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Is weight bias evident in peer interactions between young and older children?

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What is already known about this subject:

- Weight bias has been observed in children of primary school age and younger.
- It is seen when children rank order drawings and match drawings of fat body shapes to negative adjectives or to characters in stories doing mean things.
- Weight bias underpins social exclusion or victimization of children with obesity and may affect children's engagement with obesity prevention and weight management.

What this study adds:

- Weight bias shared between peers may be apparent in the tone of children's conversations relating to a fat character and in their non-verbal behaviour.
- Socially-shared covert weight bias is much more apparent than overt weight bias in a school-setting.
- There is a need for a more detailed understanding of the acquisition, chronology, and individual variation in children's weight bias.

ABSTRACT

Objective: To investigate whether weight bias is apparent in young and older children's interactions during a paired reading activity.

Methods: One hundred and seventy two children (57% girls) read a book in which the main character, 'Alfie', was portrayed either as average weight or as having obesity. Younger children (m=6.1 years) were paired with a same sex older child (m=9.5 years). Questions within and at the end of the story prompted discussion. Children's conversations were analysed according to valence (emotional tone). Non-verbal behaviour was noted via observation.

Results: Pairs of children reading about fat 'Alfie' made significantly more negative and fewer positive comments when offering story completions. Just one pair of boys spoke about him being fat. There was no evidence that older children passed negative attitudes to younger children. Covertly expressed weight bias was more common. There was more frequent laughter while reading about fat 'Alfie', and two pairs made non-verbal reference to 'Alfie's' appearance.

Conclusions: Covert weight bias was apparent in the interactions of some of these children but overt weight bias was rare. There is a need to establish a better chronology of children's awareness of, and attitudes to, obesity and how they are acquired.

INTRODUCTION

That children prefer thin to fat body shapes[a] was established over half a century ago. This work preceded the current and more user-engaged perspective on weight bias and obesity stigma and is repeatedly cited.[1] The first studies showed children, when presented with drawings of young people differing in physical appearance or disabilities, to like the fat child least,[2] and to assign negative features of personality and behaviour to this body shape.[3] This collection of negative attitudes and beliefs about others with overweight refers to weight bias.[4,5] Weight bias in children is of concern as it underpins actions towards others with obesity, such as social exclusion or victimization.[6] Perceived weight stigma may impact on children's engagement with initiatives on weight surveillance or obesity management.[1] In addition, internalized weight bias can contribute to adverse health states in children and young people with obesity.[5]

Particular attention has been given to the age at which weight bias becomes first evident. Several studies have shown children of pre-school age to match drawings of fat body shapes to negative adjectives or to characters in stories doing mean things.[6-12] Concurrently, thin or average weight body shapes are matched to positive descriptors or characters doing good things. That three to five-year olds show the same matching and preferences as their older peers indicates how socially engrained weight bias is.

[a] The language used by children in our previous research guides the terminology in this paper. When describing the image of the overweight character children use the word "fat". 'Obesity' will used to refer to the health condition.

There has been much less research attention directed to the acquisition of weight bias by young children. Content analyses of media such as children's cartoons and popular movies show the expected stereotyping of fat characters,[13-15] something less apparent in children's books.[16] Parental attitudes to body size have been examined as to their association with the weight bias of their children.[12,17-18] However, research into the influence of peers on young children's weight bias is almost absent. Several studies with older children have used peer nomination procedures (rated liking of classmates or selecting best friends) to examine peer acceptance and friendship networks of children with obesity.[19-21] There are no similar studies of children younger than eight. Consistent in other findings regarding young children has been diminished social acceptability of 'hypothetical' peers (vignette characters), i.e. the reduced likelihood of inviting a fat child to a party or them being chosen as a friend.[18,22] These judgements of pictures of children are quite different to understanding how peers may interact in situations where weight differences are apparent.

The present study addresses this knowledge gap and examined weight bias within peer interactions by observing children co-reading stories in which the characters differ in body shape. Paired reading is a form of peer assisted learning in which one child (the tutor) supports another child (the tutee) with their reading. It defines peers as fellow students at school, the definition used in this study. Paired reading has been used around the world in primary and secondary schools. It has been evidenced as successful in children without reading difficulties and those with mild learning difficulties.[23-25]

Listening to and recording peer interactions also addresses one of the major limitations within the literature on young children's weight bias. Very few studies in this area have used approaches that enable children's own framing of issues relating to body size

and shape.[26] Indeed, the passivity of children is characteristic of most of this work. The tasks (and outcomes) used to confirm young children's weight bias are determined by adult researchers, leaving little space to hear what children actually think and say. In this study we have used a paired reading activity but supplemented it with questions within and about the story itself. The intention was to encourage discussion between the two children.

Accordingly, the aim of this study was to investigate the sharing of weight bias between children reading a book in which the main character was portrayed either as average weight or as fat. Although weight bias is commonly observed in older pre-adolescent children[26] we made no hypothesis regarding whether the older or younger child would instigate any negativity. Overt verbal and more covert non-verbal interactions between children were noted. In addition, the responses of children who were themselves overweight were examined, as were potential differences between girls and boys.

METHOD

Participants

One hundred and seventy two children (98 girls and 74 boys) from seven primary schools in the north of England took part in the study. These were state schools in areas where families were mainly of low to middle socioeconomic status. Children were in two age groups. The younger children were in Years 1 and 2 of the national curriculum in England, and aged between five and seven (N=89, m=6.1 years (sd=0.6)). The older children were in Years 5 and 6, and between nine and eleven

years old (N=83, m=9.5 years (sd=0.7)). Information about the study was sent to parents and they consented to their child's participation.

Each younger child was paired with an older child of the same sex by random drawing of names. Pairings were checked by teachers to ensure there were no reasons to prevent children working together e.g. family relationship or a history of bullying. Six of the older children participated twice to allow all of the younger children to be matched and to participate (the older child being allocated to the same story book on both occasions). Overall, there were 92 pairs of children. Three pairs failed to provide data: one child was absent on the day of testing, one child failed to provide their assent, and one failed to understand the study task (all younger children). Ethical approval for the study was granted by the Leeds School of Medicine Research Ethics Committee.

Materials

Story books. Two story books were created specifically for this study. They featured a professionally illustrated character ('Alfie') who was drawn for previous studies.[20,25-26] 'Alfie' appeared as average weight in one version of the book and as having obesity in a second (Figure 1). The eight-page story described 'Alfie' going to the park for a picnic with his mum (who was referred to in the story but not drawn). When he sits down to eat, a duck takes 'Alfie's' sandwich from his hand and flies off with it. The penultimate page had the following questions for the younger child: what do you think 'Alfie' does next; what do you think mum does next; what do you think the duck does next? The final story page shows the duck dropping 'Alfie's' sandwich into a rubbish bin and then describes 'Alfie's' mum buying him an ice-cream. There was a separate

card with the following questions for the older child to ask the younger child: what was your favourite bit of the story; and why was it your favourite?

- Figure 1 near here -

Body size rating. The body figure scale by Collins[29] was used to estimate the body size of each participant. This pictorial scale features seven preadolescent figures of increasing body size but has uncertain psychometrics for use by young children.[30] The body size of each participant was therefore estimated by the researcher and matched to one of the figures following the procedure of Charsley et al.[28]

Procedure

The reading pairs were allocated alternately to the two versions of the story books. This was done by gender to ensure similar proportions of girls and boys in each group. The researcher met with the older child in a quiet area of the classroom or school. The child's assent was obtained and they were briefed regarding the paired-reading task. The older child was informed that: (1) they were going to be doing 'an experiment', (2) they would be working with a younger partner, (3) their partner should read the story but they should help if their partner got stuck, (4) there would be questions about the story ending and that the researcher was interested in both their and their partner's ideas, (5) they would operate the audio recorder and, (6) they could stop and ask the researcher for help at any time.

The younger child was collected from the classroom and the researcher described the task, explaining they were going to read a story with the older child and then talk about it. During the paired-reading task the researcher was positioned a short distance from the children, monitoring the interaction and taking notes.

Data analysis

The audio recordings were transcribed verbatim. Children's answers and exchanges to the question prompts within the story about what characters did next (story completions) were analysed using thematic analysis.[29] Each answer or comment made by a child was the unit of analysis. The lead author generated (and summarised) themes and children's responses were further assessed according to valence i.e. whether they were positive, negative, or neutral in tone. A coding frame was established that described each valence category and gave examples of children's comments. Positive responses included when something good happened, the character did something good, or a positive comment was made. Negative responses included when something bad happened, the character did something bad, the character experienced a negative emotion, or a negative comment was made, including about appearance, body shape or weight. Neutral responses included descriptions of the activity or character in the absence of positive or negative tone. The frequencies of positive, negative, and neutral responses were tabulated and compared between story versions, by age of child, and gender using two proportion z-tests. Valence coding reliability was independently determined in a sample of 20% of responses by a second author. A very high level of agreement was found, $\kappa = 0.91$ (95% CI, .84 to .93), $p<.001$. Patterns of interaction between children were analysed using the audio records and researcher observation notes.

RESULTS

Story completion themes

One or both children from each pair gave meaningful responses to the story completion questions on 86% of occasions. “Don’t know” (3%) or no response (11%) were observed in the others.

The most frequent themes in response to what ‘Alfie’ or mum did next were ‘retrieve’ (“*Think he might try and find the duck and get his sandwich back*”) and ‘replace’ (“*Mum might go and buy him a new one*”; see supplemental Table 1). There was no difference in the frequency of retrieve completions between the stories featuring average weight or fat ‘Alfie’ (43.1% *vs* 44.4% respectively, z=0.23, p=0.82) or in replace completions (34.0% *vs* 25.0%, z=1.73, p=0.08). Asked what the duck did next then the most frequent responses were ‘escapes’ (“*Probably tries to get away, flies as high as it can and gets away*”) and ‘eats it’ (“*I think the duck ate the sandwich*”). Again, there were no differences in either theme between the two story versions (escapes, 37.7% *vs* 27.5%, z=0.96, p=0.34; eats it, 33.3% *vs* 36.3%, z=0.38, p=0.70).

Story completion valence

Considering valence, 73% were coded as neutral (Table 1). Children who read the story about fat ‘Alfie’ made significantly more negative comments (z=2.65, p=0.007) and fewer positive comments (z=2.34, p=0.02) than those who read about average weight ‘Alfie.’ Looking at comments about specific characters, only eight children made negative comments about what ‘Alfie’ did next. However, significantly more negative comments were made when reading the fat ‘Alfie’ book (e.g. “*I think he’ll feel upset and hungry*”; z=2.03, p=0.04). In addition, there were significantly fewer positive comments about what mum did next in the completions offered by children reading the fat ‘Alfie’ book (e.g. “*Give her, Alfie, her sandwich*”; z=2.03, p=0.04). There were proportionately more negatively valenced than positively valenced completions when

asked what the duck did next (e.g. "*Steal the next sandwich*") but no difference between the story versions.

Younger and older children's story completion content matched in 42% of pairs and differed in 37%. When only one child in a pair completed the story then this was more likely to be the older child (86% of these instances, $z=4.83$, $p<0.001$). When completions matched then there was no difference in whether the younger or older child spoke first (54% *vs* 46%). Younger children were more likely to have responded first when story completions were different (66% *vs* 34%, $z=3.23$, $p=0.001$). There were no differences in which child made the greater number of negatively valenced completions regarding what 'Alfie' did next, in the fewer positive comments about what mum did next, or in which child answered first when children read the book featuring fat 'Alfie'. In other words, there was no evidence of the older child consistently leading the opinion of the younger child, or vice versa.

Children's favourite part of the story

Some 97% of the children answered when asked to identify their favourite bit of the story once the reading was completed. Paramount was the naughtiness of the duck in stealing 'Alfie's' sandwich and then dropping it in the bin (69% of responses). 'Humour' ("*Because it was just funny*") accounted for over half the responses. Assessment of valence of children's statements showed over 70% of statements were coded as negative as it related to stealing or loss (Table 2). In contrast, positively valenced reasons were given for why it was chosen as favourite, primarily because children said it was funny. Significantly fewer children gave positively valenced reasons when reading the story about fat 'Alfie' (91% *vs* 77%, $z=2.28$, $p=0.02$). There were no differences in the valence of responses between young and older children. However,

girls were more likely than boys to give a positively valenced reason for their choice of favourite part of the story ($z=2.03$, $p=0.04$). This was the only gender difference observed in any of these verbal responses.

- Tables 1 and 2 near here -

Additional observations

The great majority of children were researcher rated as within the mid-range of the Collins body shape scale. Only one was rated at figure 6 and none at 7 (the largest body shape on the scale). They were the younger child of the pair and reading the story about average weight 'Alfie.' Their interactions were no different from those in other pairs of children.

Comments relating to 'Alfie's' body weight or shape were extremely rare. In fact, only one pair of children directly referred to it. The younger child interrupted the story to make the first comment: "*OK, that guy's fat*", "*Look at that guy, look how fat he is*" and then, "*Why is that guy so fat*?" The reading of the rest of the story was punctuated with negative comments from both the younger and older child but nothing more on 'Alfie's' body shape.

In two pairs, both reading about fat 'Alfie', there were non-verbal references to 'Alfie's' body shape. In one pair of male participants, when the younger child opened the story he pointed at 'Alfie' and then rubbed his own stomach. He then began to read the story. Children in the other pair were female. The story states that, "Alfie started to feel very hungry", at which point the older child laughed, pointed at the picture of 'Alfie' and adopted a humorous facial expression.

All instances of children's laughter during the story reading were examined. In total, 67 pairs of children laughed during reading. This was more frequent when children were reading the story about fat 'Alfie' (72% vs 28%, $z=5.01$, $p<0.001$). In addition, the number of pairs in which more than one episode of laughter occurred was compared. In the story about average weight 'Alfie', 9 pairs (20%) had more than one episode of laughter during the paired reading interaction. This compared with 18 pairs reading about fat 'Alfie' (40%; $z=2.01$, $p=0.04$). Across both story versions, girls were significantly more likely than boys to engage in laughter ($z=3.63$, $p<0.001$).

DISCUSSION

This study aimed to investigate the nature and sharing of weight bias within the conversations of young and older children. Covertly expressed weight bias was observed in the two pairs who made non-verbal reference to 'Alfie's' appearance, and in the more frequent laughter while reading about fat 'Alfie'. Children who read this story version made more negatively toned comments when offering story completions. They also made fewer positive comments in these completions and when choosing their favourite part of the story. In contrast, overtly expressed negativity was rare. Of the 45 pairs of children who read the story featuring fat 'Alfie', just one pair of boys spoke about him being fat. There was no evidence that older children communicated weight bias to younger children, or vice versa.

Giving children the opportunity to talk, provoking conversation (albeit a very concrete one relating to a story in a book), and listening to what children say was one of the distinctive and novel features of this study. It gave children their own voice rather than

testing adult expectation. It recognised that young children have different views and experience events and situations differently from older children and adults.[32]

Is it possible that the study approach of asking open-ended questions mitigated against overt weight bias in these children? Was there, for example, a lack of understanding or verbal fluency? Although their vocabulary and understanding of words can be limited, young children have awareness and a desire to communicate.[30] For example, 4-6 year-old children are quite able to articulate their understanding of how weight loss and gain are achieved, why people want to change their weight, and the physical, health, and social consequences of weight loss or gain.[27] Other research into weight bias in young children has asked them to talk about characters they are presented with and choices they have made.[33] Most often their answers have little to do with the character's body weight or size.[34] Cramer and Steinwert found that only 15% of young children gave weight or shape-related reasons for matching fat with mean and thin with nice story characters.[6] Indeed, Jaffer and Ma[35] dropped their post-choice questioning from their second study. These pre-school children were willing to give reasons but failed to relate their choices to the character's physical characteristics.

Study design might also be relevant. In the present study, children saw 'Alfie' as either average weight or as a fat. They never saw the two representations side-by-side as has been typical of most previous research.[6-12] Without the task of comparing body shapes then children had their own choice of what to focus on. It is unlikely those children who read about fat 'Alfie' failed to identify him as fat. The characters were the same drawings rated by children in a previous study of ours as figures 3 and 7 on the Collins body figure scale.[22] More likely is that fatness or body shape was a less dominant feature of appearance for young children than may be expected. For children

aged between five and seven years old, body shape or size is no more prominent than hairstyle or clothing in identifying key differences between characters differing in body shape or ability.[28]

Previous work on children's perception of physical disabilities is pertinent. Children's preference for non-disabled and non-different looking children is apparent from pre-school and through primary school age.[36,37] Their preference for peers perceived as similar describes 'like me' tendencies, something best evidenced at this age in choices of same gender playmates and toys.[38] From a developmental perspective, as children mature then 'like me' becomes increasingly overlaid by considerations of 'not like me' and differences in appearance become important. Facially disfigured and fat figure drawings have been reported as more negatively perceived than other physical differences in children of increasing age.[36] The early formation of broad categories in processing social information becomes overlaid with the social learning of dominant values associated with particular features of appearance.[36] Obesity is prominent in these and media, parents, and peers are primary vehicles for its social valuation.

Given that social learning experiences relating to weight bias differ between children then inter-individual differences in weight bias should be expected. The present observation of a single very vocal instance of weight bias is consistent with other studies.[28] Why fatness was so distinctive and commented on by one younger child in this paired reading situation is unclear. It was not a simple function of their own weight. Having been spoken about, this pair then moved on to other topics. Body shape or weight were not referred to again. Exactly what influence extreme individual views have on the values of the wider group is a matter for future research.

A more covert expression of weight bias was certainly in evidence in these interactions. There was more negative (and less positive) tone in what children said. Three quarters of the pairs of children laughed while reading about fat 'Alfie' and they were nearly three times more likely to laugh than those pairs reading about average weight 'Alfie.' Some 18 of 45 pairs of children (40%) engaged in prolonged laughter during the story (twice that in those reading about average weight 'Alfie'), and 2 pairs made non-verbal reference to fat 'Alfie's' appearance while reading. These fine-grained observations show the value in attending to individual differences in responses alongside group averages.

The attention to acquisition of weight bias was a novelty and strength of this study. Studies on acquisition are rare. Parental transmission was examined in a study looking at mothers reading to their pre-school aged children.[39] The task was to create a story about a child going to a new school for the first time. Mothers were asked to use one of three pictures to describe the child: a normal appearing child, a child with obesity, and a child missing part of an arm. References to major problems for the child were made in 20% of those stories featuring the child with obesity and 80% with the physical disability, but were absent for the normal appearing child. Likewise, there was reference to the child's physical appearance only when it was different. This appears to be strong evidence that parents communicate social values and stereotypes associated with physical appearance difference. But without analysis of the children's responses and engagement, the direction of effect is uncertain. It may be that children first observed differences and parents responded in turn. Parent-child interactions are dynamic and this is part of the fun in reading stories with children.[40] Further work on parent-child and peer-to-peer interactions related to body weight and shape is

warranted. Audio or video recordings of interactions in settings other than school will be of value.

In terms of study weaknesses then this study shares with the majority of the literature on children's weight bias uncertainty as to how any negativity is related to actual behaviour. It also shares with much of the literature on peer relations and social networks the limitations of research in a school setting.[21] So, while story-reading in the presence of an adult was a familiar task, any school or staff constraints on children sharing negative views is uncertain, especially views on sensitive issues. How observed weight bias is reflected in out-of-school behaviour is unknown. In addition, children with obesity were not represented in this research and the generalizability of the present study findings to children outside of the UK must be questioned.

In conclusion, while covert weight bias was apparent in the interactions of some of these young children, overt weight bias was rare, and was led by neither older nor younger child. These findings do not deny the damage that weight bias continues to cause. But they are consistent with other studies in challenging assumptions about how prominent these social values are in younger children's lives.[26] There is a need to establish a better chronology of children's awareness of, and attitudes to, obesity and how they are acquired. Weight surveillance and actions to prevent obesity start in early school years.[41] In England, the National Child Measurement Programme assesses overweight and obesity in reception class (a year younger than the youngest children in this study). [42] Obesity is therefore a conspicuous issue for some young children and their parents. Peer verbal exchanges in primary school are part of the spectrum of victimization for overweight.[43] Actions to mitigate weight bias and its behavioural consequences should join with other efforts to promote equality on behalf of differences between people, and start early in children's schooling.

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Table 1. Frequency of differently valenced story completions[a] in total and by story character, N (%)

	Average weight 'Alfie'			Fat 'Alfie'		
	Neutral	Positive	Negative	Neutral	Positive	Negative
Total	160 (73.1)	44 (20.1)	15 (6.8)	176 (73.3)	29* (12.1)	35** (14.5)
'Alfie'	64 (87.7)	8 (10.9)	1 (1.4)	68 (84.0)	6 (7.4)	7* (8.6)
Mum	40 (56.3)	29 (40.8)	2 (2.8)	52 (65.8)	20* (25.3)	7 (8.9)
Duck	56 (74.7)	7 (9.3)	12 (16.0)	56 (70.0)	3 (3.8)	21 (26.3)

* p<.05 **p<.01

[a]Valence describes whether children's story completions were positive, negative, or neutral in tone.

Table 2. Frequency of differently valenced[a] end of story responses, N (%)

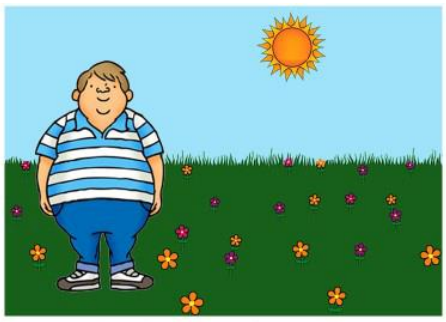
	Average weight 'Alfie'			Fat 'Alfie'		
	Neutral	Positive	Negative	Neutral	Positive	Negative
Favourite part	12 (14.3)	8 (9.5)	64 (76.2)	15 (17.4)	9 (10.5)	62 (72.1)
Reason given	2 (2.9)	62 (91.2)	4 (5.9)	7 (8.9)	61* (77.2)	11 (13.9)

* $p<.05$

[a]Valence describes whether children's story completions were positive, negative, or neutral in tone.

Figure 1. First page of the storybook with ‘Alfie’ represented as healthy weight (left) and as with obesity (right)

It was a lovely sunny Saturday. Mum and Alfie thought it would be nice to go to the park to play. Mum made a picnic before they went.



It was a lovely sunny Saturday. Mum and Alfie thought it would be nice to go to the park to play. Mum made a picnic before they went.