

# The difference between actual and perceived body weight association with mental wellbeing in a sample of 10-11 year old children in England: a cross sectional survey

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## Research article

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## Abstract

## Background

In a society, where the prevalence of childhood overweight and obesity is relatively high, making childhood overweight the 'norm', some children view themselves as being of ideal weight when they are actually overweight or obese. At the same time, there is also evidence showing that children as young as nine, are becoming increasingly body conscious, leading to a potential overestimation of body weight status in these children. The aim of this study was to assess the association between mental wellbeing and perceived and actual body weight status among children aged 10–11 years old.

## Methods

The study was undertaken in 24 primary schools within one health authority area in the North East of England, UK. 264 children aged 10–11 years old (Year 6) self completed a series of questionnaires within school hours which included the general health questionnaire (GHQ), strengths and difficulties questionnaire (SDQ), and specific questions about how they perceived their body weight status prior to being weighed and measured as part of the National Child Measurement Programme (NCMP). The parents of participating children also completed and returned a form reporting the height and weight results from their child's NCMP feedback letter.

## Results

Most of the children misclassified their body weight status, but not always in the same direction. Approximately 1 in 10 ideal weight children perceived themselves to be overweight. However over three quarters of overweight children perceived themselves to be of an ideal weight. In this study sample, mental well-being was not associated with actual body weight status, but it was associated with perceived body weight status; those children who perceived themselves to be an ideal body weight, regardless of what their actual body weight status, had better mental well-being than those who perceived themselves to be either underweight, overweight, or obese (again, regardless of their actual BMI).

## Conclusions

The study strengthens the understanding of the potential relationship between mental well-being and perceived body weight status in 10–11 year old children. The phenomenon of children misperceiving their weight status could on one hand lead to unnecessary mental health problems whilst on the other hand undermine efforts to support interventions aimed towards combating weight problems among children. Surveillance and monitoring programmes e.g. the NCMP which weigh and measure children and feedback their true weight status need to be encouraged.

## Background

The rapid shift in the weight of children towards overweight and obesity over the past decades is said to threaten both the future mental and physical well-being of children, in addition to potentially impacting upon their quality of life and life expectancy [1–3]. In a society, where the prevalence of childhood overweight and obesity is relatively high, childhood overweight is now the 'norm', resulting in some children viewing themselves as ideal weight, when they are actually overweight or obese. At the same time, there is also evidence showing that children as young as nine, are becoming increasingly body conscious, leading to a potential overestimation of body weight status in these children.

The body of evidence linking child weight status and mental wellbeing has been at best equivocal. A systematic review by Reilly and colleagues reported that obese children had low self-esteem, were depressed, developed anxiety and many other psychological problems [4]. This was supported by Tiffin and colleagues who studied a large sample of 3,898 children aged 5–16 years old obtained from the health survey for England 2007, and found evidence for a curvilinear relation between psychological wellbeing and obesity [5]. Later studies also identified that obese and overweight children were more likely to experience poor mental wellbeing such as lower levels of self-esteem and self-perception; and therefore posited a significant impact on the mental wellbeing of overweight or obese children [6, 7]. However Klesges and colleagues studied a sample of 132 children (77 males and 55 females) with mean age 4.5 years and found no differences in self-esteem between obese children and their leaner counterparts [8].

The reason for the different observations might be in the different perception children hold towards their weight status at the time of being studied. The above earlier studies did not consider whether or not the children investigated had been told and/or knew that they are overweight or obese. It is thus not clear whether or not these children perceived themselves to be ideal weight, overweight or obese. Studies have reported weight status misperception among young people [9]. Fan and colleagues [10] studied a large sample of US adolescents ( $n > 70,000$ ) and found statistically significant discrepancies between perceived and reported weight status. One might expect overweight and obese children to recognise their own weight status, but in communities where the prevalence of overweight is relatively high, it appears that children (and also their parents) do not, unless they are severely obese [11–15].

It can be hypothesised that a stronger relationship exists between children who perceive themselves as overweight or obese, and would prefer to be ideal weight, and lower scores of mental wellbeing. However there is a dearth of evidence to suggest whether or not this hypothesis is true. The solution to the on-going debate as to whether or not families should be told the child's weight status through routine feedback from school-based weight surveillance and monitoring programmes like the UK's National Child Measurement Programme (NCMP) lies in first understanding how known/perceived weight status may affect mental wellbeing of children.

This study reports on one component of a larger project [16] which aimed to assess the association between mental wellbeing and perceived and actual body weight status among school children aged 9–10 years old.

## Methods

The study was a cross sectional survey, where children in Year 6 (aged 9–10) who attended schools in one health authority in the North East of England, were invited to complete questionnaires pre-participation in the NCMP. The health authority was selected because demographic data for the area demonstrated higher levels of poverty and deprivation, together with all the associated public health problems. It is one of the regions most severely affected by childhood obesity with the rate of increase in the prevalence being higher than the national average [17].

A sample size of 191 participants based on a power calculation was required to detect a moderate effect size for the relationship between mental wellbeing and weight status of children (Pearson's correlation coefficient,  $R = 0.2$ ), at a power of the study of 80% and level of significance being 5%. The basic sampling unit were clusters of primary schools in the health authority catchment area. The sampling frame was the list of all primary schools in the health authority and it was obtained from the authority council website [18]. It was estimated that 24 schools would be required to obtain the required sample size of children. Schools were first classified according to deprivation status using percentage of children on free school meals in a school as a surrogate measure of poverty obtained from the Office for Standards in Education, Children's Services and Skills (Ofsted) reports [19].

Of the 66 eligible schools, 39 were categorised as highly deprived, 12 as moderately deprived and 15 as low deprived. Participating schools were selected using a proportionate stratified random sampling technique. Selection was done using

tables of random numbers and 14 schools were selected from the highly deprived category, 4 schools from the moderately deprived category and 6 schools from the low deprived category. Once a school was selected, all children aged 10 years and 11 years were approached and asked to volunteer to take part in the study. If a school declined to take part, it was replaced using a similar procedure described above. Children were given an information pack containing information sheets and consent and assent forms to take home to their parents/guardians. Only those children who had both parental consent and child assent forms returned to school were recruited into the study.

Data on the mental wellbeing of children was collected using a school-based self-report questionnaire. This included two standard scales for measuring mental wellbeing in children, the self-completion Strengths and Difficulties Questionnaire (SDQ) and the 12 item General Health Questionnaire (GHQ-12). These scales have proven reliability and validity for measuring the mental health status of children aged between 11–16 years [20–23]. In addition children were asked to self-assess their weight status. This questionnaire was completed by children before they took part in the NCMP.

Later, at some point in the academic year, children participated in the NCMP where they were weighed and measured by the school nurse and parents/guardians subsequently received their child's weight status measurements (feedback) from the health authority. Soon after this feedback was sent, children were given a pack containing the demographic data collection form to take home to their parents. On this form, parents were asked to write the weight and height measurements they had received as feedback from the health authority, along with some information on socio-demographic characteristics e.g. age, ethnicity, education, and occupation of the parents/guardians. Data was analysed using the Statistical Package for Social Sciences Software (SPSS) version 16 and the main statistical test was the Chi-square ( $\chi^2$ ) to test the association between actual weight status and perceived weight status and mental wellbeing of children. Ethical approval to conduct the study was obtained from Teesside University School of Health and Social Care Research Governance and Ethics Committee.

## Results

Of approximately 500 children invited to take part in the study, only 264 (53%) completed the questionnaire. Table 1 shows the socio-demographic characteristics as reported on the questionnaire which was completed by the children, and on the data collection form which was completed by the parents/guardians. 146 (55.3%) of the children were female.

Table 1  
Socio-demographic characteristics of the 264 children (44.7% male; 55.3% female)

		Frequency	Percentage (%)
<b>Gender of child</b>	<b>Male</b>	118	44.7%
	<b>Female</b>	146	55.3%
<b>Gender of the parent or guardian</b>	<b>Male</b>	16	13.9%
	<b>Female</b>	99	86.1%
<b>Age of parent or guardian answering the questions*</b>	<b>Below 21 years</b>	11	9.6%
	<b>21–30 years</b>	10	8.7%
	<b>31–40 years</b>	48	41.7%
	<b>41–50 years</b>	44	38.3%
	<b>More than 50 years</b>	2	1.7%
<b>Parent or guardian highest level of education</b>	<b>No qualification</b>	9	8.2%
	<b>Vocational qualification</b>	10	9.1%
	<b>GCSEs/O-levels</b>	39	35.5%
	<b>A-levels/Diploma</b>	32	29.1%
	<b>University degree</b>	20	18.2%
<b>Occupation of the main household earner</b>	<b>Unemployed</b>	7	6.5%
	<b>Unskilled labourer</b>	10	9.3%
	<b>Skilled labourer</b>	24	22.2%
	<b>Professional job</b>	65	60.2%
	<b>Own business</b>	2	1.9%
<b>Ethnicity</b>	<b>White British</b>	110	96.5%
	<b>Asian</b>	1	0.9%
	<b>White Irish</b>	1	0.9%
	<b>White other</b>	1	0.9%
	<b>Black</b>	1	0.9%

Table 2 compares actual weight status of children determined from the NCMP data and child's perceived weight status.

Table 2

Body weight status of the sample, compared with the 'ideal' range and the average for best comparison from UK data.

	Mean	Range	Ideal	UK average (benchmark)				
<b>Actual BMI<sup>1</sup>(Kg/m<sup>2</sup>)</b>	19.43	12.60–30.69	*	*				
<b>Perceived weight status of children<sup>2</sup></b>								
	<b>Underweight</b>	<b>Normal</b>	<b>Overweight</b>	<b>Very overweight</b>	<b>Total</b>	<b>Chi-Square (χ<sup>2</sup>)</b>	<b>Sig. (p)</b>	
	<b>N (Row %)</b>	<b>N (Row %)</b>	<b>N (Row %)</b>	<b>N (Row %)</b>	<b>N (Table %)</b>			
<b>Actual weight status<sup>1</sup></b>	<b>Ideal weight</b>	7(14.3%)	38(77.6%)	4(8.2%)	0(0.0%)	49(59.8%)	22.18	0.008
	<b>Overweight</b>	1(5.1%)	13(76.5%)	3(17.6%)	0(0.0%)	17(20.7%)		
	<b>Underweight</b>	0(0.0%)	4(100.0%)	0(0.0%)	0(0.0%)	4(4.9%)		
	<b>Obese</b>	0(0.0%)	5(41.7%)	6(50.0%)	1(8.3%)	12(14.6%)		
	<b>Total (Table %)</b>	8(9.8%)	60(73.2%)	13(15.9%)	1(1.2%)	82(100.0%)		

<sup>1</sup> = BMI calculated from height and weight measured as part of the NCMP, and weight status calculated using UK90 charts.

<sup>2</sup> = collected from child

\*No known figure

About 1 in 10 children who were subsequently adjudged to be ideal weight by the Primary Care Trust (PCT) reported figures (8.2%) wrongly perceived themselves as overweight. Of particular interest, however, is the finding that, over three quarters of children considered overweight by the PCT reported figures perceived themselves to be of ideal weight (76.5%) and only 17.6% of these overweight children actually perceived themselves as overweight. All the underweight children according to the PCT figures perceived themselves as having an ideal weight, and just less than half of the obese children (41.7%) perceived themselves as having an ideal weight. A chi-square test identified a statistical difference between actual weight status of children and perceived weight status ( $\chi^2 = 22.18$ ,  $df = 9$ ,  $p < 0.01$ ). Table 3 shows the distribution of mental wellbeing scores as measured from the SDQ and the GHQ-12.

Table 3

Mental wellbeing by different mental health indicators compared with the 'ideal' range and the average for best comparison from UK data.

<b>Mental wellbeing of children by SDQ scores</b>				
		<b>Mean</b>	<b>Range</b>	<b>UK average<sup>1</sup> (benchmark)</b>
<b>Total difficulties (Mental wellbeing)<sup>2</sup></b>		11.41	0–33	8.4
<b>Emotional problems</b>		2.84	0–9	1.9
<b>Conduct problems</b>		2.54	0–9	1.6
<b>Hyperactivity problems</b>		3.86	0–10	3.5
<b>Peer problems</b>		2.17	0–10	1.5
<b>Prosocial behaviour</b>		7.75	2–10	8.6
<b>Mental Wellbeing of children by percentage prevalence</b>				
		<b>Current study</b>		<b>UK average<sup>1</sup> (benchmark)</b>
		<b>N</b>	<b>%</b>	<b>%</b>
<b>Overall Mental health status by SDQ total score</b>	<b>Abnormal</b>	21	8	9.8
	<b>Borderline</b>	42	15.9	8.2
	<b>Normal</b>	201	76.1	82.1
<b>Emotional problems status</b>	<b>Abnormal</b>	19	7.2	11.4
	<b>Borderline</b>	17	6.4	7.8
	<b>Normal</b>	228	86.4	80.8
<b>Conduct problems status</b>	<b>Abnormal</b>	45	17	12.7
	<b>Borderline</b>	32	12.1	10.9
	<b>Normal</b>	187	70.8	76.4
<b>Hyperactivity status</b>	<b>Abnormal</b>	35	13.3	14.7
	<b>Borderline</b>	24	9.1	7.4
	<b>Normal</b>	205	77.7	77.9
<b>Peer problems status</b>	<b>Abnormal</b>	11	4.2	11.7
	<b>Borderline</b>	44	16.7	10.2
	<b>Normal</b>	209	79.2	78.0
<b>Socio relations problems</b>	<b>Abnormal</b>	13	4.9	2.3
	<b>Borderline</b>	22	8.3	2.7
	<b>Normal</b>	229	86.7	95.0
<b>Mental wellbeing by GHQ scores</b>				
		<b>Mean</b>	<b>Range</b>	<b>UK Average</b>

Mental wellbeing of children by SDQ scores				
GHQ score (Mental wellbeing) <sup>2</sup>		1.48	0–11	*
		N	(%)	
Mental health status by GHQ	Morbid	37	14	*
	Normal	227	86	*

<sup>1</sup>UK averages derived from a nationally representative sample [29]

\*No known figures

The total difficulties score of the SDQ categorised the majority of children (76.1%) as normal and about 15.9% of children as borderline while just under 1 in 10 children were categorised as abnormal, meaning they had, in all likelihood, clinically diagnosable mental health problems.

The relationship between mental wellbeing and perceived or actual weight status was of particular importance in this study. Results of a Chi-square test for the association between mental wellbeing and actual weight status are indicated in Table 4.

Table 4  
The test of association between indicators of mental wellbeing and actual weight status

		Actual weight status of children from NCMP data (N = 82)				Chi-square ( $\chi^2$ )	Sig. (p)
		Under-weight	Ideal weight	Overweight	Obese		
Indicators of child mental health		Count (C%)	Count (C%)	Count (C%)	Count (C%)		
<b>Total difficulties</b>	Normal	4(4.9)	34(41.5)	13 (15.9)	9(11.0)	7.533	0.274
	Borderline	0(0.0)	11(13.4)	2 (2.4)	0(0.0)		
	Abnormal	0(0.0)	4(4.9)	2 (2.4)	3(3.7)		
<b>Emotional problems</b>	Normal	4(4.0)	38(46.3)	16 (19.5)	9(11.0)	4.486	0.611
	Borderline	0(0.0)	6(7.3)	0(0.0)	1(1.2)		
	Abnormal	0(0.0)	5(6.1)	1(1.2)	12(14.6)		
<b>Conduct problems</b>	Normal	3(3.7)	34(41.5)	13(15.9)	8(9.8)	3.065	0.801
	Borderline	0(0.0)	9(11.0)	2(2.4)	1(1.2)		
	Abnormal	1(1.2)	6(7.3)	2(2.4)	3(3.7)		
<b>Hyper-activity problems</b>	Normal	4(4.9)	39(47.6)	13(15.9)	8(9.8)	2.940	0.820
	Borderline	0(0.0)	1(1.2)	1(1.2)	1(1.2)		
	Abnormal	0(0.0)	9(11.0)	3(3.7)	3(3.7)		
<b>Peer problems</b>	Normal	3(3.7)	38(46.3)	11(13.4)	9(11)	3.625	0.727
	Borderline	1(1.2)	9(11)	6(7.3)	2(2.4)		
	Abnormal	0(0.0)	2(2.4)	0(0.0)	1(1.2)		
<b>Prosocial behaviour</b>	Normal	0(0.0)	4(4.9)	1(1.2)	0(0.0)	4.362	0.628
	Borderline	1(1.2)	5(6.1)	1(1.2)	0(0.0)		
	Abnormal	3(3.7)	40(48.8)	15(18.3)	12(14.6)		
<b>GHQ-12 scores</b>	Normal	4(4.9)	41(50)	15(18.3)	10(12.2)	0.950	0.813
	Morbid	0(0.0)	8(9.8)	2(2.4)	2(2.4)		

The test shows that there was no significant relationship between any of the indicators of mental wellbeing (total difficulties, emotional symptoms, conduct problems, hyperactivity, and prosocial behaviours) and actual body weight status of children. Total difficulties were not significantly associated with the PCT reported weight status ( $\chi^2 = 7.533$ ,  $df = 6$ ,  $p > 0.05$ ). This was similar for emotional problems ( $\chi^2 = 4.486$ ,  $df = 6$ ,  $p > 0.05$ ), conduct problems ( $\chi^2 = 3.065$ ,  $df = 6$ ,  $p > 0.05$ ), hyper-activity problems ( $\chi^2 = 2.940$ ,  $df = 6$ ,  $p > 0.05$ ), peer problems ( $\chi^2 = 3.625$ ,  $df = 6$ ,  $p > 0.05$ ), and pro-social behaviour ( $\chi^2 = 4.362$ ,  $df = 6$ ,  $p > 0.05$ ).

However conducting the same test using perceived weight status, the test reveals a strong relationship between mental wellbeing and perceived weight status of the children ( $P < 0.001$ ) as indicated by Table 5.

Table 5  
The test of association between indicators of mental wellbeing and perceived weight status

		Perceived weight status of the children N = 263				Chi-square ( $\chi^2$ )	Sig. (p)
		Underweight	Ideal weight	Overweight	Very overweight		
Indicators of child mental health		Count (C%)	Count (C%)	Count (C%)	Count (C%)		
<b>Total difficulties</b>	Normal	17(60.7)	159(82.0)	25(67.6)	0(0.0)	33.96	0.000
	Borderline	7(25.0)	28(14.4)	4(10.8)	2(50.0)		
	Abnormal	4(14.3)	7(3.6)	8(21.6)	2(50.0)		
<b>Emotional symptoms</b>	Normal	25(89.3)	175(90.2)	26(70.3)	2(50.0)	20.50	0.002
	Borderline	0(0.0)	12(6.2)	4(10.8)	1(25.0)		
	Abnormal	3(10.7)	7(3.6)	7(18.9)	1(25.0)		
<b>Conduct problems</b>	Normal	15(53.6)	145(74.7)	26(70.3)	0(0.0)	17.95	0.011
	Borderline	4(14.3)	22(11.3)	5(13.5)	1(25.0)		
	Abnormal	9(32.1)	27(13.9)	6(16.2)	3(75.0)		
<b>Hyper-activity problems</b>	Normal	16(57.1)	163(84.0)	25(67.6)	0(0.0)	41.85	0.000
	Borderline	1(3.6)	15(7.7)	7(18.9)	1(25.0)		
	Abnormal	11(39.3)	16(8.2)	5(13.5)	3(75.0)		
<b>Peer problems</b>	Normal	21(75.0)	164(84.5)	22(59.5)	2(50.0)	36.58	0.000
	Borderline	6(21.4)	26(13.4)	12(32.4)	0(0.0)		
	Abnormal	1(3.6)	4(2.1)	3(8.1)	2(50.0)		
<b>Prosocial behaviour</b>	Abnormal	3(10.7)	8(4.1)	2(5.4)	0(0.0)	7.103	0.311
	Borderline	5(17.9)	15(7.7)	2(5.4)	0(0.0)		
	Normal	20(71.4)	171(88.1)	33(89.2)	4(100.0)		
<b>GHQ-12 Score</b>	Normal	19(67.9)	178(91.8)	29(78.4)	1(25.0)	27.631	0.000
	Morbid	9(32.1)	16(8.2)	8(21.6)	3(75.0)		

Results indicated that children who perceived themselves to be overweight, obese and underweight were less likely to have total difficulties scores in the 'normal' range, whereas children who perceived themselves as ideal weight were more likely to have total difficulties scores in the normal range ( $\chi^2 = 33.96$ ,  $df = 6$ ,  $p < 0.001$ ). There is a significant relationship between emotional symptoms and perceived weight status of children ( $\chi^2 = 20.50$ ,  $df = 6$ ,  $p < 0.01$ ); likewise there is a significant relationship between conduct problems and perceived weight status of children ( $\chi^2 = 17.95$ ,  $df = 6$ ,  $p < 0.05$ ). There is also a significant relationship between hyper-activity problems and perceived weight status of children ( $\chi^2 = 41.85$ ,  $df = 6$ ,  $p < 0.001$ ) and Peer problems were also significantly associated with perceived weight status of children ( $\chi^2$

= 36.58, df = 6,  $p < 0.001$ ). Figure 1 shows the error bars between some indicators of child mental health and perceived and actual weight status.

The 95% confidence intervals on the error bars indicate significant differences among mean mental health scores of the children perceiving themselves to be overweight and obese compared to those perceiving themselves to be of ideal weight. However with actual weight status, there is no significant difference among the mean mental health scores for the different categories of weight status. Mental health scores are significantly higher among children perceiving themselves to be overweight and obese compared to the children who are actually overweight and obese.

## Discussion

In the current study there were no significant associations between actual weight status and mental wellbeing using any of the indicators selected. However, there were associations between the child's perceived weight status and mental wellbeing. Children who perceived themselves to be overweight and obese were more likely to have higher mental health scores indicative of poor mental health. We suggest that higher BMI which is not perceived and/or acknowledged by the child as a problem might be unlikely to affect the mental wellbeing of that child.

A number of reasons could explain why perceived or known overweight/obese weight status categories are associated with poor mental wellbeing among children. Overweight/obese weight categories carry stigmatising connotations. The derogatory attributes attached to overweight and obesity such as laziness, inability to control oneself and so on add to the psychological pressure that children perceiving themselves to be in these weight status categories would develop [24].

Although the association between perceived weight status and poorer mental wellbeing has been shown in this study, the question of the direction of causation remains unclear. While evidence indicates that childhood obesity could impact on the mental wellbeing of children, some researchers have suggested the reverse, pointing out that it is instead poor mental wellbeing that may lead to weight problems since it affects normal patterns of eating and physical activity [25]. Generally, there hasn't been strong evidence for the causal link between child weight status and mental wellbeing; the few studies conducted have been limited by small sample size, thereby affecting the external validity of the results [8, 26, 27]. The current study also did not aim to establish causality between child weight status and mental wellbeing but rather to describe the associations and relationships that exist between the two variables.

The current study also found evidence for a significant difference between actual and perceived weight status in children aged 10–11 years old. This evidence could support the claim that children of this age are largely unaware of their true weight status and may often perceive themselves to be of a completely different weight status from their true weight status. This misperception has also recently been reported by other studies [13–14]. On one hand children with weight problems misperceive themselves to be of ideal weight, probably because of the general shift in the average weight status of children towards obesity and overweight over the past decades [1]. This means that children increasingly see their weight status as the ideal because everybody else around them is within a similar range. Consequently, it becomes increasingly difficult for parents and children to spot deviations that could potentially result in childhood obesity. On the other hand, some children misperceive themselves as having weight problems when actually they are of ideal weight. This could have its roots in the influence of the popular media portraying certain sizes as particularly attractive and successful. For instance magazines, TV shows, advertisements etc. portray small sizes as the best – the 'size zero culture' [28]. This influence could make children with ideal weight misperceive themselves as overweight or obese. In all likelihood, this misperception could have far reaching implications on the wellbeing of children, especially since, Chi-square tests conducted in this study identified a significant relationship between emotional problems, conduct problems, hyperactivity problems, peer problems and perceived weight status of the children.

## Conclusion

In this sample of 264 9–10 year olds, mental well-being (as measured by GHQ and SDQ) was not associated with actual body weight status, but it was associated with perceived body weight status; those children who think they are of ideal body weight status, regardless of what their actual body status is, have better mental well-being than those who think they are underweight, overweight, or obese (again, regardless of their actual Body Mass Index - BMI). Thus a number of children (especially those who misperceive themselves to have weight problems) are likely to end up experiencing poor mental wellbeing, developing emotional problems, conduct problems and so on when they have no cause for anxiety. On the other hand, the phenomenon of children with weight problems misperceiving themselves to have normal weight is only likely to undermine efforts to support interventions aimed towards combating weight problems among children. These findings are suggestive of the need for surveillance and monitoring programmes such as the NCMP, which weigh and measure children and feed back their true weight status. However further research is needed on the potential harms, specifically in terms of a negative impact on a child's mental well-being, of such programmes which involve feedback to children on their body weight status.

## Abbreviations

BMI  
Body Mass Index  
GHQ  
General Health Questionnaire  
NCMP  
National Child Measurement Programme  
PCT  
Primary Care Trust  
SDQ  
Strengths and Difficulties questionnaire  
SPSS  
Statistical Package for Social Sciences

## Declarations

### **Ethics approval and consent to participate**

Ethical approval to conduct the study was obtained from Teesside University School of Health and Social Care Research Ethics and Governance committee and consent and assent to participate was obtained from parents/guardians and children respectively through signed consent/assent prior to participation.

### **Consent for publication**

Not applicable

### **Availability of data and material**

The datasets during and/or analysed during the current study are available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

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### **Authors' contributions**

LAN conceptualised and designed the study, collected data and contributed to the analysis of it. He also contributed to the writing of the article. EK contributed to the analysis and the writing of this article. BM contributed to the analysis of the quantitative data and the writing of the draft article. PW developed the analysis strategy, analysed the data and contributed to the drafting of the article. AMM contributed to the writing of the article and editing it. JK contributed to the analysis of data and writing the article. CI contributed to the analysis of the data and the writing of the article.

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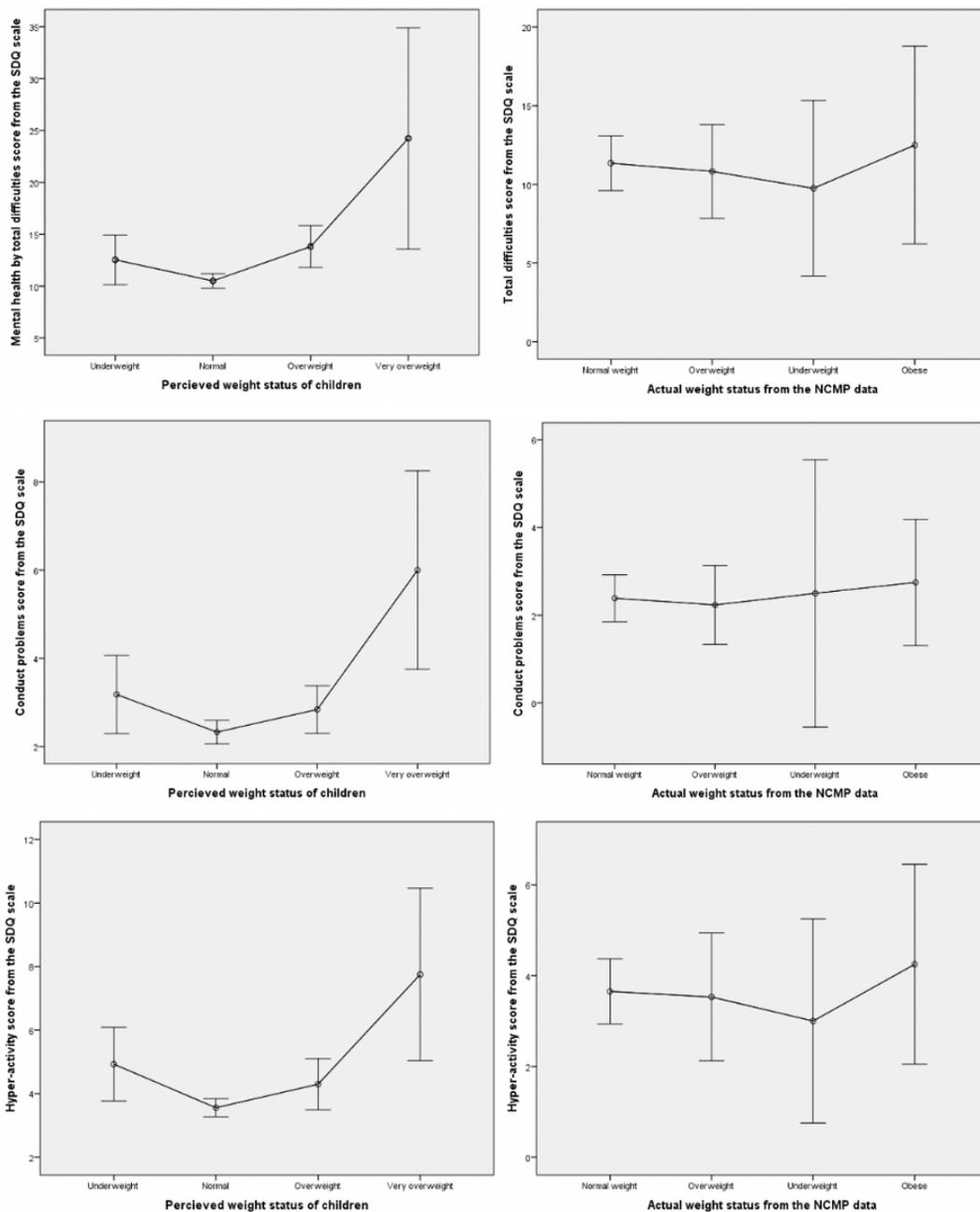
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## **References**

1. Luttikhuis HO, Baur LL, Jansen HH, Shrewsbury VA, O'Malley CC, Stolk RP, Summerbell CD. Interventions for treating obesity in children. *Cochrane Database Syst Rev.* 2009;3:1–57.
2. World Health Organisation. *Childhood overweight and obesity.* Geneva: WHO; 2009.
3. Wilkinson J, Walrond S, Ells L, Summerbell C. Surveillance and monitoring. *Obes Rev.* 2007;8:23–9.
4. Reilly J, Methven E, McDowell Z, Hacking B, Alexander D, Stewart L, Kelnar C. Health consequences of obesity. *Arch Dis Child.* 2003;88:748.
5. Tiffin PA, Arnott B, Moore HJ, Summerbell CD. Modelling the relationship between obesity and mental health in children and adolescents: findings from the Health Survey for England 2007. *Child Adolesc Psychiatry Ment Health.* 2011;5:31.
6. McCullough N, Muldoon O, Dempster M. Self-perception in overweight and obese children: a cross-sectional study. *Child Care Health Dev.* 2009;35:357–64.

7. Walker L, Hill AJ. Obesity: the role of child mental health services. *Child Adolesc Ment Health*. 2009;14:114–20.
8. Klesges RC, Haddock CK, Stein RJ, Klesges LM, Eck LH, Hanson CL. Relationship between psychosocial functioning and body fat in preschool children: a longitudinal investigation. *J Consult Clin Psychol*. 1992;60:793.
9. Martin BC, Dalton WT III, Williams SL, Slawson DL, Dunn MS, Johns-Wommack R. Weight status misperception as related to selected health risk behaviors among middle school students. *J Sch Health*. 2014;84:116–23.
10. Fan M, Jin Y, Khubchandani J. Overweight Misperception among Adolescents in the United States. *J Pediatr Nurs*. 2014;29:536–46.
11. Baughcum AE, Chamberlin LA, Deeks CM, Powers SW, Whitaker RC. Maternal perceptions of overweight preschool children. *Pediatrics*. 2000;106:1380.
12. Etelson D, Brand DA, Patrick PA, Shirali A. **Childhood obesity: do parents recognize this health risk?** *Obesity* 2003, 11:1362–1368.
13. Jones AR, Parkinson KN, Drewett RF, Hyland RM, Pearce MS, Adamson AJ. Parental perceptions of weight status in children: the Gateshead Millennium Study. *Int J Obes*. 2011;35:953–62.
14. Mooney A, Statham J, Boddy J, Smith M. The National Child Measurement Programme: Early Experiences of Routine Feedback to Parents of Children's Height and Weight. London: TCRU, University of London; 2010.
15. Vanhala LM, Keinanen-Kiukaanniemi MS, Kaikkonen MK, Laitinen HJ. Korpelainen IR **Factors associated with parental recognition of a child's overweight status - a cross sectional study**. *BMC Public Health*. 2011;11:665.
16. Nyanzi LA: **The national child measurement programme: its value and impact**. PhD thesis. Teesside University, School of Health and Social Care; 2012.
17. Ells JL, Yung J, Unsworth L. The National Child Measurement Programme: Findings from the North East of England for 2008/09. England: North East Public Health Observatory; 2010.
18. **Gateshead Council** <http://www.gateshead.gov.uk>.
19. Ofsted. **Raising Standards Improving Lives** <http://www.ofsted.gov.uk>.
20. Goodman R. The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psych*. 1997;38:581–6.
21. Koskelainen M, Sourander A, Vauras M. Self-reported strengths and difficulties in a community sample of Finnish adolescents. *Eur Child Adolesc Psychiatry*. 2001;10:180–5.
22. Mathai J, Anderson P, Bourne A. Comparing psychiatric diagnoses generated by the Strengths and Difficulties Questionnaire with diagnoses made by clinicians. *Aust N Z J Psychiatry*. 2004;38:639–43.
23. Muris P, Meesters C, Eijkelenboom A, Vincken M. The self-report version of the Strengths and Difficulties Questionnaire: Its psychometric properties in 8-to 13-year-old non-clinical children. *Br J Clin Psychol*. 2004;43:437–48.
24. Schwartz MB, Puhl R. Childhood obesity: a societal problem to solve. *Obes Rev*. 2003;4:57–71.
25. Goodman E, Whitaker RC. A prospective study of the role of depression in the development and persistence of adolescent obesity. *Pediatrics*. 2002;110:497.
26. Pierce JW, Wardle J. Cause and effect beliefs and self-esteem of overweight children. *J Child Psychol Psych*. 1997;38:645–50.
27. Stradmeijer M, Bosch J. Family Functioning and Psychosocial Adjustment in Overweight Youngsters. *Int J Eat Disord*. 2000;27:110–4.
28. Hill AJ. Motivation for eating behaviour in adolescent girls: the body beautiful. *Proc Nutr Soc*. 2006;65:376–84.
29. Meltzer H, Gatward R, Goodman R, Ford T: *Mental health of children and adolescents in Great Britain*. London TSO; 2000.

## Figures



**Figure 1**

Mental wellbeing and perceived and actual weight status (Page 16). Figure 1 shows mental wellbeing and perceived and actual weight status. The 95% confidence intervals on the error bars indicate significant differences among mean mental health scores of the children perceiving themselves to be overweight and obese compared to those perceiving themselves to be of ideal weight.