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Predictors of health-related behaviour change in parents of overweight children in England ☆

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ABSTRACT

Objective: Providing parents with information about their child's overweight status (feedback) could prompt them to make lifestyle changes for their children. We assessed whether parents of overweight children intend to or change behaviours following feedback, and examined predictors of these transitions.

Methods: We analysed data from a cohort of parents of children aged 4–5 and 10–11 years participating in the National Child Measurement Programme in five areas of England, 2010–2011. Parents of overweight children (body mass index ≥91st centile) with data at one or six months after feedback were included (n = 285). The outcomes of interest were intention to change health-related behaviours and positive behaviour change at follow-up. Associations between respondent characteristics and outcomes were assessed using logistic regression analysis.

Results: After feedback, 72.1% of parents reported an intention to change; 54.7% reported positive behaviour change. Intention was associated with recognition of child overweight status (OR 11.20, 95% CI 4.49, 27.93). Parents of older and non-white children were more likely to report behaviour changes than parents of younger or white children. Intention did not predict behaviour change.

Conclusions: Parental recognition of child overweight predicts behavioural intentions. However, intentions do not necessarily translate into behaviours; interventions that aim to change intentions may have limited benefits.

Introduction

Parents are important agents of behaviour change in the treatment of childhood obesity (Golan and Crow, 2004). However, outside of treatment settings, the majority fail to recognise that their child is overweight (Parry et al., 2008; Rietmeijer-Mentink et al., 2013). A parent's inability to recognise their child's weight status may be a barrier to effective weight management (Maximova et al., 2008).

Several theories of health behaviour propose that recognition of and intention to change an unhealthy behaviour are important steps towards change (Webb and Sheeran, 2006). The transtheoretical model (TTM) describes behaviour change as progression through a series of stages: pre-contemplation (no intention to change behaviour), contemplation (intention to change in the near future), preparation (ready to change), action, maintenance, and relapse (Prochaska and Velicer, 1997). These steps have been used to inform health promotion interventions, including childhood weight management (Howard, 2007; Mason et al., 2008). It is believed that increasing parental recognition of child overweight status through the provision of accurate information will prompt progression through stages of behaviour change, leading to healthier behaviours, including improved diet, increased physical activity and reduced sedentary behaviour (Cottrell et al., 2007; Mooney et al., 2010). This is despite the widespread recognition of the 'intention–behaviour gap', which describes the discrepancy between stated intentions and actions (Rhodes and de Bruijn, 2013; Sniehotta et al., 2005). Factors such as knowledge, confidence and environmental barriers may influence progression from intentions to action (Marcus et al., 1992; Wee et al., 2005), and these factors are likely to vary according to individual characteristics including ethnicity and deprivation. For example, families living in

☆ Data access and responsibility: MHP had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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more deprived areas experience greater barriers to healthy lifestyle including reduced access to fruit and vegetables (Cummins et al., 2009) and lack of safe outdoor spaces for physical activity (Molaodi et al., 2012).

In the context of childhood obesity, it is unclear how large the intention–behaviour gap is among parents, and how individual characteristics influence the transition to action (Neumark-Sztainer et al., 2008). Characterisation of parents who are least likely to make steps towards positive lifestyle changes may identify families in greatest need of support. The objectives of this study were to determine the proportion of parents of overweight children at each stage of behaviour change (intention and action) following receipt of information about their child's overweight status, and to identify predictors of these transitions.

Materials and methods

We sampled data from a prospective cohort that comprised the parents of children enrolled in the National Child Measurement Programme (NCMP) in five Primary Care Trusts (PCTs, administrative bodies that had responsibilities for local primary care and public health services) in England, in 2010–2011 (Falconer et al., 2012).

The NCMP is a government initiative which aims to measure the heights and weights of children at state primary schools in England, at school entry (age 4–5) and year 6 (10–11) each year. Weight is measured to the nearest 0.1 kg and height to the nearest millimetre. After the measurement, written feedback is mailed to parents informing them of their child's body mass index (BMI) category; cut-offs at the 2nd, 91st and 98th BMI centiles of the UK 1990 growth curves (Cole et al., 1995) define underweight, healthy weight, overweight and obese (described to parents as 'very overweight'), respectively. Parents of non-healthy weight children are provided with information about the health risks associated with their child's weight status. Feedback also includes information about healthy lifestyles and local health and leisure services.

Parents of the following children were invited to participate in the study: all children enrolled in the NCMP in Redbridge, Islington, and West Essex PCTs, children aged 10–11 in Bath and North East Somerset (BANES) PCT, and children aged 4–5 in Sandwell PCT (n = 18,000). Parents completed self-administered questionnaires about perceptions of their child's weight and health, lifestyle and health-related behaviours, and socio-demographic characteristics before the NCMP feedback (baseline, February–July 2011) and at one month and six months after feedback. The questionnaires were developed for the study with input from experts in health-related behaviour and evaluation. The study was approved by the London School of Hygiene and Tropical Medicine ethics committee.

Parents of children identified as overweight or obese by the NCMP who completed questionnaires at baseline and at least one follow-up were included in this study.

Outcomes

Primary outcomes were selected to correspond to the contemplation and action stages of the transtheoretical model: 1) intention to change health-related behaviour at one month after feedback, and 2) positive change in health related-behaviour at one or six months after feedback.

Intention to change health-related behaviour was defined as parental intention to make changes to any of the following at one month: child's diet, physical activity, or use of health or leisure services (doctor, nurse, pharmacist, weight management clinic or leisure services). Intention was assessed based on responses to the questions: *After receiving feedback on your child's result, did you make any changes to your child's diet/how much physical activity your child does?*; and *In the past month, have you accessed any of the following health professionals or leisure services regarding your child's weight?* Those that selected the response, *No, but I intend to*, were considered to have an intention to change the behaviour.

Positive change in health-related behaviour was defined as a positive change in any of: parent-reported diet, physical activity, screen-time behaviour, or health or leisure services use between baseline and one or six month follow-up. An individual with data at both one and six month follow-ups was categorised as having changed their behaviour if an improvement was observed at either time point. Positive change in diet was defined as an increase in healthy eating score between baseline and follow-up. The healthy eating score was derived from the frequency of consumption of fruits, vegetables, sugary drinks, and snacks (Croker et al., 2012). For each food category, a score ranging from 1 to 7 was generated according to the frequency of consumption (higher score for increasing consumption of fruit and vegetables, the reverse for other food categories); the healthy eating score was derived as a mean of these scores, with a higher score indicating healthier eating behaviours. Improvement in physical activity was defined as a change from a child not meeting the national physical activity recommendation of 1 h per day at baseline (Department of Health, 2011), to achieving this level at follow-up. Improvement in screen-time behaviours was similarly defined as a change from not meeting screen-time recommendations of up to two hours per day at baseline (American Academy of Paediatrics, 2012), to meeting this level at follow-up. Positive change in the use of health or leisure services was defined as a change from not accessing any of these services for their child's weight at baseline, to accessing one or more of these at follow-up.

Predictors

Predictor variables for intention to change health-related behaviour were: 1) parental recognition of their child's overweight status (parents described their child as *overweight* or *very overweight*; parents of obese children that described their child as overweight were considered to recognise their child's overweight status because they acknowledged an issue with excess weight), and 2) parental recognition of the health risks associated with their child's overweight status (parents answered *Yes* to the question, *Do you think your child's current weight puts their health at risk?*), at one month.

The predictor variable for change in health-related behaviour was intention to change behaviour. Other predictors for both outcomes were ethnicity of child (white or non-white, from PCT records), child's sex, child's school year, child overweight status (overweight or obese, from NCMP), deprivation tertiles (using the Index of Multiple Deprivation IMD score, a measure of local area deprivation based on postal code), and PCT (an indicator of area level differences).

Statistical analysis

The characteristics of the cohort were described using frequencies and percentages. The association between each predictor variable and outcome was assessed using logistic regression analysis. In adjusted analyses, models were adjusted for all other predictor variables. Robust standard errors were used to account for clustering by PCT. Results were presented as odds ratios (OR) and 95% confidence intervals (CI). A complete case analysis was carried out for each regression model; this was considered reasonable because analysis of missing observations for predictor variables indicated that missingness was not associated with outcome variables. Potential modification of the main effects by child's overweight category, child's age, or PCT was assessed by the inclusion of interaction terms. All analyses were carried out using Stata version 12 (College Station, TX: StataCorp).

Results

Table 1 shows the study sample characteristics. Of the 3397 parents who responded to the baseline questionnaire (response rate = 18.9%), 579 (17.0% of respondents) had children who were classified as overweight or obese. Of these, 202 parents that responded at baseline and one month follow-up (34.9% of baseline sample) formed the sample for analysis of intention to change; 285 parents that responded at baseline and to at least one of the follow-up questionnaires (49.2% of baseline) formed the sample for analysis of behaviour change; 94% of parents in the sample recalled receiving the feedback letter.

At one month follow-up, 38.2% of parents of overweight children identified their child as overweight, and 28.7% recognised health risks associated with their child's weight.

Most parents (72.1%, n = 145) reported an intention to change health-related behaviours at one month; of these, 32 parents (22%) had not reported an intention at baseline. In adjusted analyses (Table 2), intention to change behaviour was positively associated with parental recognition of child overweight status (odds ratio OR 11.20, 95% confidence interval CI 4.49, 27.93). Positive associations

Table 1
Characteristics of study sample: parents of overweight and obese children participating in the 2010–2011 National Child Measurement Programme in five Primary Care Trusts in England with longitudinal data, and samples used in adjusted complete case analysis of each outcome (intention to change and behaviour change).

Characteristic	Total N = 202[a]	n (%)	
		Complete cases in adjusted analysis of intention to change N = 186	Complete cases in adjusted analysis of behaviour change N = 188
Ethnicity of child			
White	110 (55.0)	100 (53.8)	100 (53.2)
Non-white	90 (45.0)	86 (46.2)	88 (46.8)
Child's sex			
Female	99 (49.2)	89 (47.9)	90 (47.9)
Male	102 (50.8)	97 (52.1)	98 (52.1)
Child's school year			
Reception (age 4–5)	103 (51.0)	94 (50.5)	95 (50.5)
Year 6 (age 10–11)	99 (49.0)	92 (49.5)	93 (49.5)
Child's overweight status			
Overweight	119 (58.9)	109 (58.6)	111 (59.0)
Obese	83 (41.1)	77 (41.4)	77 (41.0)
Social deprivation tertile[b]			
1 (most deprived)	59 (30.6)	55 (29.6)	56 (29.8)
2	74 (38.3)	72 (38.7)	72 (38.3)
3 (least deprived)	60 (31.1)	59 (31.7)	60 (31.9)
PCT			
Islington	40 (20.1)	36 (19.3)	36 (19.1)
Redbridge	82 (41.2)	76 (40.9)	78 (41.5)
West Essex	43 (21.6)	43 (23.1)	43 (22.9)
BANES	20 (10.1)	18 (9.7)	18 (9.6)
Sandwell	14 (7.0)	13 (7.0)	13 (6.9)
Parent recognises child's overweight status			
Yes	76 (38.2)	76 (40.9)	n/a
No	123 (61.8)	110 (59.1)	n/a
Parent recognises health risk associated with child's overweight status			
Yes	58 (28.7)	57 (30.7)	n/a
No	144 (71.3)	129 (69.4)	n/a
Parent intends to change behaviour			
Yes	145 (72.1)	138 (74.2)	139 (73.9)
No	56 (27.9)	48 (25.8)	49 (26.1)
Parent reports positive change in health-related behaviour			
Yes	156 (54.7)[c]	n/a	108 (57.4)
No	129 (45.3)	n/a	80 (52.6)

BANES — Bath and North East Somerset; NCMP — National Child Measurement Programme; PCT— Primary Care Trust; n/a — variable not included in analysis.
[a] Total responses at one month N = 202.
[b] Based on Index of Multiple Deprivation (IMD) from postcode.
[c] Responses at 1 & 6 months combined, N = 285.

with parental recognition of health risks, child age and ethnicity that were observed in unadjusted analyses were attenuated in the adjusted model. Other *a priori* predictor variables were not associated with intention.

Just over half (54.7%, n = 156 out of 285) of parents reported a positive change in health-related behaviours after receiving feedback about their child's weight; 39.5% reported an improvement in diet, 14.0% an improvement in physical activity, 25.3% an improvement in screen-time, and 23.3% a positive change in service use. A third of parents (33.7%, n = 96) made changes to just one type of behaviour, 15.4% made changes to two behaviours, 6.0% to three, and 0.4% to all four. In adjusted analyses (Table 3), child's school year was positively associated with behaviour change after NCMP feedback, with parents of children aged 10–11 more likely to report behaviour change than parents of children aged 4–5 (OR 1.91, 95% CI 1,35, 2.70). The parents of children from non-white ethnic groups were more likely to report positive changes to behaviour than those of children from white ethnic groups (OR 2.35, 95% CI 1.59, 3.48). Other characteristics, including parental intention, were not associated with behaviour change. There was no strong evidence for modification of the main effects by child's overweight category, school year, or PCT.

Discussion

Parents who identified their child as overweight after receiving feedback were several times more likely to report intention to change behaviours than those who did not acknowledge overweight in their child. Parents of older children were more likely to report behaviour change, while parents of children from non-white ethnic groups were more likely to report changes than parents of white children. Intention did not predict reported behaviour change at follow-up.

The association between recognition of overweight status and intention to change is consistent with previous studies which have shown that parents who perceive their child as overweight are more likely to express readiness to make lifestyle changes than parents who do not recognise overweight (Rhee et al., 2005). However, the majority of parents reported an intention to change health-related behaviours despite low rates of acknowledgement of child overweight status. This may

Table 2
Associations between predictor variables and parental intention to change behaviour at one month after receiving NCMP feedback, among parents of overweight and obese children participating in the 2010–2011 National Child Measurement Programme in five Primary Care Trusts in England: results from unadjusted and adjusted logistic regression models.

Outcome: Intention to change behaviour	Model	
	Unadjusted	Adjusted[a]
	OR (95% CI)	OR (95% CI)
Parent recognises child's overweight status	18.08 (5.40, 60.56)	11.20 (4.49, 27.93)
Parent recognises health risks associated with child's overweight status	35.62 (4.79, 264.71)	9.24 (0.66, 127.76)
Child's sex — male (reference: female)	0.98 (0.53, 1.82)	0.84 (0.42, 1.68)
Child's school year — age 10/11 (reference: age 4/5)	2.10 (1.11, 3.96)	1.71 (0.72, 4.04)
Child's overweight status — obese (reference: overweight)	1.71 (0.90, 3.28)	0.58 (0.16, 2.15)
Social deprivation tertile[b] (reference: 1 — most deprived)		
2	0.86 (0.39, 1.89)	0.67 (0.41, 1.09)
3 (least deprived)	0.74 (0.33, 1.68)	0.65 (0.37, 1.16)
Ethnicity (reference: white)		
Non-white	2.90 (1.47, 5.71)	1.50 (0.79, 2.83)

NCMP — National Child Measurement Programme; PCT — Primary Care Trust.
[a] Adjusted for other predictor variables in table and using robust standard errors to account for clustering by PCT, number of observations included in final model n = 186.
[b] Based on Index of Multiple Deprivation (IMD) from postcode.

suggest that parents of overweight children more readily accept advice on areas for improvement in health-related behaviours than weight status itself (Grimmett et al., 2008; Towns and D'Auria, 2009), and that a healthy lifestyle is viewed as an important outcome in itself, unrelated to weight (Campbell et al., 2006).

A number of theories of health behaviour propose that intentions are a precursor to behaviours (Webb and Sheeran, 2006), but in line with other studies that have reported an 'intention–behaviour gap', intentions did not predict reported behaviour change in our study. A meta-analysis of data from experimental studies showed that a sizeable change in intention was required to produce a change in behaviour (Webb and Sheeran, 2006). It may be the case that provision of weight feedback, a relatively low intensity intervention, produced only weak changes in parental intentions. Our study did not assess the strength of intentions, and more detailed assessment of parental intentions in future work may provide insights into the process of parental behaviour change. Several studies indicate that the link between intention and behaviours may be modified by social-cognitive and environmental variables (Gollwitzer and Sheeran, 2006; Pomery et al., 2009). For example, a central concept in many theories of behaviour change is that higher levels of self-efficacy or confidence increase the likelihood of a change in health behaviour (Strecher et al., 1986).

Studies have shown that parents of older children are more likely to be in the preparation and action stages of behaviour change than those of younger children (Rhee et al., 2005). Studies have also shown that parents are more likely to recognise overweight in older children (Hudson et al., 2012.; Maynard et al., 2003), but in the present study the association between school year and behaviour change remained after adjusting for child's overweight status and recognition of overweight. One possible explanation is that unhealthy behaviours increase during adolescence (Brodersen et al., 2007; Dumith et al., 2011), therefore parents of older children may feel more concerned about poor lifestyle behaviours than those of younger children. Older children themselves may also be more aware of their behaviours and have greater desire to change.

Ethnic differences in behaviour change could be explained by culturally specific responses to health advice. For example, among South Asian groups in the UK, advice from health professionals is more likely to be seen as authoritative (Lucas et al., 2013) therefore parents may be more likely to take action in response to recommendations in the feedback letter. Another explanation may be an increased effect of social desirability on reporting of favourable behaviours among ethnic minority groups (Klesges et al., 2004). Our questionnaires were not translated into other languages, therefore our sample did not include parents who were unable to read and write in English, which is likely

Table 3
Associations between explanatory variables and positive change in health-related behaviours at one or six months after receiving NCMP feedback, among parents of overweight and obese children participating in the 2010–2011 National Child Measurement Programme in five Primary Care Trusts in England: results from unadjusted and adjusted logistic regression models.

Outcome: Positive change in health-related behaviour	Model	
	Unadjusted	Adjusted [a]
	OR (95% CI)	OR (95% CI)
Parent intends to change behaviour (reference: no)	1.18 (0.63, 2.21)	0.67 (0.29, 1.53)
Child's sex — male (reference: female)	1.26 (0.79, 2.01)	1.32 (0.97, 1.80)
Child's school year — age 10/11 (reference: age 4/5)	1.80 (1.12, 2.89)	1.91 (1.35, 2.70)
Child's overweight status — obese (reference: overweight)	1.19 (0.73, 1.93)	0.78 (0.41, 1.47)
Social deprivation tertile[b] (reference: most deprived)		
2	0.48 (0.26, 0.88)	0.69 (0.17, 2.72)
3 (least deprived)	0.46 (0.25, 0.84)	0.72 (0.22, 2.39)
Ethnicity (reference: white)		
Non-white	2.25 (1.38, 3.66)	2.35 (1.59, 3.48)

NCMP — National Child Measurement Programme; PCT — Primary Care Trust.
[a] Adjusted for other predictor variables in table and using robust standard errors to account for clustering by PCT, number of observations included in final model n = 188.
[b] Based on Index of Multiple Deprivation (IMD) from postcode.

to have led to an underrepresentation of ethnic minority groups who may experience the greatest barriers to behaviour change. Due to the small numbers of participants from individual ethnic minority groups, we were not able to further disaggregate the effects of ethnicity. Further exploration of the effects of ethnic group on behaviour change may indicate whether there is a need for culturally-specific approaches to weight feedback.

This study was limited by the relatively small number of overweight children in the wider sample. The low response rates at follow-up and substantial missing data for some variables raise the possibility of selection bias; comparison of the study sample with all children participating in the NCMP in the five PCTs (n = 18,000) showed that there were lower proportions of overweight children, ethnic minority families, and parents from the most deprived areas among respondents. These groups may be less likely to engage with public health interventions, and less likely to make changes as a result of feedback. A further limitation is the use of brief measures of lifestyle behaviour, which were selected to keep questionnaires concise and maximise response rates, but have not all been validated. The dietary measures used in the questionnaires were assessed using test–retest methods for a previous evaluation study (Croker et al., 2012), and were shown to have reasonable reliability. There may be the potential for social desirability bias in self-reported outcomes, with parents overreporting positive intentions and desirable behaviours.

Conclusions

Parental recognition of overweight in children is a predictor of behavioural intentions. However, parental intentions do not necessarily translate into behaviour change. Interventions that aim to improve parental awareness of overweight or change intentions may therefore be of limited benefit in terms of weight management. A focus on helping parents to improve lifestyle behaviours regardless of their child's weight status may have greater effect.

Conflicts of interest

AK is also the Director of Public Health Strategy and the Director of Research and Development at Public Health England (PHE). The views expressed in this paper are those of the authors and are not intended to represent the views of PHE. The other authors have no conflicts of interest relevant to this article to disclose. The authors have no financial relationships relevant to this article to disclose.

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