exposure to animated characters with thin-ideal features [26]. In the only known study on the topic using *non-human* animated characters, research using a priming paradigm [27] found that exposure to overweight non-human cartoon figures elicited higher food intake, which the authors suggested indicated the activation of a weight bias schema. However, no research has directly examined the weight bias that children express about non-human cartoon figures. Given the prevalence of such animated characters (e.g., animals, fantasy characters) in TV programming targeted at young children [23], the current study investigated childhood weight bias toward two validated sets of human figures and a set of novel non-human cartoon figures. It was hypothesized that children would hold similar weight bias against overweight non-human cartoons as they do toward human figures. If supported, this finding would suggest that children use weight-based scripts to judge non-human novel figures, and that child-focused media depicting weight bias against non-human cartoons may be propagating weight-based biases [28].

2. Method

2.1. Participant recruitment

Preschool aged children (between 4 to 6 years old) were recruited by undergraduate Psychology students at a large Midwestern university. Undergraduate students received minimal course extra credit for recruiting children to participate in the study, with an alternate assignment for students who were unable to recruit preschool-aged children. Interested undergraduate students attended a training session that included information on how to lessen social desirability bias when conducting research and how to use the online survey system with the preschoolers. Students practiced administration with each other during this session prior to administering the task to a preschooler. The students first obtained written consent and demographic information from the child's parent, and then obtained verbal assent from the child with the following statement: "I have some games to play with you and some questions to ask you today. There are no right or wrong answers for these games or questions. Whatever you say is okay. It'll take about 15 minutes and we can play right here on the computer (tablet/laptop, etc.). Would you like to play with me?" If the child provided assent, students accessed the online protocol, and assisted the preschoolers only in manipulating the computer. Students were specifically instructed not to influence the child's responses in any way. The University Institutional Review Board approved all procedures prior to recruitment.

2.2. Procedure and materials

After obtaining parental consent and child assent, the undergraduate student used a laptop, tablet, or other internet-enabled device to access the online protocol in a location convenient to the caregiver and child participating. Each page of the survey presented one centered image and the instructions "Can you drag and drop this boy/girl/alien into the right box?" The tester read the instruction and helped the child only to manipulate the technology if needed.

Each child was asked to assess a series of images on an adjective rating scale as used in prior work by Musher-Eizenman et al. [29] to investigate weight bias in preschool-aged children. In the present study, each child rated ten figures presented in random order by "dragging and dropping" the image to the box corresponding with their answer. These figures were: line drawings of a thin girl and boy and an overweight boy and girl, originally used in Collins' [30] figure array (images correspond to images C and F); photographs of a thin girl and boy and an overweight boy and girl, originally used by Meers et al. [25]; and novel images of a thin and overweight cartoon alien created for this study (see Fig. 1). The alien form was developed for the current study and thus was novel to the children, so their assessments of this figure could not be based on prior experience or reflect prior bias towards the alien cartoon. In addition, aliens used in children's cartoons have been depicted as both good and bad characters, so without context, the children would need to rely on their weight-based schemas to make decisions about these novel characters.

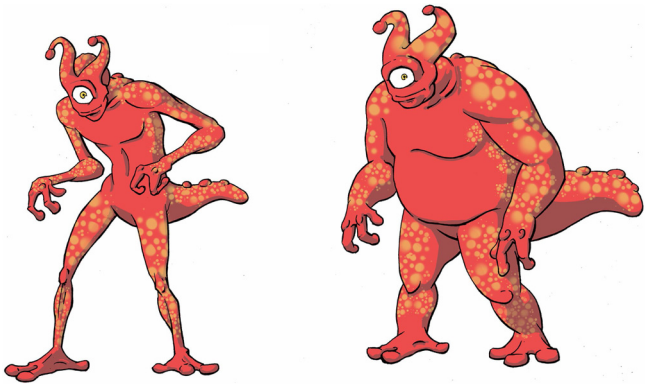

Fig. 1. Images of the thin and overweight cartoon aliens.
Note: Thin and overweight alien cartoons with the same features as those above were displayed in 6 different colors and patterns.

Children looked at each randomly presented image, one at a time, for as long as necessary, and then "dragged and dropped" the image onto a five-point scale using four adjective pairs found to be reliable in prior research [29]: Nice-Mean, Hardworking-Lazy, Smart-Stupid, and Good Looking-Ugly. Positive characteristics were assigned a higher numerical rating. For example, the more "Nice" an image was rated, the higher the image's score. Conversely, the more "Mean" an image was rated, the lower the image's score. Alpha reliability ratings in the present study for the overweight boy drawing across the four rating scales (0.65) were comparable with prior research using six rating scales (0.63). Alphas for the ten images in the present study across the four rating scales ranged from 0.53 to 0.79.

Because of the potential diversity in monitor settings on internet-enabled devices, images presented to the children may have varied slightly in size and color. However, images were typically approximately 4 square inches in the center of the screen, with the rating scale spanning the width of the screen.

2.3. Data analysis

Analyses were conducted using the Statistical Package for the Social Sciences Version 22. Repeated measures analysis of variance (ANOVA) and *t*-tests were conducted to compare mean ratings of each of the ten figures to examine the presence of bias towards the various stimuli. To compare the magnitude of bias, difference scores were calculated by subtracting mean ratings for the overweight image of a stimulus type from the mean ratings of for the thin image of the same stimulus type (e.g., Mean of thin girl line drawing – Mean of overweight girl line drawing).

Table 1
Mean (SD) ratings by stimulus type, weight status, and gender.

Weight Status						
	Thin			Overweight		
Gender/stimulus	Girl	Boy	Alien	Girl	Boy	Alien
Line Drawing	3.62 (1.04)	3.24 (1.01)		2.86 (0.86)	2.70 (0.94)	
Nice/Mean	3.59 (1.34)	3.18 (1.46)		3.20 (1.30)	3.03 (1.41)	
Hardworker/Lazy	3.52 (1.35)	3.15 (1.36)		2.40 (1.33)	2.38 (1.35)	
Smart/Stupid	3.67 (1.37)	3.37 (1.29)		3.08 (1.12)	2.73 (1.19)	
Ugly/Good Look	3.69 (1.33)	3.25 (1.41)		2.75 (1.23)	2.65 (1.38)	
Photograph	3.55 (0.95)	3.40 (0.94)		2.75 (0.82)	2.73 (0.87)	
Nice/Mean	3.93 (1.15)	3.67 (1.36)		3.05 (1.41)	3.32 (1.46)	
Hardworker/Lazy	3.48 (1.32)	3.22 (1.47)		2.62 (1.21)	2.48 (1.29)	
Smart/Stupid	3.25 (1.42)	3.43 (1.24)		2.88 (1.31)	2.83 (1.24)	
Ugly/Good Look	3.48 (1.41)	3.27 (1.39)		2.45 (1.18)	2.28 (1.09)	
Cartoon			2.74 (1.04)			2.35 (1.01)
Nice/Mean			2.85 (1.51)			2.63 (1.50)
Hardworker/Lazy			2.68 (1.41)			2.32 (1.54)
Smart/Stupid			2.89 (1.54)			2.33 (1.40)
Ugly/Good Look			2.48 (1.54)			2.12 (1.22)
Overall	3.58 (0.92)	3.32 (0.89)	2.74 (1.04)	2.81 (0.77)	2.71 (0.82)	2.35 (1.01)

Notes: $N = 60$; Line Drawing, Photograph, and Cartoon ratings are averaged across adjective ratings.
Overall ratings are averaged across adjective ratings and stimulus type. Higher numerical values indicate a more positive rating.

3. Results

3.1. Participant demographics

Participants in this study were sixty children ages 4–6 years (Mean age = 65 months, SD age = 10 months, 53.3% female, 83.3% white). Complete height and weight data were reported by parents of fifty-four children (weight percentiles: 7.4% underweight (under 5th percentile), 64.8% healthy (5th to under 85th percentile), 7.4% overweight (85th to less than 95th percentile), 20.4% obese (95th percentile and greater)). Gender of participant was not related to any variables of interest or the aims of this study, and thus was not included in the analyses. Due to evidence that parents are inaccurate reporters of their child's height and weight [31], analyses using weight or BMI percentile were not conducted.

3.2. Main effects: comparison of mean ratings

3.2.1. Stimulus type

A repeated measures ANOVA comparing the three stimulus types (line drawings, photos, and cartoons) revealed a significant main effect ($F(2) = 13.3$, $p < 0.001$). Follow-up analysis with paired-samples *t*-tests indicated that mean ratings of the alien cartoon were significantly lower than ratings of both the line drawing ($t(59) = 3.7$, $p < 0.001$) and the photograph ($t(59) = 3.8$, $p < 0.001$). This finding indicates that the children assigned fewer positive characteristics to the alien cartoons than they did to either the line drawings or photographs, regardless of weight status or gender. See Table 1 for all descriptive statistics.

3.2.2. Stimulus weight status

Analysis using a paired-sample *t*-test found a significant main effect of weight status ($t(59) = 8.1$, $p < 0.001$), indicating that overweight figures were rated more negatively than thin figures overall, regardless of stimulus type or gender. This effect held true when stimulus gender was included in the analysis using a 2 (weight status) by 2 (gender) by 2 (stimulus type, excluding alien) ANOVA, ($F(1) = 10.5$, $p = 0.002$), indicating that children assigned fewer positive characteristics overall to the overweight figures than to the thin figures, regardless of stimulus type of gender.

3.3. Analysis of bias: comparison of difference scores

Comparison of difference scores in a repeated measures ANOVA indicated significant disparity in magnitude of bias displayed toward various stimulus types, ($F(1) = 69.5$, $p < 0.001$). Further exploration using paired sample *t*-tests indicated that the difference between ratings of the thin and the overweight alien cartoon stimulus was significantly smaller than the difference between ratings of the thin and overweight girl line drawing ($t(59) = 2.6$, $p = 0.013$) and the thin and overweight girl photograph ($t(59) = -2.9$, $p = 0.005$). Additionally, the difference in ratings of the photograph of the girl was significantly greater than the difference in ratings for the line drawing of the boy ($t(59) = 2.1$, $p = 0.039$).

4. Discussion

This research explored the presence of weight bias among preschool-aged children towards thin and overweight human and non-human figures. Results indicated that, consistent with prior research [22,26,27], the children in this study held weight based bias towards photographs and line drawings regardless of gender, and hold the most fat bias against girl figures. Findings also supported the study hypothesis, indicating that preschool children hold weight bias towards non-human cartoon figures.

This evidence that children show similar bias against overweight non-human cartoons as they do against human figures is new to the literature. Prior research has provided participants information about the non-human cartoon [32], but the present study provided no additional information about the characters and presented them with otherwise matched physical characteristics (e.g. color, features, height, etc.). The alien cartoons were presented in context of eight other images that differed in weight status, which may have triggered the participants to pay attention to the alien cartoon's weight rather than other features. Therefore, it can be surmised that participants' ratings of these characters are likely based largely on the alien cartoon's weight status, indicating that young children's existing weight bias toward human figures acts as a script for evaluating unknown images [33–35]. The presence of this bias towards novel, non-human figures indicates how pervasive and automatic weight-based discrimination is [36] even among children [37]. It should be noted that in addition to displaying weight bias, participants rated the alien figures most negatively overall. There are several possible explanations for this, including the well-

documented bias against the unfamiliar (see, e.g., [38,39]), or other characteristics of the alien figures themselves. It is recommended that future studies in this area utilize a number of different novel images to attempt to untangle this finding.

It is important to note that, among the figures presented, although the children rated the alien cartoons least positively overall, they also demonstrated the smallest discrepancy in ratings between the thin and overweight versions of these figures. In other words, their ratings of the thin and overweight alien cartoons were more similar to each other than were their ratings of the other thin-overweight pairs. One possible explanation for this may be a floor effect [40,41]. As the thin alien cartoons were rated less positively overall, there was less room for reduced ratings of the overweight alien cartoon. Another explanation may be related to the variety of body shapes and sizes presented in children's cartoon media. In animated media, it is sometimes the case that overweight characters are the heroes and thin characters are the villains. For example, in Pixar's "Monster's Inc.," "Sully," the tall large monster, and "Mike," the short round monster, are the heroes, and "Randall," the thin monster, is the villain. This is counter to what is expected based on weight bias literature, which would suggest that the thin monster would be the hero and the short and large monsters the villains. However, other media has portrayed the opposite; for example, in Disney's "The Little Mermaid," the overweight villain "Ursula" is defeated by the thin heroes, "Ariel" and "Prince Eric." Perhaps this fluidity of roles and size can be capitalized on to break down existing weight bias towards human figures and promote body acceptance among children. The more often that unconventional heroes in media become the norm, the more opportunities children have to associate a variety of characteristics with being desirable, weakening weight bias, as suggested by the cultivation and attribution theories. This may also provide an avenue to intervene in prevention of weight-based bullying, allowing children with a variety of characteristics to identify with their heroes and stand up against weight bias. Future research should explore this as one possible avenue for intervention, while also assessing more directly children's reasoning behind assigning particular characteristics to each image.

Though the current study has several strengths, there are also several limitations worth noting. As mentioned above, children's ratings may have been affected by a floor effect, such that they did not frequently assign negative characteristics to the targets, perhaps due to social desirability. Additionally, the relatively small and predominantly white composition of the sample may limit the generalizability of the results. Finally, although alien, the cartoon image did have some human-like characteristics (e.g., two legs), which may have facilitated their generalization of weight bias from humans to these novel images.

Despite these limitations, the present study provides unique evidence that weight bias in preschool-aged children exists for non-human cartoons, as well as adds to existing evidence that bias against overweight girls may be stronger than that against overweight boys. Given the pervasive and harmful nature of weight bias, it is important for future research to continue to explore the impact media portrayals have on children's development of weight-related attitudes. Overall, the findings of this study suggest that children use weight-based scripts to judge non-human novel figures, and that child-focused media should be cautious and intentional about creating figures that avoid weight bias and promote inclusive messages to young, impressionable minds.

Conflicts of interest

The authors have no conflicts of interest to disclose.

Ethical statement

Institutional Review Board approval was obtained from Bowling Green State University prior to subject recruitment. Authors have read and have abided by the statement of ethical standards for manuscripts submitted to the Obesity Research & Clinical Practice.

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References

[1] O'Hara MD. Please weight to be seated: recognizing obesity as a disability to prevent discrimination in public accommodations. Whittier Law Rev 1996;17:895–954.
[2] Danielsen YS, Stormark KM, Nordhus IH, Mæhle M, Sand L, Ekornås B, et al. Factors associated with low self-esteem in children with overweight. Obes Facts 2012;5:722–33.
[3] Halfon N, Larson K, Slusser W. Associations between obesity and comorbid mental health, developmental, and physical health conditions in a nationally representative sample of US children aged 10 to 17. Acad Pediatr 2013;13:6–13.
[4] Drukker M, Wojciechowski F, Feron FJM, Mengelers R, Van Os J. A community study of psychosocial functioning and weight in young children and adolescents. Int J Pediatr Obes 2009;4(January (2)):91–7.
[5] Paxton SJ, Damiano SR. Chapter eight – the development of body image and weight bias in childhood. In: Benson JB, editor. Advances in child development and behavior, vol. 52. JAI; 2017. p. 269–98.
[6] Su W, Aurelia D. Preschool children's perceptions of overweight peers. J Early Child Res 2012;10(1):19–31.
[7] Puhl R, Brownell KD. Psychosocial origins of obesity stigma: toward changing a powerful and pervasive bias. Obes Rev 2003;4:213–27.
[8] O'Brien KS, Daníelsdóttir S, Ólafsson RP, Hansdóttir I, Fridjónsdóttir TG, Jónsdóttir H. The relationship between physical appearance concerns, disgust, and anti-fat prejudice. Body Image 2013;10:619–23.
[9] Park JH, Schaller M, Crandall CS. Pathogen-avoidance mechanisms and the stigmatization of obese people. Evol Hum Behav 2007;28(6):410–4.
[10] Vartanian LR. Disgust and perceived control in attitudes toward obese people. Int J Obes 2010;34:1302–7.
[11] Gerbner G, Gross L, Morgan M, Signorielli N. Growing up with television: the cultivation perspective. In: Bryant J, Zillmann D, editors. Media effects: advances in theory and research. Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc; 1994. p. 17–41.
[12] Black MJ, Sokol N, Vartanian LR. The effect of effort and weight controllability on perceptions of obese individuals. J Soc Psychol 2014;154(November (6)):515–26.
[13] Weiner B. An attributional theory of achievement motivation and emotion. Psychol Rev 1985;92(4):548–73.
[14] Weiner B, Perry RP, Magnusson J. An attributional analysis of reactions to stigmas. J Pers Soc Psychol 1988;55(5):738–48.
[15] Goldstein TR, Alperson K. Dancing bears and talking toasters: a content analysis of supernatural elements in children's media. Psychol Popular Media Cult 2019;(February).
[16] Davidson ES, Yasuna A, Tower A. The effects of television cartoons on sex-role stereotyping in young girls. Child Dev 1979;50:597–600.
[17] Gorn GJ, Goldberg ME, Kanungo RN. The role of educational television in changing the intergroup attitudes of children. Child Dev 1976;47:277–80.
[18] Herbozo S, Tantleff-Dunn S, Gokee-Larose J, Thompson JK. Beauty and thinness messages in children's media: a content analysis. Eat Disord J Treat Prev 2004;12:21–34.
[19] Rodgers RF, Damiano SR, Wertheim EH, Paxton SJ. Media exposure in very young girls: prospective and cross-sectional relationships with BMIz, self-esteem and body size stereotypes. Dev Psychol 2017;53(December (12)):2356–63.
[20] Robinson T, Callister M, Magoffin D, Moore J. The portrayal of older characters in Disney animated films. J Aging Stud 2007;21(August (3)):203–13.
[21] Robinson T, Callister M, Jankoski T. Portrayal of body weight on children's television sitcoms: a content analysis. Body Image 2008;5:141–51.
[22] Greenberg B, Eastin M, Hofschire L, Lachlan K, Brownell K. Portrayals of overweight and obese individuals on commercial television. Am J Public Health 2003;93:1342–8.
[23] Klein H, Shiffman KS. Thin is 'in' and stout is 'out': what animated cartoons tell viewers about body weight. Eat Weight Disord Stud Anorex Bulim Obes 2005;10:107–16.
[24] Klein H, Shiffman KS. Messages about physical attractiveness in animated cartoons. Body Image 2006;3:353–63.
[25] Meers MR, Koball AM, Oehlhof MW, Laurene KR, Musher-Eizenman DR. Assessing anti-fat bias in preschoolers: a comparison of a computer generated line-drawn figure array and photographic figure array. Body Image 2011;8:293–6.

[26] Anschutz DJ, Engels RCME, Van Strien T. Increased body satisfaction after exposure to thin ideal children's televis. . .: EBSCOhost. Psychol Health 2012;27(5):603–17.
[27] Campbell MC, Manning KC, Leonard B, Manning HM. Kids, cartoons, and cookies: Stereotype priming effects on children's food consumption. J Consum Psychol 2016;26(2):257–64.
[28] Bissell K, Parrott S. Prejudice: the role of the media in the development of social bias. J Commun Monogr 2013;15(4):219–70.
[29] Musher-Eizenman DR, Holub SC, Miller AB, Goldstein SE, Edwards-Leeper L. Body size stigmatization in preschool children: the role of control attributions. J Pediatr Psychol 2004;29:613–20.
[30] Collins ME. Body figure perceptions and preferences among preadolescent children. Int J Eat Disord 1991;10:199–208.
[31] Townsend MS, Melgar-Quinonez H, Hudes M, Crawford P. How well do parents in the United States report heights and weights for children? In: Merrick J, editor. Public health yearbook. Hauppauge, NY: Nova Biomedical Books; 2009. p. 45–56.
[32] Mares M-L, Acosta EE. Be kind to three-legged dogs: children's literal interpretations of tv's moral lessons. Media Psychol 2008;11:377–99.
[33] Abelson RP. Psychological status of the script concept. Am Psychol 1981;36:715–29.
[34] Connolly DA, Hockley WE, Pratt MW. A developmental evaluation of frequency memory for actions presented in lists, scripts, and stories. Memory 1996;4(3):243–63.
[35] Siegler RS, Alibali MW. Memory development. In: Children's thinking. 4th ed. Upper Saddle River, NJ: Prentice-Hall, Inc; 2005.
[36] Flint SW, Snook J. Obesity and discrimination: the next 'big issue'? Int J Discrim Law 2014;14(3):183–93.
[37] Puhl R, Heuer CA. The stigma of obesity: a review and update. Obesity 2009;17(5):941–64.
[38] Carraro L, Castelli L. On the generality of children's racial attitudes across target groups. Psicol Soc 2015;10(1):71–81.
[39] Rennels JL, Langlois JH. children's attractiveness, gender, and race biases: a comparison of their strength and generality. Child Dev 2014;85(July (4)):1401–18.
[40] Terwee CB, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol 2007;60(1):34–42.
[41] McHorney CA, Tarlov AR. Individual-patient monitoring in clinical practice: are available health status surveys adequate? Qual Life Res 1995;4(4):293–307.