
SCHOOL NURSES AND CHILDHOOD OBESITY: AN INVESTIGATION OF KNOWLEDGE AND PRACTICE AMONG SCHOOL NURSES AS THEY RELATE TO CHILDHOOD OBESITY

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Background: Childhood obesity has escalated to an alarming proportion in the last twenty years. It is currently the most preventable nutritional disease of the 21st century. Anecdotal literature suggests that school nurses play a pivotal role in the fight against the escalating incidence of childhood obesity. However, research has not clearly shown that school nurses engage in health promotion behaviors that combat childhood obesity. Methods: A convenience sample of 103 New Jersey school nurses who attended county school nurses association meetings were surveyed. A 55-item tool was used to measure school nurses' knowledge and practice regarding childhood obesity. Results: While ninety-nine percent of the nurses are aware that childhood obesity is becoming more prevalent, more than 35% of the school nurses reported a lack of competence in recommending weight-loss programs for children. More than 65% rated using age-specific BMI to calculate childhood obesity "sometimes," "rarely," or "never." Conclusions: Data from this study indicates that

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New Jersey school nurses are knowledgeable regarding childhood obesity, yet many do not report levels of competence in recommending weight-loss treatment to promote healthy lifestyle choices for their students. Further research is needed to understand the barriers to health promotion practices among school nurses.

Keywords: Body mass index, Childhood, Obesity, Perceptions and knowledge, School nurse

INTRODUCTION

Caprio and Genel (2005) described childhood obesity as the most widespread and preventable nutritional disorder of the twenty-first century in the United States. The incidence of childhood obesity has increased substantially in the past two decades and affects children in the United States with an increasing prevalence. The National Health and Nutrition Examination Survey (NHANES) reported an increase in the number of overweight children in the United States over the past 40 years. The NHANES (1999–2000) survey data indicates that 15% of the nation's children are overweight, which is the prelude to childhood obesity. In fact, childhood obesity has tripled to an escalating proportion in the last 20 years (Ogden, Flegal, Carroll, & Johnson, 2002). According to the U.S. Centers for Disease Control and Prevention (CDC, 2004), more than 17% of New Jersey children under the age of 5 are overweight or obese, which is the highest rate in the country.

According to the CDC (2007), genetics, behavioral, and environmental factors influence childhood obesity. Given the dynamic exchange between these influences and the etiology of childhood obesity, early and appropriate interventions remain crucial. As the prevalence of childhood obesity increases, it will be important to assist parents and caregivers in understanding the importance of healthy lifestyles and behavior modification.

From an environmental perspective, the National Association of School Nurses (2002) advocate for the role of the school nurse in advancing the well-being, academic success, and life-long achievement of students. In accordance with that role, according to Kubik, Story, and Davey (2007), the widespread issue of childhood obesity requires attention from schools and healthcare workers. Although these authors suggest that school nurses play a primary role in obesity prevention services, references such as the well-respected Institute of Medicines' text by Koplan, Liverman, and Kraak (2005), gives little attention to the school nurse's role in childhood obesity prevention and intervention services. In addition, there is scant research regarding school nurses' knowledge and practice related to childhood

obesity prevention. The aim of this study is to describe New Jersey school nurses' knowledge and practice regarding childhood obesity.

LITERATURE REVIEW

Childhood Overweight and Obesity

Epidemiology

In 2004, Henry & Royer reported that childhood obesity affected more than nine million children in the United States. There has been a disturbing increase in childhood obesity in recent years, with the rate going from 6.5% in 1980 to 17.0% in 2006 among American children 6–11 years of age. The National Center for Health Statistics reported that one out of four children is either overweight or at risk for being overweight, which for many children may be a precursor to obesity (Hagerty et al., 2004). The proportion of children and adolescents who are overweight in the United States has increased by 7% increase since 1994 (Ogden et al., 2002).

Etiology, Contributing Factors and Context

Obesity is defined as a chronic condition characterized by an excessive or abnormal increase in the accumulation of fat cells in the body (Hagerty, Schmidt, Bernaix, & Clement, 2004). The etiology of obesity is an imbalance between caloric intake and energy expenditure (Hagerty et al., 2004). As conveyed by the CDC (2007), this imbalance is the result of genetic, behavioral, and environmental factors. Genetic risk factors include high birth weight, maternal diabetes, familial history of obesity, and early menarche. If one parent is obese, there is a 40% chance that the child will be obese in adulthood; this risk increases to 80% if both parents are obese (Hagerty et al., 2004). These risk factors can lead to obesity through a spiraling cycle of weight gain, which then contributes to a further decrease in physical activity and other health complications. An example of this cycle was seen in the longitudinal study of 138 Pima Indian 5-year-old children in Sacaton, Arizona. Salbe, Weyer, Lindsay, Ravussin, and Tattaranni (2002) reported that the percentage of body fat at 5 years of age was a factor in determining the percentage of body fat at 10 years of age ($R^2 = 0.53$).

Behaviors, such as a regular diet of fast food, can lead to an increase in caloric intake and childhood obesity. According to

Gance-Cleveland and Bushmiaer (2005), fast foods are more accessible than ever, with many of these foods processed, prepackaged, and containing high levels of sugar and fat. The availability to choose items such as soft drinks and fast food from vending machines has become the accepted behavior of today's culture. These authors note that meals eaten outside of the home have been shown to be a barrier to maintaining a healthy diet. The accessibility of fast food restaurants and the "super sized" mentality have allowed for increased portion size and high caloric intake (Gance-Cleveland & Bushmiaer, 2005).

Environments such as homes, child care centers, schools, and communities are all factors that influence behaviors related to food intake and physical activity, and all have an impact on childhood obesity according to Koplan, et al. (2005). Parents provide a strong influence on physical activity. Child care providers share responsibility with parents for setting healthy eating and physical activity habits. The increased hours of television viewing, computer usage, and video-game playing decrease the adolescents' opportunity for outside play and other physical activity (Drohan, 2004). According to a survey conducted by Action for Healthy Kids, fewer than 25% of American children get at least 30 minutes of any type of physical activity every day (*Health and Health Care in School*, 2005). Mosca (2006) suggests that additional reasons for decreased physical activities are increased violence, crime, and child abductions within communities, and unsupervised latch-key children, who have limited outdoor play and increased indoor sedentary lifestyles. Within the community, access to physical activity opportunities and access to affordable and healthy foods also are examples of methods that can be used to reverse the rising prevalence of childhood obesity (Koplan et al., 2005).

School Nurse Practice

Within the school, nurses can help to alleviate childhood obesity through early identification and family education (Hagerty et al., 2004). Health care professionals have a critical role to play in both prevention and treatment efforts (Story, Neumark-Stzainer, Sherwood, Holt, Sofka, Trowbridge, & Barlow, 2002). It is the school nurses' role to identify students at risk for obesity through screening and the development of interventions. Moreover, school nurses understand that proper nutrition is a significant component of a healthy lifestyle (Hagerty et al., 2004). Conversely, the literature does not discuss the barriers that school nurses have in implementing obesity prevention programs, nor does it provide

insight on how the relationship between parents, teachers, school nurses, and students influence childhood obesity.

Literature (*Role of the School Nurse*, 2005) shows that school nurses have the knowledge regarding management of chronic health problems of the school-age child. However, the literature does not document that school nurses are appropriately utilized to their full potential to educate parents and children about healthy lifestyles such as diet and exercise. Once such activity which is useful to both the prevention of and education about obesity is the screening of body mass index (BMI). Use of the BMI in children is recommended by the Centers for Disease Control (CDC, 2004). The BMI is a mathematical calculation that approximates body fat percentage by using the ratio of weight and height. The BMI is age- and gender-specific (Henry & Royer, 2004), and has been used by researchers to document presence of obesity in populations of children. For example, Bassett and colleagues (2007) found that obesity was rare as measured by BMI in a study of 139 Amish children between the ages of 6–18. In a study of 4,441 students from randomly selected schools in Australia, O'Dea and Wilson (2006) found diet and socioeconomic status to be predictors of BMI, suggesting that, for low-income children, BMI may be an effective method of measuring childhood obesity. Nemet and colleagues (2005) were able to demonstrate the long-term effects of a combined dietary, behavioral, and physical activity intervention among obese children as measured by BMI.

THEORETICAL FRAMEWORK

The theoretical framework that guided this study was Pender's Health Promotion Model (HPM). The revised HPM (1996) considers 3 factors: *Individual Characteristic and Experiences*, *Behavior-Specific Cognitions and Affect*, and *Behavioral Outcomes*. An individual's characteristics and experiences affect their actions and are determinants of health-promoting behaviors. Specific cognition and affect are characterized as having direct and indirect effects on whether a person is likely to engage in certain behaviors. The third characteristic, behavioral outcomes, describes an individual's action that leads to health-promoting behavior, which is an action outcome in the HPM (Pender, 1996).

Using this model it is assumed that school nurses would utilize the BMI often and, based on nurses' knowledge of the incidence of childhood obesity, inform families about weight-control programs. Therefore, this study describes school nurses' practice and knowledge regarding childhood obesity.

METHODS

Design

A descriptive correlational design (Burns & Grove, 2005) was used to provide a picture of the perceptions of school nurses regarding obesity in school-age students.

Sample

A convenience sample of 103 school nurses residing in the state of New Jersey and who attended county school nurses' association meetings were surveyed. Demographic data was collected to allow for a thorough description of the sample.

Measures

The original instrument, which was developed to measure school nurses' knowledge and practices toward childhood obesity, was administered to 220 school nurses (Price, Desmond, Ruppert, & Stelzer, 1987). Reliability of the original 50-item instrument was $\alpha = .80$. Moyers, Bugle, and Jackson (2005) revised the tool and administered it to 106 school nurses. Three veteran school nurses who did not participate in the study established content validity of the instrument. The 55-item, five-point Likert-type questionnaire was comprised of nine sections ($\alpha = .74$). Sections 1 and 2 included 15 items ($\alpha = .71$) about school nurse knowledge regarding childhood obesity and weight-control programs. Sections 3 and 4 contained 9 items ($\alpha = .69$) and covered practices about referral for obesity and the school's role in weight control. Section 5 contained 6 items ($\alpha = .56$) that pertained to the different criteria used for determining obesity. Health risks related to childhood obesity and the etiology of childhood obesity were covered in Sections 6 and 7 (18 items; $\alpha = .79$). Section 8 covered the sources of weight-control information used by school nurses, and the ninth section collected demographic information. Cronbach alpha reliability coefficients were not applicable to either of the last two sections. In this study, the Cronbach alpha for the total instrument was $\alpha = .77$.

Ethics and Procedure

Upon Institutional Review Board approval from the Office of Research and Sponsored Programs Division of Institutional Advancement at Kean

University, the 55-item questionnaire (Moyers, Bugle, & Jackson, 2005) was mailed to each New Jersey School Nurse Association County President. A letter of introduction was included explaining the objectives of the study.

Of the 21 county associations contacted, three had a scheduled meeting during the timeframe allotted for this study. The researchers attended the Union, Essex, and Middlesex county school nurse association meetings and surveyed the participants on-site after obtaining their written informed consent. Data collection ended February 10, 2006.

Data Analysis

Descriptive statistics were used to determine the percentage of school nurses who checked off each category of the 5-point Likert-type statements, which were anchored with “strongly agree” and “strongly disagree.” Descriptive analysis also was used to see how often school nurses used certain methods to measure obesity.

To understand whether correlations exist between ordinal variables such as the use of the BMI-for-age percentile to define obesity and practices towards recommending treatment for weight for all children who are obese, Spearman correlation coefficients were computed among ten of the study variables.

RESULTS

A total of 225 surveys were distributed from January 24, 2006 to February 10, 2006 with 103 (46%) surveys returned. The respondents were all females with a mean age of 50.62 years (*S.D.* = 7.12) and practicing as a school nurse between 1 year and 34 years (*M* = 11 years; *S.D.* = 7.49). Sixty-five percent of the respondents indicated that they had their Bachelors degree in nursing (BSN) and 34% had received their Masters Degree. There were no respondents educated at the doctoral level. The mean number of students for which the school nurses were responsible was 591 (*S.D.* = 419.5). Sources of weight-control information utilized by the school nurse were nursing journals (86%), workshops/seminars (85%), past experience (75%), mass media (62%), colleagues (60%), textbooks (44%), nursing school classes (35%), and “other” (10%).

As shown in Table 1, the vast majority of the study participants believed that poor eating behavior (99%), excessive caloric consumption (99%), and a sedentary lifestyle (97%) had a major role in the occurrence

Table 1. School nurse knowledge of the etiology of childhood obesity

Item	Major Role		Minor Role	
	<i>n</i>	%	<i>n</i>	%
1. Poor eating behavior	101	99	1	1
2. Excessive caloric consumption	101	99	1	1
3. Sedentary lifestyle	98	97	3	2.9
4. Heredity	75	74.3	25	24.8
5. Cultural factors	80	79.2	20	19.8
6. Prevalence of machine-dispensed “junk food”	56	55.4	42	41.6
7. Lack of parental concern	73	71.6	29	28.4
8. Low socioeconomic class	60	58.8	37	36.3
9. Peer Pressure	40	40.4	53	53.5
10. In utero development of adipose hypercellularity	19	22.4	49	57.6
11. Hormone problems	26	27.7	62	66

of childhood obesity. Moreover, the surveys indicated that 99% of New Jersey school nurses believed childhood obesity has become more prevalent and 89% believe that most children will not outgrow the problem (Table 2).

Thirty-four percent of New Jersey school nurses sampled recommended treatment for weight loss for all children who are obese (Table 2). Additionally, 25% of the nurses usually recommended treatment for weight loss only for children with a health problem affected by obesity (Table 2).

It also was found that more than 65% of the nurses in the study responded that they sometimes, rarely, or never use age-specific BMI to calculate childhood obesity (Table 3). In contrast, 71% of school nurses strongly agreed that normal weight is important to the health of children and eliminating the long-term consequences of childhood obesity (Table 2).

Also, as illustrated in Table 4, 94% of the respondents either “strongly agreed” or “agreed” that a comprehensive weight-control health curriculum should be available in every school. Furthermore, 77% believed that schools are not doing enough to help alleviate childhood obesity. In addition, 92% of the respondents agreed that schools should eliminate “junk food” machines and 86% agreed that schools should offer special low-calorie lunches.

Spearman correlation coefficients were computed among ten of the study variables to determine the relationship between knowledge about obesity and behavior (use of BMI). The results of the correlation analysis are present in Table 5. The following significant positive relationships were noted between use of the BMI-for-age percentile to define obesity and:

Table 2. School nurse perceived accountability concerning childhood obesity

Items	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
	N (%)	N (%)	N (%)	N (%)	N (%)
1. Normal weight is important to the health of children.	70 (70.7%)	29 (29.3%)	0	0	0
2. Childhood obesity is becoming more prevalent.	74 (71.8%)	28 (27.2%)	1 (1%)	0	0
3. Most obese children will outgrow their obesity.	0	2 (1.9 %)	9 (8.7%)	59 (57.3%)	33 (32.0%)
4. I feel competent in recommending weight-loss programs for children.	9 (8.7%)	26 (25.2%)	37 (35.9%)	26(25.2)	5 (4.9%)
5. I usually recommend treatment for weight loss for all children who are obese.	9 (9%)	34 (34%)	13 (13%)	40 (40%)	4 (4%)
6. I usually recommend treatment for weight loss only for children with a health problem affected by their obesity.	3.0 (3%)	25 (24.8%)	7 (6.9%)	59 (58.4%)	7 (6.9%)
7. Alleviating childhood obesity is more important to health than alleviating obesity in adulthood.	24 (23.3%)	41 (39.8%)	23 (22.3%)	14 (13.6%)	1 (1%)
8. Childhood obesity is a significant cause of peer rejection.	33 (32.0%)	55 (53.4%)	9 (8.7%)	6 (5.8%)	0

Table 3. New Jersey school nurses practice of childhood obesity tool

How often do you use each of the following methods to assess excess weight in children and adolescents?	Most of the time	Often	Sometimes	Rarely	Never
Item	%	%	%	%	%
1. Clinical impression	38.4	31.3	20.2	4.0	6.1
2. Weight for height percentile	34.7	30.7	14.9	12.9	6.9
3. Body mass index (BMI= weight/height ²)	27.3	13.1	18.2	17.2	24.2
4. BMI-for-age percentile	26.7	7.9	15.8	19.8	29.7
5. Skin-fold thickness percentile	0	1	5.1	14.3	79.6
6. Waist-hip ratio or waist circumference	2	0	2	14.0	82

Table 4. School nurse knowledge of the school's role as it relates to childhood obesity

Item	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
	N (%)	N (%)	N (%)	N (%)	N (%)
1. Schools are not doing enough to help alleviate childhood obesity.	39 (37.9%)	41 (39.8%)	10 (9.7%)	12 (11.7%)	1 (1%)
2. A comprehensive health curriculum with units on nutrition and weight control should be available in every school.	59 (57.8%)	38 (37.3%)	5 (4.9%)	0	0
3. Schools should eliminate "junk food" machines.	69 (67.6%)	26 (25.5%)	2 (2%)	4 (3.9%)	1 (1%)
4. Schools should offer special low-calorie lunches.	44 (43.6%)	45 (44.6%)	5 (5%)	6 (5.9%)	1 (1%)
5. Schools should offer on-site weight-control treatment programs for students.	22 (21.8%)	32 (31.7)	28 (27.7%)	14 (13.9%)	5 (5%)
6. Physical education classes especially for overweight children should be available in every school.	39 (38.6%)	29 (28.7%)	16 (15.8%)	15 (14.9%)	2 (2%)

1. "I have an obligation to counsel parents of obese children regarding the health risk of obesity" ($r = 0.27, p = 0.000$);
2. "I usually recommend treatment for weight for all children who are obese" ($r = 0.35, p = 0.000$);
3. "I usually recommend treatment for weight loss only for children who ask for help" ($r = 0.34, p = 0.000$);
4. "I usually recommend treatment for weight loss only for children with a health problem affected by their obesity" ($r = 0.27, p = 0.000$);
5. "I usually do not recommend treatment for weight loss" ($r = -0.30, p = 0.000$); and
6. agreeing that schools should eliminate junk food machines ($r = 0.29, p = 0.000$).

DISCUSSION

Findings from this study show that school nurses from the state of New Jersey appear knowledgeable about childhood obesity. However, only one-third of the respondents indicated that they routinely check the BMI

Table 5. Inter-correlations between items (N = 103)

Items	1	2	3	4	5	6	7	8	9	10
1) School nurses are obligated to counsel the parents of obese children concerning the health risk of obesity.	–	.38**	.16	–.01	.41**	.08	.16	.27**	.13	.07
2) I usually recommend treatment for weight loss for all children who are obese.		–	.43**	.36**	.71**	.03	.10	.35**	.06	.04
3) I usually recommend treatment for weight loss only for children (or parents of children) who ask for help.			–	.65**	.43**	.01	.04	.34**	.12	.09
4) I usually recommend treatment for weight loss only for children with a health problem affected by their obesity.				–	.32	.10	.04	.27**	.08	.12
5) I usually do not recommend treatment for weight loss.					–	.21	.18	.30**	.09	.10
6) A comprehensive health curriculum should be available in every school.						–	.45**	.15	.15	.04
7) Schools should eliminate “junk food” machines.							–	.29**	.21*	.05
8) BMI-for-age percentile method to access weight								–	.16	.30**
9) Nursing journal — source of weight control information									–	.15
10) Workshop/seminar — sources of weight control information										–

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

and recommend weight-control programs. Compared with Moyers, Bugle, and Jackson’s (2005) study of school nurses, this study indicated that there was an increased percentage [26.4% vs. 33.9%] of respondents who felt competent referring children for weight-loss programs. Unfortunately, when comparing the percentage of school nurses who reported using the BMI-for-age percentile between studies, this increased only slightly (31.1% vs. 34.6%). Even more troubling was the finding that fewer school nurses in this study reported that they usually recommend treatment programs for children with a health problem affected by their obesity (32% vs. 27.2%). This finding could be related

to the low percentage of nurses in this study who reported feeling competent recommending a weight-loss program for children.

The question could be raised as to whether the nurses are familiar with obesity treatment programs. However, a Google™ search of the anecdotal literature revealed that there are more than 300,000 results for the search terms “New Jersey” and “weight loss programs for children,” indicating that information about this topic is not unknown. Further barriers to addressing this issue could include the overwhelming responsibilities and workloads of school nurses and the stress of delivering sensitive, stigmatizing news to parents.

Approximately 78% of respondents agreed that schools are not doing enough to help alleviate childhood obesity, compared to the findings of Moyers et al. (2005) of 71%. This may be due, in part, to the timing of data collection of the two studies, as childhood obesity became an even more prominent issue in the time period between these studies. Moreover, the timing of New Jersey’s 2003 initiatives to combat childhood obesity and this study’s data collection in 2006 may suggest discouragement about the time lapse between policy and practice.

With respect to school nurses’ knowledge concerning childhood obesity, the finding that 99% agreed that childhood obesity is becoming more prevalent supports the report of Ogden et al. (2002) of the escalating problem of childhood obesity. Nurses in this study also were aware that poor eating habits, excessive caloric intake, and sedentary lifestyles contribute to the problem of obesity. Moreover, these school nurses reported that they believed that most of the children would not outgrow the problem of obesity. Given this knowledge level, based on the Health Promotion Model, it was expected that they would use the BMI often and recommend families to weight-control programs. However, this was not the case. Only one-third of the nurses sampled reported using routine BMI screening and reported confidence recommending weight-control programs for children with obesity. Based on their knowledge according to the Health Promotion Model, it could be assumed that school nurses would utilize the BMI and recommend families to weight-control programs. Pender (1996) suggests that experience and cognition influence behavior. In the case of this study, nurses did not report behaviors that were expected.

The finding that more than one-half of the nurses sampled strongly agreed that a comprehensive health curriculum on weight control should be made available in every school may indicate that they need more structured support by school administration to address the tough issue of obesity. Although Mosca (2006) identified schools as one of the hopes for a

solution to reduce the incidence of childhood obesity in the next generation of Americans, the nurses' indicated that schools were not doing enough to alleviate childhood obesity.

The study participants also agreed overwhelmingly that cafeteria menus should offer low-calorie lunches (92%) and that junk-food vending machines should be eliminated (86%). With new regulations and standards being implemented in New Jersey school districts, school nurses may affect changes that meet the challenges encountered in promoting a healthy lifestyle among students.

Given the finding that only 35% of the school nurses reported that they use the BMI-for-age percentile "most of the time" or "often," correlations were computed on the BMI-for-age percentile item. In general, the results suggest that if nurses use the BMI-for-age percentile "most of the time" or "often," they tend to recommend treatment for weight loss. This finding may have practice implications, for as the use of BMI-for-age is mandated within school districts, there may be an increase in the number of families who are referred to weight-loss programs.

Limitations

The theoretical limitation of using Pender's Health Promotion Model (1996) is multifaceted. Despite the fact that this study was a replication of the Moyers et al. (2005) study that was a replication of Price et al. (1987), the study variables have never been clearly linked to the concepts in the framework. Authors of this study question the conceptual and empirical links between the tool developed by Price et al. and the Health Promotion Model.

Generalizability is limited due to the use of a convenience sample and a survey return rate of 46%. Moreover, Price et al. (1987) reported a reliability coefficient of $\alpha = .80$, which is minimally acceptable for a well-developed psychosocial measurement instrument (Burns and Grove, 2005). Moyers et al. (2005) reported a reliability coefficient of $\alpha = .74$ for the revised tool, and the reliability coefficient for the current study was $\alpha = .77$. This instrument may need further revisions to increase its reliability. Because school nurses are perhaps the only health care professionals that many children see consistently, it is important to study school nurses with a reliable questionnaire.

Implications and Recommendations

Well-developed psychosocial measurement tools are needed to assess school nurses' knowledge and perceptions of children with elevated BMIs. Although the issue of childhood obesity continues to arise, mature

psychometric tools measuring these variables are scarce. Therefore, studies with clear links between a conceptual model and these measures are needed. In addition, subsequent research is needed to determine how school nurses envision their future role in childhood obesity interventions.

Perhaps as suggested by Price et al. (1987) and Kubik et al. (2007), school nurses should receive support to conduct more obesity prevention tasks such as BMI screening and recommending weight-loss programs. Moreover, research is needed to explain why nurses lack confidence in recommending weight-control programs for children and why nurses are underutilizing the BMI method of screening for childhood obesity. A possible factor that may reduce a nurse's confidence in recommending programs is parental resistance. Research has shown that parents and health professionals disagree on whether a child is obese (Jain, Sherman, Chamberlin, Carter, Powers, & Whitaker, 2001). Further studies are needed that measure the effectiveness of school nurses in curbing this epidemic.

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