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Weight status of children aged 2-5 years old, attending a paediatric outpatient clinic and its association with parental feeding style and parental perceptions of weight status

Aisling Lee

Institute of Technology Sligo, aisling.lee@mail.itsligo.ie


Helen Callaghan

Institute of Technology Sligo, helen.callaghan@mail.itsligo.ie

Dara Gallagher Dr

Sligo University Hospital, dara.gallagher@hse.ie

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 [Annette Lalor](#), [Dietetics and Clinical Nutrition Commons](#), [Maternal and Child Health Commons](#), and the [Sligo University Hospital](#), annette.lalor@hse.ie
[Public Health Education and Promotion Commons](#)

Louise Rattigan

Sligo University Hospital, louiserattigan1@eircom.net

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Cover Page Footnote

The authors wish to acknowledge all the participants who took the time to take part in this study.

Authors

Aisling Lee, Helen Callaghan, Dara Gallagher Dr, Annette Lalor, Louise Rattigan, Hilary Greaney, and Laura Keaver

Weight status of children aged 2-5 years old, attending a paediatric outpatient clinic and its association with parental feeding style and parental perceptions of weight status.

Aisling Lee¹, Helen Callaghan¹, Dara Gallagher², Annette Lalor², Louise Rattigan², Hilary Greaney² and Laura Keaver^{1*}

¹ Department of Health and Nutritional Science, Institute of Technology Sligo, Sligo, Ireland

² Sligo University Hospital, Sligo, Ireland

*Corresponding Author e-mail: Keaver.laura@itsligo.ie

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1. Introduction

Monitoring the growth pattern of children ensures they are growing at an optimal rate and allows clinical practitioners to detect an under or overweight status (De Onis, Blössner and Borghi, 2010). Both an under and overweight status can negatively impact a child's health status (Bhagowalia, Chen and Masters, 2011). In undeveloped and developing countries the most prevalent weight status is that of underweight (United Nations Childrens Fund *et al.*, 2020) although this is now shifting towards an overweight or obese weight status, which to date has been more commonly seen in developed countries (United Nations Childrens Fund, 2019). Childhood obesity is a serious public health issue. Globally 41 million children under the age of 5 are overweight or obese (World Health Organisation, 2019). Within the Republic of Ireland, 1 in 4 children are overweight or obese (Murray *et al.*, 2019). If current trends continue it is said that 70 million children will be affected worldwide by 2025 (World Health Organisation, 2014). An overweight or obese weight status increases the likelihood of developing what were originally diseases associated with adulthood such as diabetes mellitus and cardiovascular disease (Mark *et al.*, 2015). Such conditions can reduce a child's quality of life (Pandita *et al.*, 2016) and increase the risk of ill health in adulthood (Mark *et al.*, 2015). Developing healthy lifestyle behaviours in early life can help maintain a healthy weight status and reduce the risk of developing co-morbidities (Waters *et al.*, 2011).

Dietary intake and nutrition are some of the main determinants that impact a child's weight status (Moutusi and Debmalya, 2012; Nilmani *et al.*, 2018). A child's set of eating behaviours are influenced by many factors, with parental feeding style playing an important role (Wardle *et al.*, 2012; Vollmer *et al.*, 2015; Pesch *et al.*, 2018). Certain parental feeding styles are associated with the development of an overweight or obese weight status in children; indulgent feeding (Shloim *et al.*, 2015) and restrictive feeding (Tschann *et al.*, 2015). The dietary choices a child makes at a young age can become habitual and remain with the child throughout the life cycle (Lo *et al.*, 2015; Magarey *et al.*, 2003; Demir and Bektas, 2017). There is an opportunistic window in early childhood to implement interventions for developing healthy eating behaviours that can shape lifelong eating behaviours and therefore decrease the risk of developing non-communicable diseases associated with a poor dietary intake throughout the lifespan (Brown *et al.*, 2015; Scaglioni *et al.*, 2018).

Interventions using a family-based approach have been shown to have a positive impact on a child's weight status (Ash *et al.*, 2017) as well as on the parents weight status (Trier *et al.*, 2016). Tackling childhood obesity needs to begin in the home environment as this is where behaviours are learnt at a young age (Brown *et al.*, 2015). The Irish Government has implemented programmes for treating/preventing childhood obesity (Department of Health, 2016). Within these programmes one of the aims is to learn healthy lifestyle behaviours that could be practised inside and outside of the home (Couch *et al.*, 2014; Ong *et al.*, 2016). However, the accessibility of these programmes in Ireland is reported as poor (Department of Health, 2016; Health Services Executive, 2014). Only children who are severely/clinically obese are considered eligible for enrolment and there remains a long waiting list (Health Services Executive, 2014). In addition, parents that do not classify their child as being overweight or obese are unlikely to participate in these programmes (Love *et al.*, 2018). Parental acceptance and recognition of a child being overweight or obese could contribute to poor participation in these programmes.

In Ireland, and in other countries, the recognition of childhood obesity outside of medical professionals is poor (Hudson, McGloin and McConnon, 2012; Warkentin *et al.*, 2018). An individual's ability to correctly classify their own weight status is reported as poor (Robinson and Oldham, 2016). Research is limited in looking specifically at the accuracy of parental classification of their own weight status and its relationship to the accuracy of classifying their child's weight status (Allison *et al.*, 2015).

The objectives of this research project, therefore, were to determine: (1) The weight status of children aged 2-5 years attending Sligo University Hospital (SUH); (2) current parental feeding styles being utilised; (3) whether parents were able to correctly classify their own weight status and their child's and whether this was associated with parental misclassification of their own weight status and (4) whether there is an interest in further information in this area and what form this information/guidance should take.

2. Materials and Methods

Ethical Approval

Ethical approval was granted by the Research Ethics Committee at Sligo University Hospital.

Study design

Cross-sectional study

Participants

Parents of children aged 2-5 years who attended a paediatric outpatient clinic in Sligo University Hospital (SUH) were invited to participate in the study. Only the parent attending the clinic with the child was invited to participate.

Exclusion Criteria

Any individual who fell into the following categories were excluded from this study; a child not within the age range (2-5 years), mothers who were pregnant (due to the impact on body composition and weight), any individual who had a cast on or a heavy object that could not be removed and any individual who couldn't speak English.

Data collection

Data were collected between September 2018 and May 2019. All parents attending the clinic with their child were approached to participate. An information sheet was provided to all participants detailing the study and any questions about the study were addressed. It was made clear that participation was voluntary, and individuals could choose to withdraw from the study at any stage. Informed written consent was obtained from all parents in the study before enrolment.

Anthropometry Measurements (AM)

Weight and height were measured in both parents and children. Weight was measured in kilograms (kg) using a *Seca* clinical electronic weighing scale to the nearest 0.1kg for both parents and children. A wall mounted stadiometer (*Seca*; Model 213 1821129) was used to measure height in centimetres (cm) to one decimal place for children. A portable stadiometer was used to measure parent's height. The subjects stood up straight with their head in the Frankfort plane position when their height was taken. Subjects wore light clothing and all other heavy clothing/objects were removed when both measurements were recorded. The heavy objects included shoes, jewellery, mobile phones, wallet/purse, car keys etc.

*Calculation of body mass index (BMI)**Parents*

Parent BMI was calculated using the World Health Organisation (WHO) BMI equation for adults over 20 years (World Health Organisation, 2020; Jelliffe and Jelliffe, 1979) which was $\text{Weight(kg)}/\text{Height(m}^2\text{)} = \text{BMI kg/m}^2$. The answer was rounded to the nearest 0.1kg/m². WHO classifications were used to determine parents weight status based on their BMI (Table 1).

Table 1 The BMI value related to weight status classification in adults (World Health Organisation, 2020; Jelliffe and Jelliffe, 1979)

BMI (kg/m ²)	Classification of weight status
< 18.5	Underweight
18.5 – 24.9	Healthy weight
25.0 – 29.9	Overweight
>30.0	Obese

Children

Child BMI was calculated by the following equation $\text{Weight(kg)}/\text{Height(m}^2\text{)} = \text{BMI kg/m}^2$. The answer was rounded to the nearest 0.1kg/m². The BMI was then plotted on an age and sex specific growth chart to determine the percentile. Classifications for these are given in Table 2 (Royal College of Paediatrics and Child Health 2012a; Royal College of Paediatrics and Child Health 2012b).

Table 2 BMI percentile cut off marks for weight status classification in children (Royal College of Paediatrics and Child Health, 2012a; Royal College of Paediatrics and Child Health, 2012b).

BMI percentile	Classification of weight status
<2 nd	Underweight
2 nd – 90 th	Healthy weight
>91 st	Overweight
≥ 98 th	Obese

*Questionnaires**Demographic Questionnaire (DQ)*

The DQ was developed and piloted by the student researcher and tested with the paediatric nursing and dietetic team and medical staff (n= 6) in SUH to ensure face validity and usability. Demographics, such as the child's age and gender, were recorded as well as information on; parental perceptions of their child's weight status and their own weight status, how concerned they were about their child becoming overweight or obese in the future, how they felt about discussing weight with doctors during consultations, along with their perceptions on obtaining healthy lifestyle information, what aspects of healthy lifestyle information they would like to attain and how they would like to receive the information. Questions were completed by all parents independently. This questionnaire included one open ended question on the preferred delivery options of receiving healthy lifestyle information.

Parental Feeding Style Questionnaire (PFQ)

A validated questionnaire assessed the type of parental feeding styles parents use most frequently (Wardle *et al.*, 2002). The four feeding styles assessed were; instrumental, control, emotional and encouragement feeding (see Table 3). There were 27 questions within the PFQ. Each question had 5 response options. The responses for these questions were scored using a standard scoring system; never =1, rarely = 2, sometimes = 3, often = 4, always = 5. Five of the control feeding style questions were assessed on a reversed scoring system. Where never would attract a score of 5, rarely would be 4, sometimes still equals 3, often becomes 2 and always was 1. The mean for each feeding style was calculated. The feeding style with the highest mean indicated the feeding style utilised the most. The administration of the PFQ and scoring system was unaltered from the original research paper in which it was created (Wardle *et al.*, 2002).

Table 3 Description of the four feeding styles assessed (Wardle *et al.*, 2002)

Feeding Styles	Description of Feeding Styles
Instrumental	Using food as a reward.
Control	Restricting food based on personal beliefs of the food source.
Emotional	Using food as a response to different emotional states.
Encouragement	Supporting food consumption usually with foods described as being healthy.

Statistical Analysis

All data obtained from the AM, DQ AND PFQ were analysed using SPSS (Version 24). Descriptive statistics were used for the analysis of the parent and child demographic characteristics. An independent t-test was used to determine if the correct weight status of the child influenced parental feeding style. Parental perception of their own weight status and their child's weight status was analysed using chi-square. To determine the correlation between parental misperception of their own weight status and that of their child's weight status a chi-square was also performed. To identify if parental perception of their child's weight status or actual weight status of the child was associated with parents' feelings around discussing weight with a doctor, a chi-square was performed.

3. Results

Participant Characteristics

71 participant units (parent and child) were approached to take part in this study, 60 were enrolled and 50 completed all aspects of the study, giving a response rate of 70% (Figure 1). The majority of the children were male (n=32, 64%) and of a healthy weight status (n=36, 72%) with a mean age of 3.3 (± 1.0) years (Table 4). The majority of adults were overweight (n=26, 52%). Most parents (n=44, 80%) were unconcerned about their children's weight (Table 5).

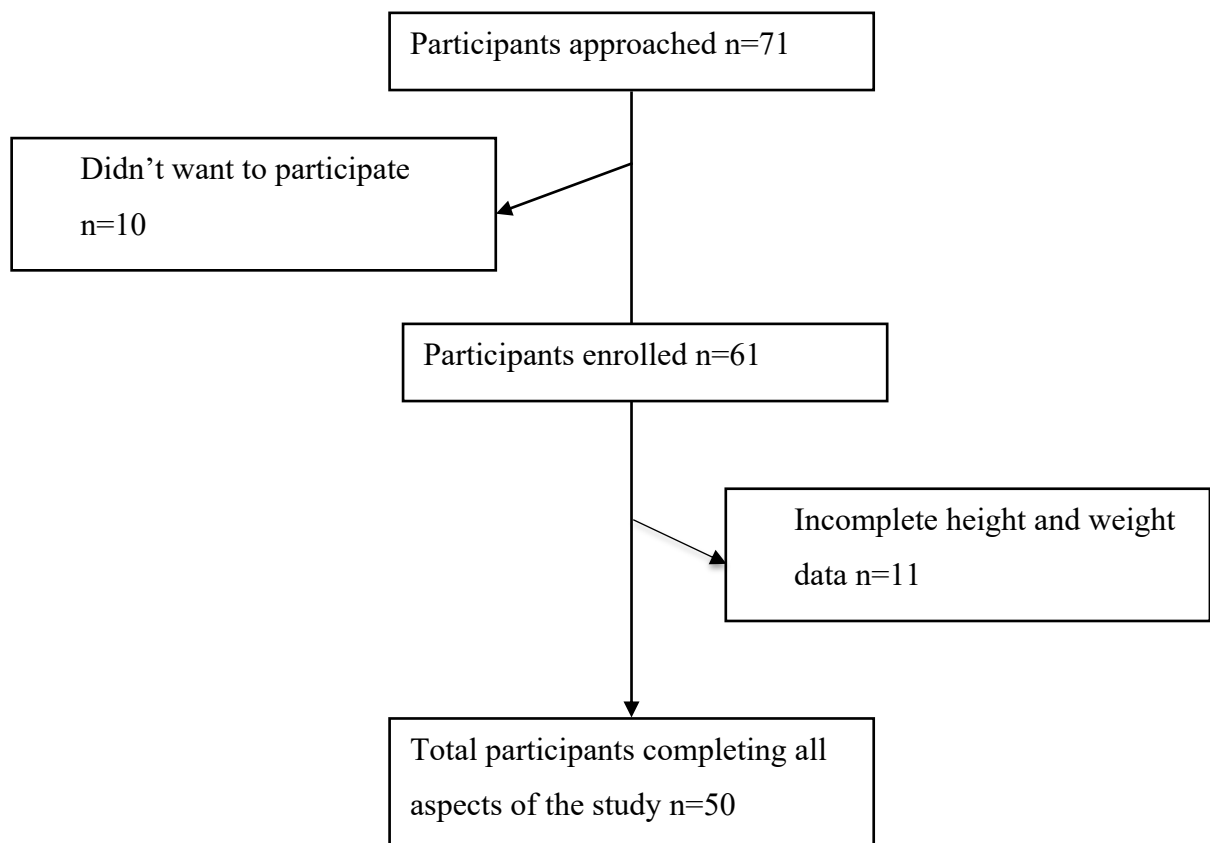


Figure 1 Flow diagram of participants approached for participation in a cross-sectional study to determine Weight Status of Children aged 2-5 years old, attending a paediatric outpatient clinic in Sligo University Hospital and its Association with Parental Feeding Style and Parental Perceptions of Weight Status

Table 4 Characteristics of the parents and children who attended a paediatric outpatient clinic in Sligo University Hospital (n=50) and completed all aspects of data collection.

Child characteristics	n (%)
Males	32 (64%)
Females	18 (36%)
Healthy weight	36 (72%)
Overweight	11 (22%)
Obese	3 (6%)
Age, <i>years</i> . mean (SD)	3.3 (1.0)
Adult Characteristics n (%)	
Healthy weight	24 (48%)
Overweight	14 (28%)
Obese	12 (24%)

Table 5 Preferred parental feeding style and parental concern about childhood overweight or obesity (n=50).

Preferred feeding style	
Instrumental feeding	1 (2%)
Control feeding	8 (16%)
Emotional feeding	1 (2%)
Encouragement feeding	40 (80%)
Parental concern of childhood overweight or obesity in the future	
Very unconcerned or unconcerned	44 (88%)
Concerned or very concerned	6 (12%)

Feeding Style

The most common feeding style was encouragement feeding (n=40, 80%) The weight status of the child was associated with parental feeding style (p=0.00). This was determined using an independent t-test. Table 6 outlines the relationship between the different types of feeding styles and child's weight status.

Table 6 The frequency of parental feeding style and its association with a child's weight status.

Feeding style	Mean \pm SD Total cohort	Parents whose child had a healthy weight status	Parents whose child had an overweight/obese weight status	p- value*
Instrumental	2.0 \pm 0.1	2.0 \pm 0.2	2.0 \pm 0.0	0.21
Control	1.8 \pm 0.4	1.8 \pm 0.4	1.9 \pm 0.3	0.02
Encouragement	1.2 \pm 0.4	1.3 \pm 0.4	1.0 \pm 0.3	0.00
Emotional	2.0 \pm 0.1	2.0 \pm 1.7	2.0 \pm 0.0	0.21

* Independent t-tests were used to determine the difference between parents of children of a healthy weight status compared to parents of children with an overweight or obese weight status.

Perception of weight status

Table 7 illustrates parental perception of their own and their child's weight status against the parent and child's actual weight status. The majority of parents correctly classified their child's weight status when they were in a normal weight category. Misclassification of a child's weight status was seen to be highest in the overweight category. There was a significant association between the actual child's weight status and the parental perception of the child's weight status $\chi^2(4) = 16.348$, $p = 0.00$. Chi-square analysis was used to determine this.

Parental misclassification of their own weight status was determined using chi-square analysis. Parental weight misclassification was present in terms of under, and overestimation, of their weight status. 44% of parents correctly categorised their weight status. Misclassification of a parent's weight status was seen to be equal in terms of under and overestimating an overweight category. There was a significant association between the parent's actual weight status and their perception of their own weight status $\chi^2(6) = 16.525$, $p = 0.01$.

Table 7 Child and Parent actual weight status and parental perceptions of same

Parental perception of their child's weight status	Actual weight status of child		
	Normal weight n (%)	Overweight n (%)	Obese n (%)
Underweight	1 (2%)	0 (0%)	0 (0%)
Normal weight	35 (70%)	11 (22%)	2 (4%)
Overweight	0 (0%)	0 (0%)	1 (2%)
Obese	0 (0%)	0 (0%)	0 (0%)
Parental perception of their own weight status	Actual weight status of parent		
Underweight	1 (2%)	1 (2%)	0 (0%)
Normal weight	16 (32%)	6 (12%)	4 (8%)
Overweight	6(12%)	7 (14%)	3 (6%)
Obese	1 (2%)	0(0%)	5 (10%)

The percentage in brackets represents the proportion of the total sample size not just that category

Association between the misperception of parents and child's weight status

No significant association was found between parental misperception of their own weight status and the misclassification of their child's weight status $\chi^2(1) = 1.090, p = 0.29$.

Parents feelings around discussing weight

The majority of parents reported that they felt comfortable talking about weight with a doctor ($n = 37, 74\%$). While 14% of parents said they were uncomfortable and 12% reported to be neither comfortable nor uncomfortable. No significant association was found between the correct classification of a child's weight status and parents' comfort around discussing weight with doctors $\chi^2(8) = 14.645, p = 0.07$. There was a significant association between parental classification of a child's weight status and comfort around discussing weight with doctors $\chi^2(8) = 16.972, p = 0.03$.

Interest in receiving additional information

There was a keen interest ($n = 42, 84\%$) in receiving health and lifestyle information within the clinical setting, with a similar interest being demonstrated for information on diet, physical activity and mindfulness (Table 8). There was a preference ($n = 36, 72\%$) for this information to be delivered in the format of a leaflet.

Table 8 Parents interest in obtaining healthy lifestyle information within a clinical setting; n=42 (84%).

Preferred topics of healthy information	
Diet	17 (34%)
Physically activity	17 (34%)
Mindfulness	16 (32%)
Preferred way to receive information	
Verbally	11 (22%)
Leaflets	30 (60%)
Videos	6 (12%)
Email	2 (4%)
Social media	1 (2%)

4. Discussion

The main findings from this study illustrate that the prevalence of overweight and obesity amongst children aged 2-5years within the Sligo region is 28%. The parental feeding style reported to be utilized by parents most frequently was encouragement feeding and this was associated with the child's weight status ($p=0.00$). Parents were found to be poor at correctly classifying their child's weight status as well as their own weight status. Parents were unable to correctly classify an overweight status in children. No association was found between parental misclassification of their own weight status and their child's weight status.

Recently, the rates of childhood overweight and obesity have increased globally and nationally, causing a public health concern (World Health Organisation, 2019; Department of Health, 2016). This study found 28% of children fulfilled the definition of an overweight or obese weight status. These findings are slightly above the national rates of childhood overweight/obesity as 1 in 4 (25%) children have previously been reported to be overweight or obese (Department of Health, 2016). More than half of the parents in this cohort attained an overweight/obese weight status which is just below the national rates of adulthood obesity as 60% of adults are said to be overweight/obese (Department of Health, 2016). It is important that region-specific studies such as this one are carried out to inform local policy and actions, as the prevalence of these weight statuses will not be the same in all regions (Myers *et al.*, 2015). Studies have found parents who are overweight or obese to be more likely to have children with an overweight/obese weight status (Bahreynian *et al.*, 2017). Multiple factors contribute to this statement such as parental recognition of their child's true weight status, parental feeding style used and the home food environment (Allison *et al.*, 2015; Campbell, Crawford and Hesketh, 2007; Couch *et al.*, 2014).

In this study, parents were poor at correctly classifying their child's weight status with no parent recognising a child with an overweight status. Studies have linked the reasons for parental misclassification to protective factors, societal norms and the phenomenon of a growth spurt

(Morgan, Thornton and McCrory, 2016). Children who are overweight or obese and/or male are more likely to have their weight status interpreted incorrectly by all adults, not just parents (De La O *et al.*, 2009). As children increase in age the misclassification of one's weight status also increases (Queally *et al.*, 2018). The findings in this study supports the current literature that parental misclassification of a child's weight status does not greatly influence parental misclassification of their own weight status (Allison *et al.*, 2015).

Discussion around weight can be a difficult topic for healthcare professionals to bring up with their patients (Blackburn *et al.*, 2015). In this study, 74% of parents reported that they were comfortable discussing their child's weight status with a health care professional. As the majority of children in this cohort are of a healthy weight status, this could potentially have influenced how they felt about this topic. Research has found parents who have a child of an unhealthy weight status dislike discussion around the topic of weight (Nnyanzi *et al.*, 2016). This could be due to an element of feeling responsible for the child's weight status or previous attempts to help reduce the child's weight status which did not succeed (Davidson and Vidgen, 2017). While there was no significant association between child's weight status and being comfortable discussing weight status, there was a significant association between how parents perceived their child's weight status and how comfortable they were discussing weight status.

The literature reports that parental concern around weight can be associated with the use of restrictive feeding and parent's encouragement of avoidance of food (Ek *et al.*, 2016). This feeding style is associated with an overweight status (Tschann *et al.*, 2015). The majority of parents in this study reported using encouragement feeding, which is associated with a healthy weight status (Lo *et al.*, 2015). Similar to parental classification, parental feeding style is also influenced by multiple factors such as the child's weight status, age and gender (Lipowska *et al.*, 2018; Rodgers *et al.*, 2013). Parents can alter their feeding style dependent on their perception of their child's weight status (Lee and Keller, 2012; Ek *et al.*, 2016). Parental feeding style is a strong factor in the development of a child's set of eating behaviours as is the home food environment (Campbell, Crawford and Hesketh, 2007; Couch *et al.*, 2014). From observation, the majority of parents attending the outpatient department in this study were female; however, the actual number of females attending wasn't recorded. Recent research has shown that household dynamics are changing and fathers are beginning to impact their child's dietary intake to a greater extent (Scaglioni *et al.*, 2018). It will be interesting to see how this shapes feeding styles of parents and eating behaviours of children in future studies.

Interestingly, 84% of parents reported that they were interested in receiving healthy lifestyle information. This could illustrate high levels of motivation from parents and possibly the desire to act as a protective barrier for their child's weight status and ultimately their health status (Colquitt *et al.*, 2016). In this study, 88% (n=44) of parents reported that they were either unconcerned or very unconcerned about their child being overweight or obese in the future, highlighting the lack of parental awareness around childhood overweight/obesity (Nnyanzi *et al.*, 2016). Parental recognition of childhood obesity is one of the first steps in tackling this public health issue (Kelleher *et al.*, 2017; Department of Health, 2016). If parents do not recognise that their child is overweight or obese, they are less likely to enrol their child in obesity prevention/treatment programmes (Kelleher *et al.*, 2017; Department of Health, 2016). The design of these national programmes is to empower parents and teach children healthy lifestyle behaviours that they can utilize throughout life (Department of Health, 2016). It is very positive that such a large number of parents in this study were interested in receiving education material on topics such as physical activity, nutrition and mindfulness.

Limitations

This study supports current literature that parental classification of a child's weight status in an overweight/obese weight category is poor. However, there are some limitations that need to be considered when interpreting the data. The sample size of this data is small $n=50$, which can impact on the statistical significance found (Faber and Fonseca, 2014). As the PFQ was self-reported, the responses may not have been accurate. While the PFQ used in this study is validated, it cannot control or identify where answers have not been honest. Reason for appointment with the paediatrician was not obtained, therefore it is unknown if participants type of treatment/consultation influenced weight status, perceived weight status or feeding style. Other data not obtained was the parent's gender, this would have allowed for a gender breakdown on weight status and differentiation in feeding styles used.

5. Conclusions

Overall, this study found an overweight/obesity prevalence of 28% in children aged 2-5 years of age, living in the North West of Ireland. Our findings add support to the literature that parents are poor at recognising an overweight or obese weight status in children of this age. Interventions need to be implemented to aid parental recognition of childhood obesity as this may increase engagement with existing programmes. There was an interest in additional health information in this cohort and a willingness to discuss weight with a healthcare professional.

6. Future Work

On the basis of these findings, future work should aim to promote an increase in parental recognition of childhood obesity as well as engagement in existing obesity prevention/treatment programmes. These actions could allow for a decrease in the incidence of childhood obesity as well as decreasing the risk of children developing adulthood obesity in the future. Future research could look into factors which are resulting in parents not recognising childhood overweight/obesity. In terms of action, there was a strong interest among parents in receiving extra information, we therefore recommend the provision of information on lifestyle behaviours, preferably in the form of leaflets in outpatient departments and GP settings. Parents reported being comfortable discussing their child's weight, therefore all healthcare professionals should take the opportunity to discuss weight and healthy lifestyles where appropriate.

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