

Maternal Perspectives on Growth and Nutrition Counseling Provided at Preschool Well-Child Visits

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Background: The inclusion of growth assessment and nutrition-related anticipatory guidance in all well-child visits is recommended. Although prior studies have assessed whether these topics are discussed, the content of the discussions has not been explored from the maternal perspective.

Objective: To explore what mothers of preschoolers recall and understand about growth assessment and nutrition anticipatory guidance provided at their child's most recent well-child visit.

Methods: Qualitative, semistructured telephone interviews were performed with 20 mothers of preschoolers recruited from a Head Start program. Interviews were recorded and transcribed. Themes were identified and refined in an iterative process.

Results: Three main findings emerged: 1) although mothers generally recalled the use of growth charts and often recalled their child's height and weight percentiles, they were generally unable to articulate the meaning of these percentiles; 2) most mothers stated that their nutrition-related decisions were not influenced by growth chart findings. However, when growth chart findings were interpreted as positive, mothers found them reassuring. Conversely, when growth chart findings were interpreted as negative, mothers discounted the growth chart in favor of other comparisons of growth; 3) a considerable proportion of mothers reported that nutrition was not discussed at the most recent well-child visit, which mothers commonly attributed to a lack of weight or feeding problems for their child.

Conclusion: Among the low-income mothers studied, growth chart use and findings were memorable but frequently misunderstood, while nutrition-related anticipatory guidance was not consistently recalled. These findings suggest opportunities to improve physician-patient communication regarding these topics.

Key words: anticipatory guidance ■ maternal ■ preschoolers ■ nutrition ■ growth

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INTRODUCTION

Growth assessment and nutrition-related anticipatory guidance are key components in the provision of well-child care.¹⁻³ In light of the current epidemic of childhood obesity in general,⁴ and in low-income populations in particular, these issues warrant even greater attention. Thus, the American Academy of Pediatrics strongly encourages addressing growth and nutrition at each well-child visit.⁵ Nevertheless, time constraints impose limits on the number of issues that might be meaningfully discussed during these relatively brief encounters.⁶ Consequently, providers are faced with the formidable task of distilling the most salient information for each patient and providing this information to parents in an understandable manner.

Growth assessment and nutrition-related anticipatory guidance may be particularly pertinent during the preschool years, when potentially lifelong habits and tastes are formed.⁷ Optimizing nutritional guidance provided during preschool well-child visits has the potential to aid in obesity-prevention efforts. Such efforts are especially important for children living in low-income households, who may be at higher risk of obesity.^{4,8}

Studies have shown that the majority of pediatricians and parents report discussing growth and nutrition during well-child visits.⁹⁻¹² However, we have fewer data regarding later parental recall of the content of this counseling provided during well-child visits. Additionally, parental understanding of the information provided remains unclear from prior research. Previous work has evaluated the perceptions of Latina mothers and found that their cultural beliefs may limit the effectiveness of traditional approaches to nutrition counseling.¹³ Howev-

er, perceptions of growth and nutrition counseling along with the connection between the two have not been explored fully among low-income mothers in general.

To inform future work in enhancing the effectiveness of growth and nutrition-related assessment and counseling, we designed a hypothesis-generating study. Our objectives were to explore what mothers recalled and understood about the growth and nutrition counseling provided by their child's primary care physician at their most recent preschool well-child visit.

METHODS

Study Design

The focus of this project was to explore the content of growth and nutrition counseling during well-child visits from the maternal perspective, with a particular emphasis on mothers' understanding of the information they received. Thus, we chose to use qualitative methods to allow mothers to express their thoughts in their own voice and to facilitate our exploration of common experiences and patterns that may exist among this population of mothers.

Between June and December 2005, semistructured telephone interviews were conducted with mothers whose preschool-aged children were enrolled in Head Start, a federally funded school readiness program for low-income families,¹⁴ in one community in Michigan.

Recruitment

Purposive sampling¹⁵ was performed to recruit low-income mothers of preschool well-child visits with their primary care physician. We recruited mothers of preschoolers without regard to the weight status of their children; as we believe in this age group, where many children with risk factors for obesity may not yet be obese, prevention is particularly important. Hence, our interest is in growth and nutrition counseling for all preschoolers.

A recruitment instrument was sent to mothers of students in a Head Start program to invite them to participate in an in-depth interview on childhood nutrition. Included in the recruitment instrument were items related to maternal and child demographic and anthropometric characteristics, along with permission to obtain child height and weight data from Head Start records. Child body mass index (BMI) percentiles¹⁶ were calculated from measured anthropometrics in Head Start records or from maternal report of height and weight in six cases where Head Start records were not available.

Mothers were compensated with a \$10 gift card for participation. Fifty-four mothers agreed to participate in the interview. Interviews were performed with the mothers who could be contacted by telephone until thematic saturation was achieved.

Interview Guide

An interview guide was developed, piloted and revised in an iterative process. The instrument included specific questions on physician-parent interaction about growth and nutrition. The instrument included both closed-ended questions (e.g., "Did the doctor show you the growth chart at the last well-child visit?") and open-ended questions (e.g., "What is your understanding of what percentiles mean?"). Follow-up probes were used as needed to clarify participant responses.

Data Collection

In-depth, semistructured telephone interviews were performed by the lead author, who has been trained in qualitative interviewing (Woolford). The interviews ranged from 20–40 minutes in duration and were digitally recorded in their entirety. Mothers were asked to answer the questions in reference to their oldest child enrolled in Head Start during spring 2005. Signed consent was obtained from the participants prior to the interviews. The study protocol was approved by the institutional review board of the University of Michigan, Ann Arbor, MI.

Data Management and Analysis

All interviews were digitally recorded in their entirety and transcribed by independent transcriptionists (248 pages). Transcripts were then checked for accuracy before coding was performed. The transcribed data were entered into a computerized qualitative software program (NVivo, QSR International, Victoria, Australia). Preliminary coding was performed by the principal investigator and refined through discussion among all research team members.

Transcripts were read and coded independently by two authors (Woolford: female pediatrician with public health training and training in qualitative research; and Clark: female, MPH with extensive research experience); a third author (Davis) adjudicated any differences. Transcript data were systematically analyzed using the constant comparative method.¹⁷ Within the two main topic areas to be explored, common experiences and patterns were identified and refined in an iterative process. Using the qualitative software program, all comments corresponding to the two major topics were listed. From these lists, representative comments were selected for the purpose of illustration. There was high convergence of the thoughts expressed and, after 15 interviews, no new responses emerged regarding these topics; thus, interviews were terminated after 20 had been completed.

RESULTS

Of the 20 mothers interviewed for this study, the median age was 28 years (range 19–54 years). The distribution of maternal race was 70% white, 20% black

and 10% other. Self-reported median maternal weight was 190 lbs with a range of 118–312 lbs. The index children had a median age of 4 years; 16 of the 20 were <85th percentile for age- and gender-specific BMI and one had a BMI >95th percentile. Seventy-four percent of the children received well-child care from pediatricians and 26% from family physicians. All interviews occurred within one year of the most recent well-child visit; the median interval was three months.

Two main topic areas were explored in the interviews; these topics were: 1) maternal recall and understanding of growth charts and 2) the discussion of nutrition.

Growth Charts

Growth chart use and findings were typically recalled. All but one mother recalled seeing the growth chart at their child's most recent well-child visit, and mothers were typically able to recall their child's height and weight percentiles.

Quote 1.1

Interviewer: Sometimes at well-child checks doctors will use something called a growth chart. Do you know what the growth chart is?

Mother: Yeah.

Interviewer: Did the doctor show it to you at the last visit?

Mother: Every time.

Interviewer: And do you remember where your son was on the growth chart?

Mother: I think he was in the 75th percentile for both height and weight if I'm not mistaken.

Growth charts were often not clearly understood. Mothers' interpretations of these percentiles suggested they did not have a clear understanding of their meaning. Typical exchanges regarding growth charts included:

Quote 1.2

Mother: I think he is the 50th—no, the 60th—percentile for weight and the 60th percentile for height too.

Interviewer: Did your doctor explain to you what that means or do you have an understanding of what that means?

Mother: He didn't really explain it but my understanding is that, out of 100 children, 65 of them are in that area of growth.

Quote 1.3

Interviewer: And at the last physical at your doctor's office, did they use a growth chart?

Mother: I believe they did, but I can't remember what they told me. I can remember at my last WIC appointment they told me that she was in the 75th percentile for height and weight.

Interviewer: And did they explain to you what that means?

Mother: Not necessarily, no. I'm under the assumption that being higher is good.

Another mother stated:

Quote 1.4

Mother: Well if you go in one time and he's in the 50th percentile and the next time and it's at the 75th, then that would let me know that he's growing, the way that I would want him to grow—to be bigger.

Growth chart findings interpreted as normal were reassuring. When mothers believed the growth chart indicated appropriate growth, they found it reassuring and validating of current practices.

Quote 1.5

Mother: It makes me know that I'm doing all right because my kid is in the 75% where she should be. Basically it tells me that I'm doing a good job. I think every parent needs to hear it at least occasionally.

Growth chart findings interpreted as abnormal were discounted. When mothers perceived that the growth chart suggested something other than a normal pattern, they appeared to discount it and rely upon other comparisons of growth instead. One mother, in reference to a child who appeared to be overweight based on the growth chart, stated:

Quote 1.6

Mother: You know what, I think that each child grows individually their own way, I don't think it's really fair to group them into those percentiles like that, but I, you know, that's just me. What the charts say doesn't make a difference. Because I've seen kids that they say are overweight, but they don't look overweight.

Another mother highlighted a distinction between the terms used to describe weight that might affect the impact of abnormal findings:

Quote 1.7

- Mother:** She just said he was overweight for his age ... My son wasn't obese.
- Interviewer:** If she said he was obese, would that have made a difference for you?
- Mother:** Yeah, it would have because there are a lot of parents who let their kids indulge. I fed him when he was hungry, but I didn't shovel it into his mouth, you know what I mean? There are a lot of obese kids, and I don't want my children to be that, but I don't want them to be underweight either.
- Interviewer:** Okay. If, at the same weight, if she had said, "oh he's obese," would that have had more of an impact on you?
- Mother:** Yes it would have.

Growth chart findings rarely influenced nutrition-related decisions. Most mothers (n=13) reported that growth chart findings did not influence their nutrition-related decisions. Of the four mothers who stated growth chart findings influenced their nutrition-related decisions "a little" or "somewhat," three had children with a BMI \geq 85th percentile. However, even when growth chart findings were understood as indicating overweight, parents minimized this finding and did not convey a sense that action was required. One mother whose child had a BMI $>$ 85th percentile offered this response to the question, "Do growth chart findings influence how you feed your child?"

Quote 1.8

- Mother:** A little maybe. Because you can see where your child is supposed to be. I mean, I don't know, for me it's easier when things are laid out in front of me. And I can see if, if he was way overweight, you know, and he was like way above average ... I would be able to look at that and be like, wait, something is really going on, we really need to cut back or talk to a nutritionist, figure out something different to do.

Nutrition-Related Discussion

Mothers were asked whether nutrition was discussed at the most recent well-child visit. Six mothers recalled advice being given, and a further six recalled only that the physician asked them questions about nutrition. For example:

Quote 2.1

- Interviewer:** Did the doctor talk with you at all about nutrition?

- Mother:** She said everything was fine. She just asked me, you know, how often she eats—which she eats about five times a day, three big meals and two snacks—and what she likes to drink and that was basically it.

Eight mothers did not recall any questions or discussion regarding nutrition.

Nutrition discussions were considered unnecessary when growth was normal. The most common reasons perceived by mothers for not discussing nutrition were that the child's growth was normal, there were no problems with feeding, and the mother had no nutrition-related questions. Typical responses included:

Quote 2.2

- Mother:** No, he's right on target as far as growth and his hemoglobin and all of that was fine. He really doesn't have any problems eating or anything like that.

Quote 2.3

- Mother:** I don't remember that she did. But none of my kids are overweight so I don't think food has really ever been an issue.

Physicians were not the only source of nutrition-related information for the mothers in this study. Approximately half the mothers interviewed mentioned other sources of nutrition-related information, such as dentists, staff from Head Start or from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC).

DISCUSSION

Physicians face major challenges in trying to address all recommended anticipatory guidance topics during well-child visits, as they strive for both quantity of topics and quality of messages.¹⁸ As the number of topics included increases, parental recall of those topics decreases.¹² Among the topics that vie for attention in preschool well-child visits, growth and nutrition are particularly important in light of the current epidemic of childhood obesity.^{5,19} The findings of this study reveal specific aspects of maternal recall and understanding of the information discussed during preschool visits about growth and nutrition that are important to improving well-child care.

From our hypothesis-generating study of low-income mothers, two primary topics were explored. Within these, we have developed specific hypotheses to explore in future work.

Growth Chart Use and Understanding

Our findings suggest that the use of growth charts is a memorable component of preschool well-child visits. The

presentation of percentiles was also frequently recalled by mothers but often not clearly understood. A common interpretation of a given percentile was that it indicated the percentage of children who are at that weight or height, leading to the misconception that the higher the percentile, the more children who were also at that point. Mothers tended to equate doing well on the growth curve with being among the higher percentiles. In other words, in physicians' discussions of numbers and percentiles, messages about patients' growth or nutritional risks may be getting lost.

These findings suggest that growth data might be communicated to mothers more effectively if there were a tool to emphasize the patient's current weight status, risk or trend rather than focusing on percentiles.

Nutrition-Related Discussion

Mothers in this study recalled nutrition-related discussions less often than they recalled seeing growth charts. Only six mothers recalled receiving any nutrition-related anticipatory guidance. Mothers stated that having a child who they thought was growing well and/or experiencing no difficulty feeding their child led them to not seek nutrition-related information. Although there were mothers who recalled being asked a question about nutrition, generally they did not recall this being followed by any specific advice.

These findings have implications for physicians who are concerned with obesity prevention. Reliance upon the current growth of a preschooler to determine the need for nutrition-related information may underestimate that need, as their risk for future obesity may more accurately be determined by other factors such as family history.²⁰ Emphasizing nutritional practices that have been shown to affect BMI, such as avoidance of fast food and sweetened beverages along with promotion of fruit and vegetable intake, at this early stage in life may be important to obesity prevention efforts.²¹⁻²³

Though this study measures only mothers' recall of well-child encounters rather than documenting the actual occurrence of any discussion, our findings suggest a missed opportunity for memorable information about nutrition to be provided to all children. Consequently, we believe that physicians need more effective ways to highlight the importance of recommended dietary guidelines to parents of preschoolers.

Growth Chart/Nutrition Connection

Growth chart findings generally did not influence mothers' nutrition-related decisions for their children. Even mothers whose children were overweight reported only a limited influence of growth chart findings on nutrition-related decisions for their child. Consistent with previous research, we found that when the growth chart findings indicated a child was not growing appropriately, mothers discounted that information and placed more importance on other comparisons of growth.²⁴ These

findings suggest that, in situations where a preschooler's growth is abnormal, growth chart findings do not influence changes in feeding patterns. Alternative methods are needed to more clearly link growth patterns with specific nutritional guidance. Additionally, changes in the terminology used from overweight to obese, as recently recommended by the Institute of Medicine, may influence the impact of abnormal growth chart findings.

Strengths and Limitations

This was a qualitative study with a modest sample size, designed to generate hypotheses about understanding, impact and recall from the maternal perspective, which would be difficult to explore using quantitative methods. After 20 interviews, thematic saturation was achieved, suggesting that the findings may be common to the population from which our sample was obtained. This will be tested in future quantitative work.

The interviews were performed via telephone, which may have allowed for more honest answers than a face-to-face interview. However, such interviews limit the ability of the interviewer to read nonverbal communications. Telephone interviews offered the advantages of allowing participation from low-income parents of young children who may have had difficulty attending an interview in person and who may not have been accepting of interviewers visiting their homes to perform the interviews.

The results of this study are based on mothers' recollections of their interactions with physicians, not observation of these interactions. Therefore, results reflect the recall of information provided during well-child visits, rather than documenting specific content of these encounters. Nevertheless, maternal recall of anticipatory guidance is arguably equally relevant to behavior change in the home as whether such guidance was presented. Well-child visits for preschoolers typically occur annually; thus, the median interval (three months) from exam to interview seen in this study, if anything, overestimates the ability of parents to recall messages given during well-child visits that are intended to influence behavior for a year at a time. Addressing the question of whether more frequent interactions are warranted is beyond the scope of this study.

CONCLUSION

For mothers of preschoolers, growth chart use and findings are memorable but frequently misunderstood, while nutrition-related anticipatory guidance is less frequently recalled. As the medical community continues to shape its response to the childhood obesity epidemic, these findings suggest opportunities to improve physician-patient communication on growth and nutrition. Future work is required to explore different approaches to the presentation of: 1) growth parameters that would both promote understanding and influence behavior and 2) memorable nutrition-related anticipatory guidance that would underscore its relevance for all children.

REFERENCES

1. American Academy of Pediatrics. Committee on Practice and Ambulatory Medicine. *Recommendations for Preventive Pediatric Health Care*. Elk Grove Village, IL: Pediatrics. 2000;105:645-646.
2. Green M, Palfrey JS, eds. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*. 2nd ed. Arlington, VA: National Center for Education in Maternal and Child Health; 2000.
3. American Academy of Pediatrics. Committee on Psychological Aspects of Child and Family Health. *Guidelines for Health Supervision III*. Elk Grove Village, IL: American Academy of Pediatrics; 1997.
4. Ogden CL, Flegal KM, Carroll MD, et al. Prevalence and Trends in Overweight among U.S. Children and Adolescents, 1999-2000. *JAMA*. 2002;288:1728-1732.
5. Committee on Nutrition Prevention of Pediatric Overweight and Obesity Policy Statement. *Pediatrics*. 2003;112:424-430.
6. Yarnall KSH, Pollak KI, Ostbye T, et al. Primary care: is there enough time for prevention? *Am J Public Health*. 2003;93:635-641.
7. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics*. 1998;101:539-549.
8. Bhattacharya J, Currie J, Haider S. Poverty, food insecurity, and nutritional outcomes in children and adults. *J Health Econ*. 2004;23:839-867.
9. Galuska DA, Fulton JE, Powell KE, et al. Pediatrician Counseling About Preventive Health Topics: Results From the Physicians' Practices Survey, 1998-1999. *Pediatrics*. 2002;109:e83.
10. Thomas Rattay K, Fulton JE, Galuska DA. Weight Counseling Patterns of U.S. Pediatricians. *Obes Res*. 2004;12:161-169.
11. Olson LM, Inkelas M, Halfon N, et al. Overview of the content of health supervision for young children: reports from parents and pediatricians. *Pediatrics*. 2004;113(suppl):1907-1916.
12. Barkin SL, Scheindlin B, Brown C, et al. Anticipatory guidance topics: are more better? *Ambul Pediatr*. 2005;5(6):372-376.
13. Crawford PB, Gosliner W, Anderson C, et al. Counseling Latina Mothers of Preschool Children About Weight Issues: Suggestions for a new Framework. *J Am Diet Assoc*. 2004;104(3):387-394.
14. Income guidelines for Head Start. www.headstartinfo.org/publications/im05/im05_01.htm. Accessed on 08/23/05.
15. Mason J. *Qualitative Researching*. London, UK: Sage Publications Ltd; 1996.
16. Centers for Disease Control. Body Mass Index: BMI for Children and Teens. www.cdc.gov/nccdphp/dnpa/bmi/. Accessed 08/10/05.
17. Glaser BG, Strauss AL. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York, NY: Aldine Publishing Co; 1967.
18. Schuster MA, Duan N, Regalado M, et al. Anticipatory guidance: what information do parents receive? What information do they want? *Arch Pediatr Adolesc Med*. 2000;154(12):1191-1198.
19. Institute of Medicine Committee on Prevention of Obesity in Children and Youth. *Preventing childhood obesity: health in the balance*. Washington, DC: National Academies Press; 2005.
20. Whitaker RC, Wright JA, Pepe MS, et al. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med*. 1997;337:869-873.
21. Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*. 2001;357:505-508.
22. Epstein LH, Gordy CC, Raynor HA, et al. Increasing fruit and vegetable intake and decreasing fat and sugar intake in families at risk for childhood obesity. *Obes Res*. 2001;9:171-178.
23. Pereira MA, Kartashov AI, Ebbeling CB, et al. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *Lancet*. 2005;365(9453):36-42. Erratum in: *Lancet*. 2005;365(9464):1030.
24. Jain A, Sherman SN, Chamberlin LA, et al. Why don't low-income mothers worry about their preschoolers being overweight? *Pediatrics*. 2001;107(5):1138-1146. ■

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