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PERCEPTIONS INFLUENCING SCHOOL NURSE PRACTICES
TO PREVENT CHILDHOOD OBESITY

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
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ABSTRACT

Approximately one-third of children in the United States are overweight or obese with increased risks for numerous physical and psychosocial comorbidities. Schools are ideal environments to address this serious health crisis and school nurses are uniquely positioned qualified healthcare providers to actively participate in childhood obesity prevention (COP). A review of the literature provided findings to identify a gap in the knowledge regarding the association between school nurse COP perceptions and practices. A modified theoretical framework based on Bandura's health promotion by social cognitive theory guided this study. The purpose of this study was to identify the key perceptions (self-efficacy, perceived benefits and perceived barriers) influencing school nurse participation in COP practices and determine associations between school nurse characteristics and COP perceptions and practices. Preliminary research was conducted to determine content validity for modified perception scales, clarity of instructions and questions, data collection and retrieval procedures, and refinement of recruitment strategies. Adequate reliability and validity was determined for modified scales measuring school nurse self-efficacy, perceived benefits, perceived barriers, and COP practices targeting individual children (child-level) and the entire school population (school-level). Florida RN school nurses ($n = 171$) completed self-administered anonymous questionnaires from an emailed weblink or a paper version offered at two Florida Association of School Nurses conferences. School nurses with characteristics reflecting more education engaged in more COP practices ($p < .05$) than those without education-related characteristics. School nurses with > 8 hours of COP education reported higher COP self-efficacy than those with none ($p < .01$). Linear regressions showed that a model comprised of self-efficacy, perceived benefits, and perceived barriers significantly explained 12.0% of the variance in child-level practices ($p <$

.001) and 9.1% of school-level practices ($p < .001$). Self-efficacy explained the most variance of school nurse child-level and school-level practices ($p < .001$), and perceived barriers were inversely associated with child-level practices ($p < .05$). Four series of regressions showed that only perceived barriers partially mediated the influence of self-efficacy on child-level practices. Data analyses indicated self-efficacy and perceived barriers were key determinants of school nurse COP practices. Therefore, policy changes and educational interventions to increase self-efficacy and reduce perceived barriers may be effective in mobilizing school nurses to actively engage in COP practices.

I dedicate this dissertation to
my husband, Tom, who supported me in every way possible throughout this journey
and my daughters, Amanda and Sarah,
who provided mutual support and encouragement as we
completed doctoral programs together.

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CHAPTER ONE: INTRODUCTION

Childhood obesity rates soared over the past three decades resulting in more children at higher risk for developing physical and psychosocial comorbidities such as cardiovascular disease, type 2 diabetes, and depression (U.S. Department of Health and Human Services, National Heart Lung and Blood Institute, 2010). Since childhood obesity is associated with poor academic performance (Daniels, 2008; Datar & Sturm, 2006; Taras & Potts-Datema, 2005), this health problem is also an educational concern.

Healthcare costs for overweight and obese children have increased dramatically in the last decade (Transande & Chatterjee, 2009; Transande, Liu, Fryer, & Weitzman, 2009). Obese children are more likely to become obese adults with additional comorbidities (Biro & Wien, 2010; Sun et al., 2007), setting the stage for both an economic and health crisis.

A multifaceted approach to childhood obesity prevention (COP) is needed to address this complex health epidemic. The Institute of Medicine (2012) recommends that goals for obesity prevention include expanding the role of health care providers and focusing on schools. School nurses are qualified healthcare providers ideally positioned to actively participate in COP (National Association of School Nurses [NASN], 2011).

Theoretical Framework

Health behavior theoretical frameworks typically describe perceptions that influence behaviors to improve one's own health. When these theories are applied to school nurses and COP, perceptions affect behaviors or practices to improve the health of others. Social Cognitive Theory (SCT) provided the foundation for many effective school-based COP interventions (Cole, Waldrop, D'Auria, & Garner, 2006) and was selected to examine school nurse COP perceptions

and practices. Bandura’s (2004) model of health promotion using SCT was modified (see Figure 1) to guide this study.

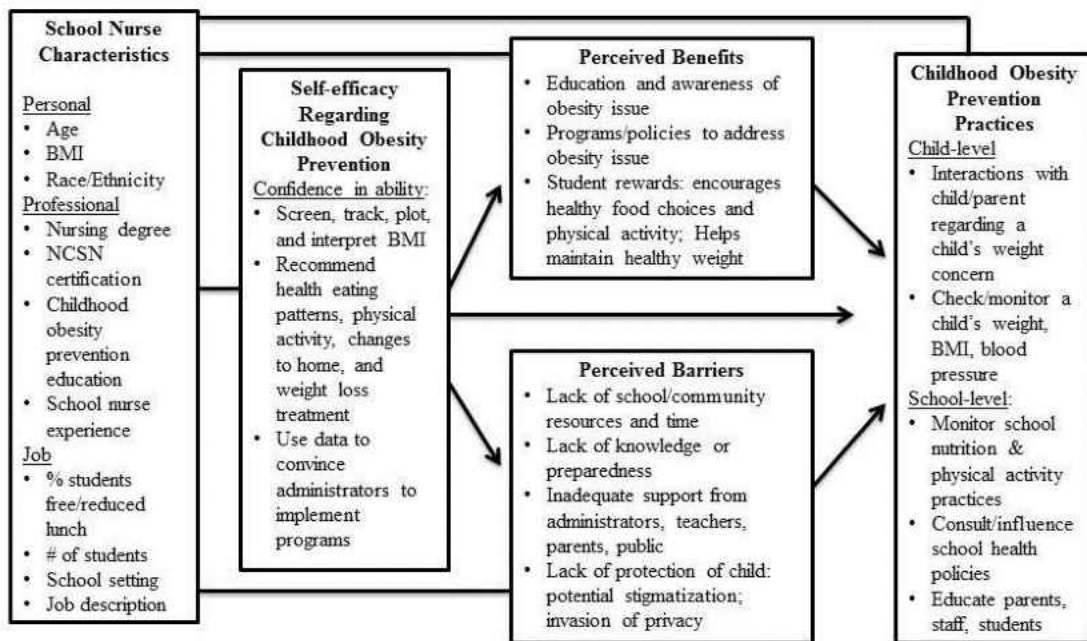


Figure 1. School Nurse Childhood Obesity Prevention Theoretical Framework. Adapted from “Health Promotion by Social Cognitive Means,” by A. Bandura, 2004, *Health Education & Behavior*, 31, p. 146. Copyright 2008 by Society for Public Education

Previous findings identify the key perceptions of self-efficacy, benefits, and barriers as significantly associated with school nurse COP practices (Kubik, Story, & Davey, 2007; Moyers, Bugle, & Jackson, 2005;) and comprise the theoretical constructs. In this theoretical framework, self-efficacy directly influences perceived benefits, perceived barriers, and COP practices. Both perceived benefits and perceived barriers also directly influence COP practices. The associations between these theoretical constructs are positive except for the negative associations between

perceived barriers and both self-efficacy and practices. The influence of self-efficacy on COP practices is also depicted as mediated by perceived benefits and perceived barriers.

School Nurse COP Practices

School nurse COP practices are directed at the individual child/parents (child-level) and the entire school population (school-level). Examples of child-level COP practices are body mass index (BMI) tracking/screening, checking blood pressure of an obese child, counseling parents about a child's weight concerns and/or recommending treatment (Hendershot, Telljohann, Price, Dake, & Mosca, 2008; Kubik et al., 2007; Moyers et al., 2005; Mullersdorf, Zuccato, Nimborg, & Eriksson, 2010; Nauta, Byrne, & Wesley, 2009). School-level COP practices include participating on a school health council, identifying groups at risk for childhood obesity, monitoring nutritional value of competitive foods from school fundraising and vending machines, and providing educational materials about nutrition and physical activity for students, parents, staff, and administrators (Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg, Kubik, & Johnson, 2011).

School Nurse COP Perceptions

Self-efficacy

Self-efficacy is one's belief in his/her ability to perform a specific behavior to achieve a certain outcome and is situation dependent (Bandura, 1977, 1986, 1997). People with high levels of self-efficacy perceive more benefits and fewer barriers associated with performing those behaviors (Bandura, 1977, 1986, 1997). School nurse self-efficacy related to recommending weight loss treatment, BMI screening, and/or other COP practices was examined in several studies (Hendershot et al., 2008; Moyers et al., 2005; Nauta et al., 2009).

Perceived benefits

Perceived benefits are the positive consequences or advantages resulting from engaging in certain behaviors or practices. Hendershot et al. (2008) found that elementary school nurses identified perceived benefits of COP practices to include creating awareness of the obesity problem, educating students and parents, encouraging physical activity/healthier food choices, and helping children maintain a healthy weight.

Perceived barriers

Perceived barriers are impediments to performing specific actions and may also be conceptualized as a perceived lack of facilitators. Perceived barriers to school nurse COP practices were examined more often than other perceptions. The most frequently studied perceived barriers included negative parental responses (Hendershot et al., 2008; Moyers et al., 2005; Nauta et al. 2009; Stalter, Chaudry, & Polivka, 2010, 2011; Steele et al., 2011; Wu & Steele, 2011), insufficient time (Hendershot et al., 2008; Kubik et al., 2007; Wu & Steele, 2011), heavy workloads with competing health priorities (Morrison-Sandberg et al., 2011; Stalter et al., 2011), unpreparedness (Kubik et al., 2007; Moyers et al., 2005; Mullersdorf et al., 2010; Steel et al., 2011), and lack of support from administrators/staff (Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg et al., 2007; Stalter et al., 2010, 2011; Steele et al., 2011).

Study Aims

The aims of this study were to: evaluate the reliability and validity of refined scales measuring school nurse COP perceptions and practices; identify key perceptions influencing school nurse COP practices; identify mediators (benefits and barriers) of the influence of self-efficacy on school nurse COP practices; identify school nurse characteristics associated with

COP perceptions and practices. Study findings are expected to contribute to tailoring interventions or changing policy to promote COP practices by school nurses.

State of the Science

Chapter two examines research findings about school nurse COP perceptions and practices. Few findings were reported regarding the association between school nurse characteristics and COP perceptions or practices. Substantial variations were found in school nurse perceptions and the frequency of participation in COP practices. However, these variances and the associations between these perceptions and practices were not well understood.

School Nurse COP Scales

Chapter three explains the development and psychometric testing of five scales measuring school nurse COP perceptions and practices. Two scales measuring the frequency school nurses engage in COP practices (child-level or school-level) and three scales measuring school nurse perceptions of self-efficacy, benefits, and barriers associated with COP practices (Hendershot et al., 2008; Kubik et al., 2007) were selected for refinement. The two COP practices scales were only modified by assigning titles. The three perception scales were refined using a four step process: Step 1, Initial scale modification; Step 2, Content validity; Step 3, Pre-testing; Step 4, Pilot study.

Following refinement of these scales, reliability and validity testing was conducted to address the first study aim. Excellent internal reliability was assessed from Cronbach's alpha measurements (.81 to .94) and acceptable stability reliability from test-retest correlations ($r = .55$ to $r = .78$) for all five scales. Significant correlations of hypothesized relationships based on the modified theoretical model (see Figure 1) were used to determine acceptable construct validity of

the five scales. The reliability and validity of all scales measuring school nurse COP perceptions and practices was determined to be adequate for use in school nurse COP research.

Research Study

The final chapter (four) describes research methods, data analyses, findings, implications, and limitations of this study. Subsequent to approval by the University of Central Florida Institutional Review Board, a purposive sample of Florida school nurses ($n = 171$) was recruited to participate by completing a self-administered anonymous paper or online questionnaire.

The Florida Association of School Nurses, Florida School Health Association, and 12 Florida county school districts emailed a recruitment-consent message to their school nurses inviting them to participate in this study. School nurses were also recruited from two Florida Association of School Nurses conferences to complete a paper questionnaire on site.

The second study aim is addressed by conducting two multiple linear regression analyses with child-level and school-level practices regressed separately on a model of self-efficacy, perceived benefits, and perceived barriers. Consistent with SCT, self-efficacy is the strongest determinant of behavior in performing more child-level and school-level COP practices ($p < .001$). Perceived barriers are significantly negatively associated only with child-level practices ($p < .05$).

The third study aim is addressed from an established mediation procedure (Baron & Kenny, 1986) using four series of regression analyses to determine the mediation of self-efficacy on both child-level and school-level practices by perceived benefits and perceived barriers. Only perceived barriers partially mediate the influence of self-efficacy on child-level COP practices.

Correlations, t-tests, and analysis of variance, are used to address the last study aim by analyzing school nurse demographic characteristics with COP practices and perceptions. Most notably, demographic characteristics indicating more education are significantly positively associated with self-efficacy and participation in COP practices.

Increasing school nurse engagement in COP practices should be part of an overall strategy to address this serious health issue. This study uses reliable and valid instruments to determine the influence of key perceptions on school nurse COP practices. These findings are expected to contribute to the development and implementation of educational interventions and policy changes to improve self-efficacy and reduce perceived barriers which may promote the mobilization of school nurses to combat the childhood obesity health crisis.

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CHAPTER TWO: STATE OF THE SCIENCE

Abstract

Approximately 30% of children in the United States are overweight or obese with increased risks for numerous comorbidities including hypertension, type 2 diabetes, dyslipidemia, and depression. This complex health problem must be addressed on many fronts, including the school environment. The purpose of this review is to explore school nurse perceptions that may promote or deter school nurse engagement in childhood obesity prevention (COP) practices. School nurse participation in COP practices is inconsistent and this variation is not well understood. Research findings primarily describe school nurse perceptions of self-efficacy, benefits, and barriers of COP practices. Variations in COP practices may be explained by differences in perceptions, but those associations are unclear due to limited findings regarding relationships between COP perceptions and practices. Additional research is needed to determine the influence of key perceptions on COP practices to support effective interventions and policy changes targeting the most influential perceptions.

Introduction

With nearly one in three U.S. children, ages 2-19, overweight or obese (Ogden, Carroll, & Flegal, 2008), more children than ever before are at increased risk for developing serious comorbidities such as type 2 diabetes, cardiovascular disease, and depression (U.S. Department of Health and Human Services, National Heart Lung and Blood Institute, 2010). Unhealthy lifestyles, physical environments, socioeconomic levels, genetics, race/ethnicity, increased television viewing, inadequate sleep, and media/marketing influences are among the many factors contributing to the complex problem of childhood obesity (Crothers, Kehle, Bray, &

Theodore, 2009; Koplan, Liverman, & Kraak, 2005). The Institute of Medicine ([IOM] 2012) recommends making schools a focal point for obesity prevention because most children spend a significant number of hours and consume one-third to one-half of their daily calories at school. The IOM (2012) also recommends expanding the role of healthcare providers to include obesity prevention. School nurses are uniquely positioned to engage in obesity prevention because they are often the only healthcare provider in many schools.

The National Association of School Nurses (NASN) (2010a) defined the role of school nurses to include promoting a healthy environment, intervening with actual and potential health problems, and actively collaborating with others to advance academic success and learning. Research findings describing positive outcomes of school nurse interventions include decreased student smoking rates, better asthma management, and increased physical activity (Stock, Larter, Kieckehefer, Thronson, & Maire, 2002). School nurses have the expertise to promote health by engaging in childhood obesity prevention (COP) practices (NASN, 2011a). Given that differences in perceptions may translate to variations in COP practices, it is worth determining which school nurse perceptions promote or deter these practices so that COP efforts may be improved. This review examines school nurse practices, perceptions, and theoretical frameworks regarding COP and identifies knowledge gaps related to potential interventions and policies.

Background

Obesity in children is defined as a body mass index (BMI) \geq 95th percentile for same age and gender, and overweight is defined as a BMI \geq 85th percentile and $<$ 95th percentile for same age and gender (U.S. Department of Health and Human Services, Centers for Disease Control and Prevention [CDC], 2012). Children from minority and lower socioeconomic populations are

at greater risk for overweight and obesity (Koplan et al., 2005; Kumanyika & Grier, 2006).

Overweight and obese children are at increased risk for developing comorbidities such as type 2 diabetes (Aschemeier, Kordonouri, Danne, & Lange, 2008; Lipton et al., 2011), cardiovascular disease (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007; Raghuvier, 2010), hypertension (Meininger et al., 2010; Pullis & Pullis, 2009), dyslipidemia (Cook & Kavey, 2011; Fortmeier-Saucier, Savrin, Heinzer, & Hudak, 2008), asthma (Noal, Menezes, Macedo, & Dumith, 2011; Rance & O'Laughlen, 2011), and obstructive sleep apnea (Bhattacharjee, Kim, Kheirandish-Gozal, & Gozal, 2011; Ievers-Landis & Redline, 2007). Obese children also have an increased incidence of low self-esteem (Griffiths, Parsons, & Hill, 2010; Wang, Wild, Kipp, Kuhle, & Veugelers, 2009) and depression (Dockray, Susman, & Dorn, 2009; Walker & Hill, 2009). These obesity-related health problems may also have a negative impact on childrens' academic performance (Daniels, 2008; Datar & Sturm, 2006; Taras & Potts-Datema, 2005). School nurses' involvement in COP is consistent with their role and responsibility to advance learning by promoting health and preventing disease.

Economic Consequences

Healthcare costs have escalated for overweight and obese children. Hospitalization costs for children diagnosed with obesity almost doubled, from \$125 million to \$237 million, between 2001 and 2005 (Trasande, Liu, Fryer, & Weitzman, 2009). Between 2002 and 2005, an additional \$14.1 billion in annual healthcare costs related to outpatient care, emergency room visits, and medications were associated with childhood overweight and obesity (Trasande & Chatterjee, 2009). The economics of childhood obesity are alarming because obese children are likely to become obese adults with more comorbidities (Biro & Wien, 2010; Sun et al., 2008).

Annual obesity-related illness is estimated to cost \$190.2 billion (IOM, 2012). These figures would be higher if the costs of reduced productivity from obesity-related disabilities and premature mortality were included (Hammond & Levine, 2010; O'Grady & Capretta, 2012). With high numbers of obese children, co-morbid conditions, and rising healthcare costs, the need for greater understanding of COP to mitigate both an economic and a health crisis is imperative.

Role of Schools

Childhood obesity is a complex problem and requires a multifaceted solution that should include school-based interventions (Story, Kaphingst, & French, 2006; CDC, 2008). Historically, the promotion of healthy nutrition and physical activity is a fundamental role of schools, a precedent that may support an environment for modifying lifestyle behaviors that contribute to childhood obesity (Wechsler, McKenna, Lee, & Dietz, 2004). Long-term healthy habits may be established in childhood, which makes this age group within the school setting optimal for COP. School-based interventions with both minority and nonminority children have used various combinations of COP interventions focusing on nutrition, physical activity, school food services, healthy lifestyle education, parental involvement, and policies, and yielded mixed successes (Budd & Volpe, 2006; Cole, Waldrop, D'Auria, & Garner, 2006; Covelli, 2008; Johnson, Weed, & Touger-Decker, 2012; Shaya, Flores, Gbarayor, & Wang, 2008; Zenzen & Kridli, 2009). Many interventions resulted in decreased sedentary activity, reduced dietary fat intake, or increased nutrition knowledge, without significant changes in BMI or differences in overweight and obesity rates (Cabellero et al., 2003; Neumark-Sztainer et al., 2010; Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003). Significant differences in outcomes from COP interventions were also evident between genders. When Chilean 1st – 8th graders participated in

a 6 month school-based COP intervention, both genders demonstrated significantly improved physical fitness, but only boys in the intervention group had significant positive changes in BMI and waist circumference relative to boys in the control group (Kain et al., 2004). COP interventions in schools appear generally most successful at increasing knowledge and modifying behaviors, with some modest improvements in BMI and other indicators of body fat.

These school-based COP programs were often implemented for limited time periods, but the influence of duration on outcomes is unclear. Zenzen and Kridli (2009) suggested that the average school-based intervention duration of 10.4 months was not adequate to achieve desired BMI-related outcomes. Consistent with this, a multifaceted school-based COP study conducted over 6 years found favorable significant differences in BMI, physical activity levels, and blood pressure changes, in an intervention versus the control group, even four years after the cessation of the program (Kafatos, Manios, Moschandreas, & Kafatos, 2007). Hence, long-term school-based COP interventions and policies supported by school nurses may be a successful strategy to achieve sustainable behavioral and physical outcomes.

School Nurse COP Practices

In previous studies, school nurse COP practices targeting individual children/parents (child-level practices) and the entire school population (school-level practices) addressed primary, secondary, and tertiary levels of prevention. Primary prevention practices included educating children, parents, and school staff, and monitoring or influencing policies to promote healthier lifestyles. COP practices that may help prevent children from ever becoming obese include education and recommendations regarding increased physical activity, better nutrition, less television/computer time, and adequate sleep (Crothers et al., 2009; Koplan et al., 2005).

Secondary prevention involved practices such as BMI screenings to identify individual and groups of overweight/obese children who may benefit most from COP interventions. BMI is an indirect indicator of body fat that is inexpensive, easily assessed, and calculated from height and weight measurements using the following formula: $\text{weight (lbs)}/ \text{height (inches)}^2 \times 703$ (CDC, 2011). Categorization of a child's weight status is determined by interpretation of BMI based on age and gender. Results may be reported to parents to motivate healthy lifestyle changes and refer for treatment if needed, and/or used for surveillance purposes to improve COP policies, practices, and services at the school level (Nihiser et al., 2007). BMI mandates, policies, and recommendations regarding targeted grade levels, state/county and parental notifications, and opt-out choices vary greatly between states, counties, and school districts (National Association of State Boards of Education, 2010; Nihiser et al., 2007). Even though most states have no formal BMI policy, BMI screening mandates were associated with school nurse COP practices in a nationwide study (Hendershot, Telljohann, Price, Dake, & Mosca, 2008). Nurses working in elementary schools with BMI mandates identified groups at risk for obesity and tracked BMI in students significantly more often than did nurses in schools without mandates (Hendershot et al., 2008). These findings support policies to implement school BMI mandates.

Many of the same practices used in primary COP may also address tertiary prevention to avert or reduce comorbidities. Tertiary prevention includes practices such as monitoring the blood pressure of obese children and referring or recommending weight loss/management, in special circumstances, to help prevent or reduce the health consequences of childhood obesity. Because pediatric weight loss is rarely recommended, a weight management goal for an obese

child may be to maintain weight or reduce the rate of weight gain (Spear et al. 2007; U.S. Department of Health and Human Services, National Heart Lung and Blood Institute, 2012).

A critical COP strategy involves active engagement by school nurses. Studies found school nurses' participation in COP practices varied greatly, BMI mandates aside. The more Missouri school nurses in rural areas believed in their ability to conduct certain COP practices and/or perceived benefits from COP practices, the more likely they were to take action (Moyers, Bugle, & Jackson, 2005). School nurses in Minnesota who perceived more barriers to COP were less likely to engage in practices than those who perceived fewer barriers (Kubik, Story, & Davey, 2007). This pattern of findings argues for more research into the impact of school nurse perceptions on COP practices.

Theoretical Framework

Theoretical frameworks that depict health behaviors typically describe the influences of perceptions on behaviors affecting one's own health. When theoretical frameworks were used to guide studies involving school nurses, they were applied to behaviors or practices intended to improve the health of others. Various theoretical frameworks have been used to guide research examining school nurse perceptions associated with performing COP practices.

Social cognitive theory provided the underpinnings for many of the effective school-based COP interventions (Cole et al., 2006) and may also be appropriate to study the association between school nurse COP perceptions and practices. The school nurse COP perceptions of self-efficacy, benefits, barriers, and their relationships with COP practices are described in a theoretical framework adapted from a model of health promotion by social cognitive means (Bandura, 2004). In the adapted theoretical framework (see Figure 1), self-efficacy is depicted

as directly influencing perceived benefits, perceived barriers, and behaviors/practices. Perceived benefits and barriers also affect practices and mediate the influence of self-efficacy on practices.

Role of Perceptions

Previous studies described several perceptions associated with school nurse COP practices. Oxford dictionaries (2012) defined perception as “the way in which something is regarded, understood, or interpreted”. Perceptions are formed through the process of sensing and interpreting personal experiences that influence ones’ views, beliefs and attitudes (McDonald, 2012). Midwestern young adult students’ decisions to increase or decrease various personal healthy lifestyle behaviors (such as smoking, drinking alcohol, exercising, and consuming fruits/vegetables) were affected by perceptions that included the analysis of a particular behavior and situation, especially concerning costs and benefits (Kiviniemi & Rothman, 2008). Southern Appalachian physician COP practices intended to improve the health of others were also significantly related to perceptions of relevant skill levels/competencies (Holt et al., 2011).

Perceptions of self-efficacy, benefits, and barriers were the salient perceptions identified in school nurse COP studies. School nurse self-efficacy in one COP practice was described as a belief in one’s ability to competently recommend weight loss programs for children (Moyers et al., 2005; Nauta, Byrne, & Wesley, 2009). A perceived benefit of COP practices was inferred from the school nurses’ belief that children were more amenable to obesity treatment than were adults (Moyers et al., 2005). Hendershot et al. (2008) identified that helping children maintain a healthy weight was another perceived benefit (referred to as an outcome expectation) of various COP practices. Perceived barriers to COP practices were described as school nurse

unpreparedness and low support for school-based COP efforts from school administrators and others (Kubik et al., 2007).

Self-Efficacy

Self-efficacy is the judgment or belief in one's ability to competently and successfully perform a specific activity or constellation of activities to achieve a certain outcome or goal (Bandura, 1977, 1986, 1997, 2004). Levels of self-efficacy are situation-dependent and may determine the extent of effort and perseverance expended to overcome obstacles. Self-efficacy as a major determinant in performing certain behaviors has been well documented in health-related studies. A person with high self-efficacy engaged in the related behavior more frequently and tended to perceive more benefits and fewer barriers associated with the behavior than did individuals with low self-efficacy. The four principle sources contributing to one's self-efficacy are derived from performance accomplishments, vicarious experiences, verbal persuasion, and physiological responses (Bandura, 1977, 1986, 1997).

Several studies reported a lack of self-efficacy in school nurses' perceived ability to initiate and competently conduct a discussion or make recommendations regarding weight with an obese child or the child's parent (Moyers et al., 2005; Müllersdorf, Zuccato, Nimborg, & Eriksson, 2010; Nauta et al., 2009). School nurses perceived they were less competent when counseling families from cultures other than their own because of differences in languages, dietary habits, perceptions about normal body size/shape, and prevalence of weight problems in the other's culture (Steele et al., 2011). A focus group of six Swedish school nurses expressed that, with adequate knowledge and experience gained from personal encounters and consulting

experienced colleagues, they developed and maintained confidence to lead discussions addressing weight issues with obese children and their parents (Müllersdorf et al., 2010).

Relatively high self-efficacy with conducting various COP practices was also reported by elementary school nurses (Hendershot et al., 2008). Self-efficacy in performing COP practices including making dietary and physical activity recommendations, measuring height/weight, and interpreting/reporting BMI was reported as moderately to very confident by most elementary school nurses. More than 60% of these school nurses reported self-efficacy as moderately to very high self-efficacy for using data to convince school administrators to implement programs, but self-efficacy was not analyzed with other perceptions or practices (Hendershot et al., 2008).

Research findings support the relationships between self-efficacy and practices, perceived benefits, and perceived barriers as described in the theoretical framework (see Figure 1). As self-efficacy increased, nurses spent more time educating patients about postpartum depression and diabetes management (Fisher, 2006; Logsdon, Foltz, Scheetz, & Myers, 2010). A significant positive correlation was reported between rural Missouri school nurses' self-efficacy regarding their ability to competently recommend weight loss programs for children and usually recommending weight loss treatment for obese children (Moyers et al., 2005). This same pattern of self-efficacy behavior relationship is found in non-nursing health related research. For example, a significant positive association was found between college students' self-efficacy to participate in physical activity and perceived benefits of exercise (Taber, Meischke, & Maciejewski, 2010). In another college student study, self-efficacy regarding exercise, nutrition, and general safety protective behaviors was found to be significantly inversely associated with perceived barriers to participating in those activities (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004).

Perceived Benefits

Perceived benefits involve the anticipated advantageous consequences of performing a specific behavior. Alternately, perceived benefits have been labeled as outcome expectations or goals in several health promotion theories (Bandura, 1977, 1986, 1997, 2004; Pender, Murdaugh, & Parsons, 2006; Rosenstock, 1960, 1990; Rosenstock, Strecher, & Becker, 1988). Perceived benefits represented the positive component of outcome expectations identified in several health promotion theories. A perceived benefit may also be conceptualized as a type of goal. For example, helping children maintain a healthy weight was not only a perceived benefit or positive outcome expectation of school nurse COP practices (Hendershot et al., 2008), but also could be considered a goal of these same activities.

Only two studies have examined the association between school nurse COP perceived benefits and practices. In a sample of Minnesota school nurses, those who supported BMI screenings, which inferred some perceived benefit from this practice, were significantly more likely to participate in child-level COP practices, than those who did not support BMI screenings (Kubik et al., 2007). A significant positive correlation was reported between the belief that obesity was more amenable to treatment in children than in adults (a perceived benefit) and usually recommending weight loss treatment for obese children among rural school nurses in Missouri (Moyers et al., 2005). Findings from these two studies are consistent with findings for other nursing specialties. For example, oncology nurses who perceived benefits of physical activity for cancer patients recommended exercise for their patients significantly more than nurses who did not perceive these benefits (Karvinen, McGourty, Parent, & Walker, 2012).

Regardless of the label, perceived benefits may be viewed as a mediator of self-efficacy. This mediation effect has not been studied with school nurses and COP, but has been reported in

other health-related research. For example, the influence of self-efficacy on nutrition behaviors was mediated by perceived benefits in predominately White female food shoppers (Anderson, Winett, Wojcik, Winett, & Bowden, 2001). Hence, in Figure 1, perceived benefits are identified as a mediator of the influence of self-efficacy on COP practices.

Perceived Barriers

Health behavior theoretical frameworks describe perceived barriers as negatively impacting behaviors. Perceived barriers can also be conceptualized as a lack of facilitators. Regardless, they are considered impediments to performing specific behaviors and often involve expense, insufficient time, and a lack of resources, preparedness, or support. As California nurses in an academic medical center perceived more barriers to evidence-based practice in terms of a lack of knowledge/skills, they implemented significantly fewer evidence-based practices (Brown, Wickline, Ecoff, & Glaser, 2009). The mediation effect of perceived barriers on the influence of self-efficacy on practices portrayed in the theoretical framework (see Figure 1) has not been examined in school nurse COP studies. However, in a health-related study, the influence of self-efficacy on fruit/vegetable consumption in high school students was mediated by perceived barriers (Bruening, Kubik, Kenyon, Davey, & Story, 2010), arguing for its role as a mediator in COP. The influence of perceived barriers on school nurse COP practices, particularly BMI screening activities, has been identified and described extensively in the literature more than any other concept in Figure 1. Considerable attention was paid to perceived barriers in this review because of this disproportionate focus of the research. Findings describing perceived barriers primarily involved the following four areas: administration/policies; school nurse preparedness; parental responses; and child concerns.

Administration/policies

Policies mandating specific COP efforts such as BMI screening or minimum hours of weekly student physical activity may be perceived by school nurses as tacit support by school administrators of some COP practices (Hendershot et al., 2008). Conversely, a lack of such policies may have been perceived as barriers to school nurse COP practices (Stalter, Chaudry, & Polivka, 2010). Working with BMI mandates was associated with higher self-efficacy, fewer perceived barriers, and school nurse COP practices in a nationwide study of elementary school nurses (Hendershot et al., 2008). More than 80% of nurses in schools with BMI mandates tracked BMI in students and identified at-risk groups, compared to just over 64% of nurses in schools without such mandates (Hendershot et al., 2008). Nurses in schools without mandates may perceive greater barriers to some BMI-related activities and other COP practices due to perceived low administrative support. Perceptions of low administrative support might make these nurses less likely to perform these BMI-related activities and COP practices. For example, BSN school nurses in Minnesota who perceived low support from administrators, school staff, and healthcare providers for school COP efforts were significantly less likely to engage in COP tasks than those who perceived greater support (Kubik et al., 2007).

Workloads/time constraints

Hospital nurses in Singapore perceived insufficient time as a major barrier to implementing evidence-based practices (Majid et al., 2011). Similarly, most school nurses in national and regional studies perceived heavy workloads and lack of time as substantial barriers to implementing COP practices, particularly BMI screenings (Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg, Kubik, & Johnson, 2011; Stalter et al., 2010; Stalter, Chaudry, & Polivka, 2011; Steele et al., 2011; Wu & Steele, 2011). A heavy workload affects time available

for school nurses to engage in COP. Nurses working in North Carolina schools with lower student-to-school nurse ratios spent more time providing care for students with asthma, injuries, vision, and psychosocial problems than those working in settings with higher ratios (Guttu, Engelke, & Swanson, 2004). A sample of Ohio school nurses identified inadequate student-to-school nurse ratios and the responsibility of caring for students with high acuity health needs or chronic illnesses as impediments to COP (Stalter et al., 2011). One Minnesota school nurse noted that so much time was spent caring for students with health conditions such as diabetes, severe food allergies, and mental health issues, little time was left for COP (Morrison-Sandberg et al., 2011).

Lack of time to conduct BMI screenings and other COP interventions was repeatedly identified and discussed in the literature. BMI screenings were described as time-consuming to conduct, calculate, and document (Stalter et al., 2010). More than 40% of elementary school nurses agreed that inadequate time for BMI screenings was a barrier to this COP practice (Hendershot et al., 2008) and a large majority (88%) of BSN school nurses believed there was insufficient time for oversight of COP in schools (Kubik et al., 2007). Focus groups of school nurses from urban and rural school districts also noted that time constraints contributed to difficulty in fostering relationships with children to address weight problems (Steele et al., 2011).

Limited resources

Perceived barriers of COP associated with limited resources could encompass a lack of equipment, space, funding, or community support. For example, a majority of school nurses in a national survey perceived inadequate school resources as a barrier to measuring BMI (Hendershot et al., 2008). A lack of space and functioning equipment such as calibrated scales,

stadiometers, and privacy screens were identified as barriers by school nurses in Ohio (Stalter et al., 2010, 2011), which was of particular concern to school nurses working without a BMI screening mandate (Hendershot et al., 2008). School nurses have also remarked on the lack of community resources and healthcare providers for referrals and follow-up care as an obstacle to COP in studies with national and regional samples (Hendershot et al., 2008; Morrison-Sandberg et al., 2011; Steele et al., 2011).

School nurse preparedness

A perceived lack of preparedness stemming from deficient knowledge and skills may be a barrier to certain nursing practices. School nurses in different focus groups perceived a knowledge deficit associated with addressing weight issues with children/families and with leading a motivational discussion about weight with an obese child and the child's parents (Müllersdorf et al., 2010; Steele et al., 2011). As school nurses at a national conference perceived less knowledge about evidence-based practice, their use of evidence-based practices decreased significantly (Adams, 2009). In contrast to Adams's (2009) correlation between knowledge and application of evidence-based practices, New Jersey school nurses scored high on a childhood obesity knowledge test, with over half of those nurses rarely or never having used the recommended method of BMI-for-age percentile to assess excess weight in children; most of these nurses reported they usually used clinical impression (Nauta et al., 2009). Less than one third of public health school nurses believed school nurses were prepared to manage school COP efforts (Kubik et al., 2007), but it was not clear if preparedness was limited to relevant knowledge and skills or to some other issue. Those who believed school nurses were prepared to oversee COP activities were significantly more likely to perform COP tasks than were those who

perceived school nurses to be unprepared. Kubik et al. (2007) suggested school nurses also need updated skills and obesity-related knowledge to successfully implement school-based COP efforts.

Parental responses

Parents of obese children often expressed perceptions of their child's weight status that were inaccurate, especially with younger children (De La O et al., 2009; Eckstein et al. 2006; Huang et al., 2007). Furthermore, when parents of overweight and obese children from predominantly minority populations did not correctly perceive their child's weight status, they were unlikely to be motivated to make behavior changes (Fitzgibbon & Beech, 2009). Most parents believed schools should have a role in COP, but more than 20% of parents disagreed (Murphy & Polivka, 2007). One parent focus group supported nutrition and physical education in school, but opposition was mixed regarding school policies to restrict food and beverages of questionable nutritional value (Booth, King, Pagnini, Wilkenfeld, & Booth, 2009). Despite parents preferring a BMI notification letter from the school nurse to receive this information (Murphy & Polivka, 2007), obese children and their parents were more likely to report discomfort with a BMI notification letter than normal weight children and their parents (Kubik, Fulkerson, Story, & Rieland, 2006). These findings help explain school nurse perceptions of negative parental responses associated with COP practices such as monitoring nutrition, BMI screening/notification, and providing referrals/recommendations concerning a child's weight.

Concerns and fears about negative, inadequate, or inappropriate parental responses from notification or a discussion regarding the weight of a child emerged repeatedly in the literature, especially in response to BMI screening notifications. These concerns were specifically noted

when school nurses perceived parents did not recognize a weight problem in their child (Moyers et al., 2005) or when notification about a child's weight problem might create a conflict with angry parents, particularly in urban areas (Stalter et al., 2011). This fear of negative parental reactions was often based on school nurses' previous experiences with parents (Steele et al., 2011). Nauta et al. (2009) suggested the stress of providing sensitive and possibly stigmatizing news to parents about their child's weight might itself be a barrier for school nurses.

Child concerns

Stigmatization of overweight and obese children has been a concern since the 1960s, when research found that school-aged children consistently ranked drawings of obese children as least likeable compared to other children with varying characteristics, disfigurements, and disabilities (Richardson, Hastorf, Goodman, & Dornbusch, 1961). In a similar study conducted by Latner and Stunkard (2003), stigmatization of obese children was found to have increased over the previous four decades. In addition to stigmatization, obese children reported increased bullying and teasing (Griffiths, Wolke, Page, & Horwood, 2006; Janssen, Craig, Boyce, & Pickett, 2004). School nurses expressed concern that some COP practices might violate the privacy of children and families, and potentially label a child with a negative weight-related term, leading to stigmatization, teasing, and/or bullying (Hendershot et al., 2008; Morrison-Sandberg et al., 2011; Stalter et al., 2011).

Invasion of privacy was identified as a perceived barrier for school nurses measuring BMI in elementary schoolchildren (Hendershot et al., 2008). To protect confidentiality and avoid embarrassment for the child, Himes (2009) recommended that height and weight measurements be taken in a private or partially screened area. Inadequate provisions to

safeguard privacy and confidentiality when measuring or communicating BMI were viewed as obstacles to these COP practices in a study of Ohio school nurses (Stalter et al., 2010). Concern for the consequences of labeling a child as overweight or obese was another barrier perceived by school nurses relative to some COP practices in both national and regional samples (Hendershot et al., 2008; Moyers et al., 2005; Stalter et al., 2011). Moyers et al. (2005) asserted school nurses were concerned that singling out a child for a COP class or program might cause additional peer pressure or ridicule to that child. School nurses' primary responsibility was to promote the health of all students, so these nurses might be reluctant to engage in COP practices they believed might create additional psychosocial problems for overweight or obese children.

Discussion

The high prevalence of childhood obesity increases the risk for serious short- and long-term health problems. Recommendations by the IOM (2012) for obesity prevention include expanding the roles of healthcare providers and making schools a focal point. Despite this clear call for school nurse involvement, there is substantial variability in school nurse engagement in COP practices and our understanding of this variability is in its infancy. Limited research findings indicate that school nurses' perceptions of self-efficacy, benefits, and barriers, may be associated with their participation in COP practices. Little research exists regarding the specific impact of school nurse COP practices on childhood obesity.

Research indicates that elementary school nurses are confident in their ability to use BMI data to influence administrators' implementation of COP programs (Hendershot et al., 2008). This research implies that school nurses frequently consult with school administrators about implementing COP programs which is consistent with Kubik et al.'s (2007) finding that more

than two thirds of school nurses sometimes or often consulted with school administrators about health-related policies. Similarly, self-efficacy in performing school nurse COP activities is associated with more frequent recommendations about weight loss treatment for obese children (Moyers et al., 2005). These findings suggest that efforts to increase self-efficacy may be critical to increase school nurses engagement in COP practices. A particularly promising approach for increasing COP self-efficacy was indicated by a focus group of Swedish school nurses remarking that experienced colleagues provided valuable knowledge that increased confidence to conduct sensitive discussions with parents about a child's weight (Müllersdorf et al., 2010). Based on this finding, the development and implementation of a COP intervention program using experienced school nurse mentors and incorporating the four sources of self-efficacy (Bandura, 1977, 1986, 1997), may help promote school nurse self-efficacy in conducting COP practices.

Consistent with the theoretical framework identified in this paper, increased perceived barriers were associated with decreased participation in COP practices. A lack of perceived support from school administrators, teachers, and food staff for COP in schools appears particularly problematic (Kubik et al., 2007). This highlights the need to pursue educational interventions and create policies to increase support from school colleagues. School nurses may garner more support through staff education grounded in evidence-based rationales for COP efforts. School staff and administrators may also not fully understand that the scope of the school nurse role involves health promotion and disease prevention to support academic success (Council on School Health, 2008; NASN, 2011c), which includes COP. Educating school administrators and co-workers about the school nurse role that involves COP from a healthcare provider perspective may increase their support and reduce this perceived barrier.

School nurses may also perceive more support from administration, teachers, and others when a mandate requires that certain COP practices be conducted. Research shows that COP mandates, such as BMI screenings, are associated with more school nurse COP practices, higher self-efficacy and fewer perceived barriers (Hendershot et al., 2008). Based on these findings, school nurses and others should petition school health policymakers to establish or expand COP mandates requiring a minimum number of hours of physical activity, improved nutritional value of school foods/beverages, and healthy lifestyle education.

Other research indicates that those who perceive school nurses to be unprepared to conduct COP practices perform fewer COP practices. Based on Kubik et al.'s (2007) finding, it would be expected that school nurses with high COP knowledge would feel prepared and likely to participate in COP practices. Surprisingly, a majority of a sample of New Jersey school nurses used clinical impression to assess child obesity instead of the recognized COP practice of BMI-for-age percentile, despite demonstrating a high level of knowledge level about childhood obesity (Nauta et al., 2009). This suggests that factors other than perceived unpreparedness due to a knowledge deficit, such as a perceived lack of self-efficacy, time, resources, privacy, or other unidentified issues, may explain why most of these school nurses rarely or never engage in this COP practice. Further research is needed to determine and explore other possible factors that may significantly influence school nurse participation in various types of COP practices.

School nurses often perceive lack of time and heavy workloads as barriers to performing COP practices in national and regional studies. Guttu et al.'s (2004) research supports this finding when nurses working in schools with lower student-to-school nurse ratios spent more time providing care to children with acute and chronic health problems compared to those nurses working in schools with higher ratios. Staffing changes to support a lower student-to-school

nurse ratio will likely provide school nurses the extra time needed to actively engage in COP practices. Consequently, it is imperative to maximize efforts to lobby legislators to fund additional school nurse positions to achieve the recommended 750:1 student-to-school nurse ratio for the general population (NASN, 2010b; NASN, 2011b). Meanwhile, high student-to-school nurse ratios in many schools may necessitate collaborative COP efforts by school nurses, administrators, teachers, coaches, and other school staff. School nurses should cultivate these relationships to be recognized as a vital part of the school team (Maughan & Adams, 2011) and facilitate shared COP efforts.

Findings from numerous studies indicate that school nurse perceptions of negative parental responses to certain COP practices, especially BMI screening/notification, pose substantial barriers. Negative parental responses range from denial and apathy to defensiveness and anger, but the magnitude of the influence of this barrier on COP practices remains unclear and needs further research. A concerted effort to inform parents about the health risks of childhood obesity may be an effective intervention to reduce negative parental responses and gain support for COP efforts. Funding and increasing the accessibility of educational interventions, such as the S.C.O.P.E. (School Nurse Childhood Obesity Prevention Education) program offered by the NASN (2012), to equip school nurses to inform parents about child weight information in a sensitive manner may also contribute to reducing this perceived barrier.

Few studies examined or described school nurse perceived benefits of COP practices, compared to perceived barriers. Perceptions regarding the benefits of COP activities may be largely overlooked and should be researched to determine their influence on school nurse participation in COP practices. As school nurses increasingly recognize and perceive potential benefits of different COP efforts, they may be more likely to actively engage in those practices.

Conclusions

School nurses have the opportunity to play a pivotal role in COP, but the factors contributing to inconsistent school nurse participation in COP practices are unclear. Self-efficacy, perceived benefits, and perceived barriers emerged as the most relevant perceptions associated with school nurse COP practices. Despite little research examining the relationship between perceptions and practices, the limited findings describing these perceptions support a modified theoretical framework to guide future studies to determine the associations between key school nurse perceptions and COP practices. Research findings suggest that policies to mandate certain COP practices and improve student-to-school nurse ratios are needed. Implementation of a mentorship program for less experienced school nurses may be warranted to increase COP self-efficacy. Educational interventions targeting parents, administrators, school staff, and school nurses may also be effective in increasing school nurse involvement in COP practices which is expected to play a strategic role in addressing the childhood obesity crisis.

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CHAPTER THREE: MEASURING PERCEPTIONS AND PRACTICES

Abstract

A multifaceted strategy to combat the childhood obesity epidemic should include increasing school nurse involvement, but measurement of childhood obesity prevention (COP) practices and the perceptions influencing these behaviors is limited. The purpose of this measurement development study was to evaluate the reliability and validity of five measures of school nurses' COP practices and perceptions (self-efficacy, benefits, and barriers). An anonymous survey was completed by 171 Florida RN school nurses. Internal reliability was acceptable for all scales, with Cronbach's alphas ranging from .81 to .94. Adequate stability reliability was determined by correlation coefficients ($r > .55$) from a test-retest by 13 participants. Significant correlations ($p < .05$) based on hypothesized relationships provided moderate support for construct validity of all five COP measures. These results support use of the five scales in future COP research with targeted school nurse populations.

Introduction

Approximately one third of children in the United States are overweight or obese (Ogden, Carroll, & Flegal, 2008) and have increased risks for health problems (S. R. Daniels, 2009) such as cardiovascular disease (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007; Raghuveer, 2010) and type 2 diabetes (Aschemeier, Kordonouri, Danne, & Lange, 2008; Lipton et al., 2010). A consensus report issued by the Institute of Medicine (2012) recommends that schools and healthcare providers should be a focus for obesity prevention efforts. Childhood obesity is associated with poor academic performance (D. Y. Daniels, 2008; Datar & Sturm, 2006; Taras & Potts-Datema, 2005), linking this health problem specifically to the school nurses' role to

enhance academic success by promoting children's health (National Association of School Nursing, 2010). Unfortunately, school nurse participation in childhood obesity prevention (COP) practices varies. Reliable and valid instruments are needed to measure school nurse COP perceptions and practices to enable analyses of associations between them. Identifying the perceptions that most affect school nurses' practices could guide the development and implementation of targeted interventions and support policy changes to increase engagement in COP by school nurses.

The purpose of this study is to evaluate and refine measures of school nurse COP practices and related perceptions of self-efficacy, benefits, and barriers. Two existing instruments with scales that measured these practices or perceptions were selected to modify and evaluate. New items derived from previous findings were added to the perception scales. Response options, wording of items, and instructions were altered through the following four-step process: Step 1, Initial scale modification; Step 2, Content validity; Step 3, Pre-testing; Step 4, Pilot study.

Theoretical Framework

Bandura's (2004) model of health promotion by social cognitive theory (SCT) was the theoretical framework guiding measurement development and validity testing. According to SCT, self-efficacy directly affects perceived benefits, perceived barriers, goals, and behaviors. Bandura's (2004) theoretical framework also depicts perceived barriers as impacting goals, perceived benefits as affecting both behaviors and goals, and goals influencing behaviors.

Previous research findings indicated that self-efficacy, perceived benefits, and perceived barriers were the key perceptions significantly associated with school nurse COP practices.

Goals were dropped from the theoretical framework because they were not specifically identified as being associated with school nurse COP practices. Consequently, Bandura's health promotion model was modified using only these key perceptions as constructs to describe the influence of school nurse perceptions on COP practices (see Figure 1). Self-efficacy is depicted as directly positively influencing practices and perceived benefits, and negatively affecting perceived barriers. Perceived benefits are portrayed as directly positively impacting practices and mediating the influence of self-efficacy on practices. Conversely, perceived barriers are shown to negatively impact practices and mediate the influence of self-efficacy on practices.

Valid and reliable measures of these specific constructs are needed to analyze and determine which perceptions most influence school nurse COP practices that are not limited to measuring body mass index (BMI). Existing scales were selected that used Likert-type response options to measure how often school nurses performed certain COP practices and levels of related self-efficacy (Hendershot, Telljohann, Price, Dake, & Mosca, 2008; Kubik, Story, & Davey, 2007). Other scales were chosen that used dichotomous response options to identify certain items as perceived benefits and barriers of measuring BMI, one important school nurse COP practice (Hendershot et al., 2008). Refinement of the three perceptions scales is needed to improve accuracy in measuring perceptions associated with measuring BMI and other school nurse COP practices. All scales have had limited psychometric testing and need additional analyses to determine or confirm different types of reliability and validity. Construct validity will be evaluated from the hypothesized relationships between the constructs in this modified theoretical framework.

COP Practices

School nurse COP practices are actions taken to address primary, secondary, and tertiary levels of prevention of childhood obesity. These practices involve preventing obesity from ever occurring, identifying individual children and groups of children affected by or at risk for obesity, and reducing or preventing comorbidities of childhood obesity. These practices can be categorized as either child-level or school-level (Kubik et al., 2007). Child-level COP practices involve actions directed at the individual child and/or parents, such as recommending that a parent contact a healthcare provider for a child's weight concern or checking the BMI of a child who appears to be overweight. School-level COP practices focus on the entire school population and include activities such as consulting with school administrators about health-related policies or providing written information about healthy lifestyle habits to parents, students, and teachers. Content validity was established for Kubik et al.'s (2007) two scales measuring how frequently school nurses engaged in child-level and school-level COP practices and both were found to be reliable (Cronbach's $\alpha \geq .83$) in one study of Minnesota nurses. However, other types of validity have not been evaluated and reliability in other samples of school nurses has not been investigated.

COP Perceptions

School nurse COP perceptions incorporate the views, beliefs, and attitudes developed from interpreting personal and professional experiences related to COP. The salient school nurse COP perceptions of self-efficacy, benefits, and barriers associated with COP practices were previously identified and measured using self-reported online or paper surveys and Likert-type or dichotomous response options.

Self-efficacy

Self-efficacy is the belief in one's ability to perform specific behaviors under certain conditions to achieve desired outcomes and is a key determinant of intentional behavior (Bandura, 1977, 1986, 1997, 2004). People with higher self-efficacy tend to engage in those specific behaviors more often and usually perceive more benefits and fewer barriers associated with those actions. Self-efficacy influences the amount of effort and perseverance a person will expend to overcome barriers in the performance of certain behaviors (Bandura, 1977, 1986, 1997, 2004).

Hendershot et al.'s (2008) School Nurses' Efficacy Expectations Regarding Measurement of Body Mass Index scale assesses self-efficacy regarding ability to perform COP practices related to measuring BMI, making recommendations for healthy lifestyle changes, and consulting with administrators about implementing programs. Content and face validity were established for this scale which was found to be reliable from a Cronbach's alpha of 0.89 and a test-retest correlation coefficient of .89 in a nationwide sample of elementary school nurses (Hendershot, 2008; Hendershot et al., 2008). Additional validity and reliability measures of this scale have not been evaluated.

Perceived benefits

Perceived benefits are the advantages or value expected from engaging in certain behaviors or practices. In a sample of school nurses across the United States, Hendershot et al.'s (2008) Benefits of Measuring Elementary Children's Body Mass Index in Mandated and Nonmandated Schools scale used dichotomous response options to identify perceived benefits of measuring BMI. However, these perceived benefits are also applicable to other school nurse COP practices. Perceived benefit items included creates awareness of obesity problem, educates

students and parents about potential problem, and encourages increased physical activity and healthier food choices (Hendershot et al., 2008). Only content and face validity were established for this scale (Hendershot et al., 2008). Reliability and other sources of validity of this scale have not been evaluated.

Perceived barriers

Perceived barriers are impediments viewed as deterrents to participating in specific activities. A perceived lack of facilitators to conduct certain practices may also be deemed as perceived barriers. Hendershot et al.'s (2008) Barriers to Measuring Elementary Children's Body Mass Index in Mandated and Nonmandated Schools scale identified perceived barriers to measuring BMI, which are also impediments to performing other school nurse COP practices. This scale was used with a nationwide sample of elementary school nurses using dichotomous response options. Scale items assess perceptions regarding inadequate school resources, inadequate or inappropriate parental responses, not enough time, and inadequate administrative support. Hendershot et al., (2008) established face and content validity, but no other measures of validity or reliability were evaluated for this scale.

Scale Development

Scale development in preparation for the study that follows proceeded in four steps. Each of these steps is described next.

Step 1: Initial Scale Modification

Initial modifications to scales involved three types of changes that included changing response options, adding items, and revising or establishing titles. The perceived benefits and perceived barriers scales were modified by changing dichotomous to 5-point Likert-type

response options where 1 = *strongly disagree* and 5 = *strongly agree* to improve accuracy in measuring those two perceptions.

One item was added to each of the scales measuring school nurse perceptions of self-efficacy, benefits, and barriers, to broaden the spectrum of those school nurse perceptions and be consistent with findings in the literature. An item measuring self-efficacy related to recommending weight loss programs (Moyers, Bugle, & Jackson, 2005) was added to the self-efficacy scale. A perceived benefit of helping children maintain a healthy weight and a perceived barrier of being unprepared to participate in COP practices (Hendershot et al., 2008; Kubik et al., 2007) were added to the benefits and barriers scales, respectively.

The three perception scales were retitled as the School Nurse Childhood Obesity Prevention Self-Efficacy Scale, Perceived Benefits of School Nurse Childhood Obesity Prevention Practices, and Perceived Barriers to School Nurse Childhood Obesity Prevention Practices. The two scales measuring COP practices were named: School Nurse Childhood Obesity Prevention Practices (Child-level) and (School-level).

Step 2: Content Validity

Recognized guidelines were used to assess item content validity (Lynn, 1986) of the three perception scales using six experts in childhood obesity, school nursing, and/or school nurse research. Only a few minor revisions for clarity were made in response to feedback from these content experts. One revision involved the deletion of an item on the perceived benefit and the perceived barriers scale because it did not match the question stem.

Content experts received instructions to review and rate the relevancy of each item on the three modified perception scales from 1 (*not relevant*) to 4 (*very relevant and succinct*). The

content validity index (CVI) for items ranged from .83 to 1.0. All items reflected sufficient content validity.

Scale CVI values were consistent with recommended values of .90 or higher using the established guidelines of item CVI averaging (Polit & Beck, 2008). After the deletion of one item on the perceived benefits and perceived barriers scale, scale content validity was determined to be excellent for self-efficacy (.98), perceived benefits (.95), and perceived barriers (.99). The three modified perception scales and two practice scales were combined to create the final 70-item closed-format questionnaire that also included 17 demographic questions (see Appendices A and B).

Step 3: Pre-Testing

Three undergraduate nursing students in Florida evaluated the online questionnaire for clarity of instructions, wording of items, and time required to complete. The participants described no substantial problems with comprehending instructions or questionnaire items, and reported needing 10-15 minutes to complete the survey.

Step 4: Pilot Study

Online study procedures were piloted with school nurses ($n = 12$) from university graduate nursing students/alumni, professional contacts, and a health foundation in Florida to evaluate recruitment strategies, data collection methods, and retrieval of data using a secure Internet survey web server. Recruitment-consent messages were sent directly to individual e-mail addresses. Based on pilot study findings, procedures involving data collection and retrieval were verified and recruitment strategies were revised by having participating organizations send the e-mail recruitment-consent messages to their members. A snowballing recruitment strategy

was also added to improve recruitment by including a request at the end of the online questionnaire inviting participants to forward the e-mail message to other RN school nurses in Florida who might be interested in participating.

Study Overview

The aim of this measurement development and refinement is to evaluate the reliability and validity of the scales measuring school nurse COP perceptions and practices. Inter-item correlation criteria are examined to determine inclusion of scale items. Cronbach's alpha and test-retest correlation coefficients are analyzed to evaluate scale reliability. Correlations from hypothesized relationships in the theoretical framework will be used to evaluate construct validity of each scale. Consistent with SCT, it is predicted that self-efficacy is the key perception influencing school nurse COP practices. It is also expected that perceived benefits will positively influence the frequency that school nurses participate in both child-level and school-level COP practices and perceived barriers will negatively impact these practices. Of interest is whether perceived benefits and perceived barriers mediate the influence of school nurse self-efficacy on COP practices.

Methods

Sample

Approval of exempt human research for this study was granted by the University of Central Florida Institutional Review Board. A purposive sample of 171 Florida school nurses was recruited to complete a self-administered anonymous online or paper questionnaire to collect information about school nurses' COP perceptions and practices. Inclusion criteria required that

participants be registered nurses currently working or having worked during the 2010-11 school year as a school nurse in Florida and self-identify as meeting criteria.

Procedure

The Florida Association of School Nurses (FASN), Florida School Health Association (FSHA), and 12 Florida county school districts sent a recruitment-consent e-mail message to their school nurses in January/February 2012. Participants were instructed to use an embedded web link in the e-mail message to access the questionnaire through a secure Internet survey web server (<http://www.surveymonkey.com>) and were offered the incentive of a \$5 gift card for completing the survey. School nurses attending two FASN conferences were also invited to complete a paper questionnaire and submit it onsite. To evaluate test-retest reliability, 13 participants completed the online questionnaire twice, approximately two weeks apart.

Data Analysis

Data were analyzed using Statistical Package for the Social Sciences Version 19.0 and an a priori significance level was set at $p < .05$. Descriptive statistics characterized the sample demographics. Mean scores were calculated for each scale, and for 34 cases with < 10% missing data, a mean scale score was calculated from the questions answered on that scale. A mean scale score for a group with a comparable characteristic (highest nursing degree) was imputed for five cases with missing data for entire scales. Analysis of box plots and stem leaf graphs identified outliers, and both histograms and skew values $< |1.0|$ determined normal distribution. Initial data analyses indicated that the self-efficacy scale was not normally distributed, based on a histogram and a skew value of -1.21, but a square root transformation of the data achieved a normal distribution and resulted in an acceptable skew value of .70.

Cronbach’s alpha and inter-item correlations were used to evaluate internal reliability. Items failing to meet the criteria of having inter-item correlations of $> .30$ with at least three other items were deleted. Test-retest correlation coefficients established stability reliability. Construct validity was evaluated using analysis of correlations between hypothesized relationships from the theoretical framework.

Results

The estimated response rate was 33%, with school nurses participating from all regions of Florida and representing 43% of counties in the state. Demographic information focused on personal, professional, and job-related characteristics is presented in Table 1 and Table 2. The mean age for this sample was 51.1 years ($SD = 10.5$) years old. Most participants were members of the FASN and/or the FSHA, and held a bachelor’s degree in nursing. Nearly 33% had no COP education and only 23% were nationally certified school nurses. The majority of school nurses reported their job description as “clinic practice” or “both clinic practice and administrative/supervisory.”

Table 1. Years of Experience of Sample Population (N = 171)

Years of experience	Mean \pm SD	Range
Years of nursing experience	25.2 \pm 11.8	1-53
Years of school nursing experience	9.5 \pm 7.4	1-32
Years in current school nurse position	7.2 \pm 6.1	1-28

Table 2. Demographic Characteristics of Sample Population (N = 171)

Characteristic	<i>n</i>	%
National Certified School Nurse		
Yes	38	23.2%
No	126	76.8%
Professional organization membership*		
FASN	102	59.6%
FSHA	35	20.5%
Other	58	33.9%
Highest nursing degree		
Associate degree/diploma	49	29.5%
Bachelor's degree	96	57.8%
Master's or doctoral degree	21	12.7%
Childhood obesity prevention education		
None	54	32.7%
0-2 hours	69	41.8%
> 2-8 hours	29	17.6%
> 8 hours	13	7.9%
School setting		
Rural	25	15.4%
Suburban	88	54.3%
Urban	49	30.2%
Job description		
Administrative/supervisory/faculty/educator	25	15.2%

Characteristic	<i>n</i>	%
Clinic practice	77	46.7%
Both clinic practice and administrative/ supervisory	63	38.2%
Grade level of school(s)		
Elementary school	48	29.8%
Middle school	9	5.6%
High school	12	7.5%
Combination of grade levels	92	57.1%
Number of students provided care		
0-500	20	12.2%
501-1,000	40	24.4%
1,001-2,000	27	16.5%
2,001-3,000	31	18.9%
≥ 3,001	46	28.0%
Percentage of students qualifying for free/reduced lunch		
0-20%	19	11.7%
21-40%	34	21.0%
41-60%	34	21.0%
61-80%	45	27.8%
≥ 81%	30	18.5%
School nurse BMI		
Underweight (BMI < 18.5)	0	0.0%
Normal weight (BMI 18.5-24.9)	80	50.0%
Overweight (BMI 25.0-29.9)	58	36.3%

Characteristic	<i>n</i>	%
Obese (BMI > 30.0)	22	13.8%
Race/ethnicity		
White	141	86.0%
Black/African American	4	2.4%
Hispanic/Latino	6	3.7%
Asian/Pacific Islander	2	1.2%
Multiracial	10	6.1%
Other/not identified	1	0.6%

Note. * Percentage may not total 100% due to ability to check more than one option.

Reliability

A total of five items were deleted from the perceived barriers scale. Three items were initially deleted from the perceived barriers scale due to failure to meet inter-item correlation criteria (see Table 3). After these deletions, two more items were deleted using the same criteria. The resultant 8-item perceived barriers scale had a slightly improved Cronbach's alpha of .81. One of these five deleted items, inadequate or inappropriate parental responses, was analyzed as a separate perceived barrier addressing inadequate or inappropriate parental responses due to the strong support for negative parental responses as a perceived barrier to school nurse COP practices found in the literature (Hendershot et al., 2008; Moyers et al., 2005; Müllersdorf, Zuccato, Nimborg, & Eriksson, 2010; Nauta, Byrne, & Wesley, 2009; Stalter, Chaudry, & Polivka, 2010; Stalter, Chaudry, & Polivka, 2011; Steele et al., 2011).

Table 3. Interitem Correlation of Perceived Barriers Scale Items (N = 171)

Perceived Barriers Scale item	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Inadequate school resources	-	.25	.28	.53	.26	.43	.34	.40	.37	.24	.29	.24	.24
2. Inadequate or inappropriate parental responses *		-	-.03	.31	.04	.14	-.09	.28	-.09	-.23	.14	.01	-.06
3. Intrusion of child's privacy **			-	.08	.41	.14	.12	.01	.31	.14	.40	.20	.19
4. Inadequate community resources**				-	.31	.16	.15	.23	.13	.07	.17	.16	.09
5. Potential for stigmatization*					-	.13	.04	-.01	.17	.18	.27	.09	.13
6. Not enough time						-	.25	.31	.32	.22	.23	.27	.27
7. Do not have proper equipment to measure height and weight for calculation of BMI							-	.35	.60	.48	.23	.33	.30
8. Inadequate administrative support								-	.38	.29	.26	.45	.15
9. Do not have a private area to measure height and weight for calculation of BMI									-	.54	.37	.50	.33
10. Do not know how to measure height and weight for calculation of BMI										-	.20	.45	.38
11. Public opposition to measurement of height and weight for calculation of BMI*											-	.26	.23
12. Teachers will not release students												-	.30
13. School nurses not prepared to participate in childhood obesity prevention													-

Note. * Item deleted due to < 3 interitem correlations \geq .30 initially. ** Item deleted due to < 3 interitem correlations \geq .30 after first round of deletions.

Table 4. Evaluation of Construct Validity from Correlations of School Nurse COP Perceptions and Practices

Construct	1	2	3	4	5	6
1. Child-level practices	-	.52**	.33**	.13	-.24*	.13
2. School-level practices		-	.32**	.09	-.05	.00
3. Self-efficacy			-	.18*	-.30**	.23*
4. Perceived benefits				-	-.01	.02
5. Perceived barriers					-	.04
6. Negative parental responses barriers						-

Note. * $p < .05$. ** $p < .001$.

None of the retained items in any of the scales increased Cronbach's alpha if deleted. Cronbach's alpha indicated acceptable internal reliability for all five scales: child-level practices (.87), school-level practices (.87), self-efficacy (.93), perceived benefits (.94), and perceived barriers (.81).

Test-retest reliability was generally good for child-level practices ($r = .78$), school-level practices ($r = .77$), self-efficacy ($r = .70$), perceived benefits ($r = .55$), and perceived barriers ($r = .68$) scales. Poor test-retest reliability was found for the single item measure of negative parental response barriers ($r = .08$), an indicator that this perception lacked stability.

Validity

The correlations depicted in Table 4 provide mixed support for construct validity. Construct validity was determined through correlations based on hypothesized relationships in the theoretical framework. As predicted, there were significant positive correlations between self-efficacy and perceived benefits ($r = .18, p < .05$), child-level practices ($r = .33, p < .001$),

and school-level practices ($r = .32, p < .001$). As expected from hypothesized relationships, there was a negative correlation between perceived barriers and both self-efficacy ($r = -.30, p < .001$) and child-level practices ($r = -.24, p < .05$). Relationships expected between perceived barriers and school-level practices ($p = .49$), and between perceived benefits and child-level practices ($p = .08$) or school level practices ($p = .22$) were not supported. The perceived negative parental responses barrier did not significantly correlate with either child-level ($p = .10$) or school-level practices ($p = .97$). Contrary to a hypothesized negative relationship between self-efficacy and perceived barriers, there was a significant positive correlation between self-efficacy and the special type of perceived barrier regarding negative parental responses ($r = .23, p < .05$).

Discussion

This measurement study evaluated the reliability and validity of five scales measuring COP perceptions and practices in a sample of Florida RN school nurses. Two scales measured child-level and school-level practices, and three scales measured self-efficacy and perceptions of benefits and barriers. All five scales demonstrated acceptable internal consistency reliability. Cronbach's alphas for the self-efficacy scale and the two practice scales were slightly higher than those previously reported with the addition of one item to the self-efficacy scale (Hendershot et al., 2008; Kubik et al., 2007), suggesting that adding an item to the original self-efficacy scale may have contributed to this improvement.

Significant positive correlations between self-efficacy and both child-level and school-level practices supported construct validity of study measures. The magnitude of the correlations between self-efficacy and child-level and school-level practices ($r \geq .32$) was similar in

magnitude that has been observed in diabetes education/management self-efficacy and blood glucose monitoring practices in school nurses ($r = .30$; Fisher, 2006).

The perceived benefits scale demonstrated strong internal consistency reliability and adequate stability reliability. Scores on this measure did not significantly correlate with child-level or school-level practices as expected, but a weak significant positive correlation between perceived benefits and self-efficacy provided some support for construct validity. The theoretical framework may not accurately describe the hypothesized relationships between perceived benefits and self-efficacy or COP practices, which may have contributed to these unexpected findings. The relative weakness of this significant correlation and lack of other significant correlations raises questions about the validity of this measure and/or the influence of perceived benefits on school nurse COP practices. It is plausible that perceived benefits were more strongly related to self-efficacy and behaviors regarding one's own health, but did not have a robust significant relationship with self-efficacy and behaviors/practices intended to improve the health of others. Further analysis of the validity of this scale and the influence of perceived benefits should be explored to determine if this construct should be revised or omitted from the theoretical framework in the context of school nurses and COP.

As posited, perceived barriers significantly negatively correlated with self-efficacy and child-level practices, supporting construct validity. Moreover, the hypothesized relationship between perceived barriers and school-level COP practices was not demonstrated. Dissimilarities between the types of activities involved with child-level and school-level COP practices may explain these different results. Child-level practices typically involve school nurses addressing sensitive weight issues with parents/children individually. In contrast, school-level COP practices primarily involve school nurses providing nutrition/physical activity

education and monitoring/influencing school policies directed at the entire school population. Due to the delicate nature of child-level practices, perceived barriers may exert a substantial deterrent effect on performance of child-level practices but not school-level practices. However, Kubik et al. (2007) found that Minnesota BSN school nurses who perceived low support for COP from others (administrators, teachers, food staff, and community healthcare providers) were significantly less likely to engage in both child-level and school-level COP practices (Kubik et al., 2007). The theoretical framework (see Figure 1) used in this study might only be appropriate to assert hypothesized relationships supporting construct validity between certain types of perceived barriers and COP practices.

Five items were deleted from the perceived barriers scale due to low inter-item correlations. Two of these items addressed potential stigmatization of a child and invasion of a child's privacy associated with some COP practices. It is possible that these items vaguely suggested another kind of elusive perceived barrier regarding the protection of the individual child. Development of a multiple-item reliable and valid measurement of school nurse perceptions addressing child protection issues associated with COP practices deserves further investigation.

One item deleted from the perceived barriers scale addressing negative parental responses was retained for further analysis in this study but was expected to function like other perceived barriers in hypothesized relationships. As self-efficacy increased, perceived barriers (including negative parental responses) were predicted to decrease. Surprisingly, self-efficacy was found to be significantly positively correlated with negative parental responses. More research is needed to replicate this finding to ensure it is not unique to this study sample.

A low test-retest correlation for the single item measure of negative parental responses indicated poor stability reliability for this type of perceived barrier. The wording of this item, “inadequate and inappropriate parental responses,” probably encompassed multiple aspects of negative parental responses to receiving information about their child’s overweight/obese weight status, health risks, and associated recommendations. Hence, it would be beneficial in future research to explore a variety of potential negative parental responses such as: denial/disbelief, apathy, unwillingness or inability to address child weight issues, and anger or defensiveness stemming from a perception that inadequate/poor parenting contributes to childhood obesity.

It is possible that the unanticipated positive correlation between self-efficacy and perceived negative parental responses indicated that negative parental responses were unique and may function differently than other perceived barriers in this context. School nurses with high self-efficacy to perform various COP activities may have interacted more with parents and increasingly interpreted negative parental responses as the main barrier to COP practices. Other barriers may have been perceived as minimal or more easily overcome. Regardless of the explanation for this unexpected relationship, a multiple-item reliable and valid scale including various facets of negative parental responses may be needed to measure this special type of perceived barrier and determine its association with school nurse COP practices.

Findings in this study were not likely a product of sampling because the Cronbach’s alpha obtained for the self-efficacy scale and both practice scales were similar to those obtained in previous studies conducted several years apart (Hendershot et al., 2008; Kubik et al., 2007). These findings are also consistent with studies of school nurses from various regions of the country and with higher response rates. The reliability and validity results in this study support the use of the five scales in future COP research with diverse school nurse populations.

Conclusions

This study demonstrated adequate reliability and validity of all five scales comprising the questionnaire. Development and evaluation of reliable and valid instruments to measure school nurse perceptions associated with COP is important to research aimed at identifying key determinants of COP practices. By accurately identifying the perceptions that exert the greatest influence on COP practices, interventions and policy changes can be targeted to facilitate school nurse engagement in combating childhood obesity. Increased involvement in COP practices by school nurses, students, parents, teachers, staff, administrators, and community healthcare providers is expected to contribute greatly to the comprehensive efforts needed to address the obesity health crisis in our nation's children.

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CHAPTER FOUR: RESEARCH FINDINGS

Abstract

Comprehensive childhood obesity prevention (COP) strategies should include increasing school nurse involvement. This study was conducted to determine the influence of school nurse perceptions (self-efficacy, perceived benefits, and perceived barriers) on participation in COP practices. Florida RN school nurses ($n = 171$) anonymously completed online or paper questionnaires. Characteristics suggesting more education were positively associated with performing COP practices ($p < .05$). Linear regression analyses identified a model of self-efficacy with perceived benefits and perceived barriers that explained 12% and 9.1% ($p < .001$) of variance in COP practices targeting individual children (child-level) and the entire school population (school-level), respectively. Self-efficacy explained the most variance in both models ($p < .001$). Mediation testing identified perceived barriers as a partial mediator of the influence of self-efficacy on child-level practices. Educational interventions and policies to increase self-efficacy and reduce perceived barriers may be effective in promoting school nurse COP practices.

Introduction

An Institute of Medicine ([IOM] 2012) consensus report recommends that obesity prevention efforts include expanding the role of healthcare providers and focusing on schools. With nearly one in three children in the United States categorized as overweight or obese (Ogden, Carroll, & Flegal, 2008), school nurses are ideally positioned as the only healthcare provider in many schools to actively address this health epidemic. Obese children are at increased risk for physical comorbidities such as cardiovascular disease (Freedman, Mei,

Srinivasan, Berenson, & Dietz, 2007; Raghuv eer, 2010), hypertension (Meininger et al., 2010; Pullis & Pullis, 2009), type 2 diabetes (Aschemeier, Kordonouri, Danne, & Lange, 2008; Lipton et al., 2011), and dyslipidemia (Cook & Kavey, 2011; Fortmeier-Saucier, Savrin, Heinzer, & Hudak, 2008). Psychosocial comorbidities of childhood obesity include depression (Dockray, Susman, & Dorn, 2009; Walker & Hill, 2009) and low self-esteem (Griffiths, Parsons, & Hill, 2010; Wang, Wild, Kipp, Kuhle, & Veugelers, 2009). Children from African American, Hispanic, Native American, and lower socioeconomic populations have a higher prevalence of obesity and are at increased risk for comorbidities (Koplan, Liverman, & Kraak, 2005; Kumanyika & Grier, 2006). Childhood obesity is associated with lower academic performance (Daniels, 2008; Datar & Sturm, 2006; Taras & Potts-Datema, 2005), making this health problem a concern in the education community.

As more obese children develop comorbidities, related healthcare costs escalate substantially (Trasande & Chatterjee, 2009; Trasande, Liu, Fryer, & Weitzman, 2009). In addition to the risks incurred during their youth, obese children are at increased risk for becoming obese adults with more comorbidities and even greater healthcare costs (Biro & Wien, 2010; Sun et al., 2008). Given these many risks and its increasing ubiquity, the childhood obesity health crisis, if left unchecked, threatens to be an antecedent to an economic crisis.

Background

Childhood obesity is a complex health problem that requires a multifaceted approach. School settings must be included because children spend many waking hours and consume one third to one half of their daily calories in schools (IOM, 2012; Story, Kaphingst, & French, 2006; U.S. Department of Health and Human Services, Centers for Disease Control and Prevention

[CDC], 2008). Collaborative efforts between school nurses, administrators and other school staff, may be an effective strategy for childhood obesity prevention (COP). School nurses have the knowledge and expertise to engage in COP (National Association of School Nurses [NASN], 2011) and efforts to increase their participation in COP practices are needed.

Theoretical Framework

Theoretical frameworks to guide health behaviors typically focus on behaviors/practices intended to improve an individual's own health, rather than the health of others. A modified version of Bandura's (2004) model of health promotion using social cognitive theory was employed to guide this research into school nurses' efforts and practices to improve the health of children. In this theoretical framework (see Figure 1), self-efficacy is described as negatively affecting perceived barriers and positively influencing perceived benefits and COP practices. Perceived benefits positively affect COP practices and perceived barriers negatively influence these practices. In figure 1, the influence of self-efficacy on practices was depicted as being mediated by perceived benefits and perceived barriers. This mediation effect has not been studied with school nurse perceptions and COP practices. However, it is suggested by a significant mediation effect by perceived benefits and perceived barriers on the influence of self-efficacy on nutritional behaviors (Anderson, Winett, Wojcik, Winett, & Bowden, 2001; Bruening, Kubik, Kenyon, Davey, & Story, 2010).

COP Practices

School nurse COP practices involved activities directed at individual children/parents (child-level practices) and the entire school population (school-level practices) (Kubik, Story, & Davey, 2007). Examples of child-level COP practices include counseling a parent regarding a

child's weight concern, recommending weight loss treatment for obese children, checking blood pressure of an obese child, and using body mass index (BMI) percentile based on CDC age/gender (CDC, 2011) to assess a child's weight status (Hendershot, Telljohann, Price, Dake, & Mosca, 2008; Kubik et al., 2007; Moyers, Bugle, & Jackson, 2005; Nauta, Byrne, & Wesley, 2009). School nurse participation in COP practices varies substantially and is not well understood. For example, 39% of Missouri school nurses never or rarely used BMI-for-age percentile to assess obesity in children (Moyers et al., 2005) compared to 82% of a sample of Minnesota school nurses who never or rarely engaged in this practice (Kubik et al., 2007). Explanation for the variance and underuse of BMI screening to assess child weight is unclear.

School nurse school-level COP practices include activities such as identifying groups at risk for childhood obesity, consulting with administrators about health-related policies, and educating parents, children, and school staff about nutrition and physical activity (Hendershot et al., 2008; Kubik et al., 2007; Moyers et al., 2005; Nauta et al., 2009). Although few studies examined school-level practices, inconsistencies in participation were found. Kubik et al. (2007) found that with regard to practices that influenced health policy, a majority of Minnesota BSN school nurses consulted sometimes or often with administrators, yet almost one third never or rarely engaged in this practice. Few studies investigated the associations between specific or comprehensive school nurse COP practices and perceptions. Determining the perceptions and factors that affect school nurse participation in these practices is important to COP efforts.

Self-Efficacy

Self-efficacy is a person's belief in his/her ability to successfully perform specific behaviors that will facilitate the achievement of certain goals and is situation dependent

(Bandura, 1977, 1986, 1997). This belief affects the degree of effort expended on a particular activity and the level of perseverance in overcoming barriers. People with high self-efficacy pertaining to certain activities will usually expect more favorable outcomes from and fewer barriers to performing those activities than will those with low self-efficacy. Primary sources of self-efficacy are derived from performance accomplishments, observational experiences, verbal persuasion, and physiological responses (Bandura, 1977, 1986, 1997).

School nurse self-efficacy varies according to the type of COP practices involved and the accompanying circumstances. Although most school nurses appear moderately confident to highly confident in their ability to calculate, track, and help parents interpret the BMI of children (Hendershot et al., 2008), self-efficacy regarding their ability to competently recommend weight loss programs for obese children seems to vary (Moyers et al., 2005; Nauta et al., 2009). A focus group of Swedish school nurses who work with 6 – 12 years old children reported high self-efficacy recommending appropriate diet, exercise, and other facts to obese children and their parents, yet indicated low confidence in their ability to conduct a motivating conversation about a child's weight problem (Müllersdorf, Zuccato, Nimborg, & Eriksson, 2010). Self-efficacy was found to be related to a COP practice in Moyers et al. (2005) study of rural Missouri school nurses with a significant positive correlation ($p < .05$) between school nurses' belief in their ability to competently recommend weight loss programs for children and usually recommending weight loss treatment for obese children.

Perceived Benefits

Few studies have addressed school nurse perceived benefits of COP practices. However, in a nationwide study examining BMI screening in elementary school children, the majority of

school nurses in the sample agreed that the following items were benefits: creates awareness of obesity problem, provides evidence to change policy, educates students/parents about possible problems, provides BMI information to parents so they can monitor their child's weight, and encourages increased physical activity and healthier food choices for students (Hendershot et al., 2008). Over half of elementary and middle school nurses in Missouri agreed that obese children can lose weight and maintain their weight loss with proper guidance, which suggests a perceived benefit of COP interventions (Moyers et al., 2005). Moyers et al. (2005) also found a significant positive correlation ($p < .01$) between the perceived benefit that childhood obesity was more amenable to treatment than adult obesity and the school nurse COP practice of recommending weight loss for obese children.

Perceived Barriers

Perceived barriers are impediments that may be conceptualized as a lack of facilitators and have been studied more often than other school nurse COP perceptions. The most commonly reported school nurse perceived barriers to COP included inadequate, inappropriate, and/or negative parental responses (Hendershot et al., 2008; Moyers et al., 2005; Nauta et al., 2009; Stalter, Chaudry, & Polivka, 2011; Steele et al., 2011), insufficient time and excessive workloads (Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg, Kubik, & Johnson, 2011; Stalter, Chaudry, & Polivka, 2010, 2011; Steele et al., 2011), and limited school and community resources (Hendershot et al., 2008; Morrison-Sandberg et al., 2011; Stalter et al., 2010, 2011; Steele et al., 2011). Negative parental responses were typically associated with parental notification of a child's BMI and/or discussions of a child's weight problem. School nurses also reported fear or concern of a negative reaction from parents when notified of a

child's overweight/obesity status (Moyers et al, 2005; Nauta et al., 2009; Stalter et al., 2011; Steele et al., 2011).

Lack of time and heavy workloads have been identified as barriers to measuring BMI and other COP practices, with increased responsibilities for the care of students with chronic illnesses and serious health conditions receiving higher priority (Morrison-Sandberg et al., 2011; Stalter et al., 2011). Limited school and community resources for COP practices were also cited as barriers, especially by elementary school nurses nationwide in regards to BMI screening (Hendershot et al., 2008). Inadequate space and a lack of operational scales, stadiometers, and privacy screens were reported (Stalter et al., 2010, 2011). School nurse focus groups conducted in Minnesota and in the Midwestern United States indicated a perceived lack of referral healthcare providers as a deterrent to some COP practices (Morrison-Sandberg et al., 2011; Steele et al., 2011).

Other perceived impediments consistently found in national and regional samples included the potential consequences of labeling a child (Hendershot et al., 2008; Moyers et al., 2005; Stalter et al., 2011), lack of knowledge/preparedness (Hendershot et al., 2008; Kubik et al., 2007; Müllersdorf et al., 2010; Steele et al. 2011), and inadequate support from administrators and school staff (Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg et al., 2011; Stalter et al., 2010, 2011; Steele et al., 2011). Less frequently reported barriers included a lack of policies or guidelines (Hendershot et al., 2008; Stalter et al., 2010, 2011) and potential violation of student/family privacy (Hendershot et al., 2008; Stalter et al., 2010). School nurse perceived barriers were significantly inversely associated with COP practices (Kubik et al., 2007) when school nurses who perceived a barrier in terms of low support from administrators,

teachers, food staff, and local healthcare providers for COP efforts in school were less likely to perform COP practices than were those who perceived high support from these colleagues.

School Nurse Characteristics

Personal, professional, and job-related characteristics of school nurses were associated with COP perceptions and practices. School nurses with graduate nursing degrees expressed significantly more perceived benefits and self-efficacy than did those with a bachelor's degree in nursing or less (Hendershot et al., 2008). Additionally, years of nursing experience and school nurse experience were significantly positively associated with frequency of performing COP practices (Kubik et al., 2007).

Study Aims

The three study aims were to identify: the key perceptions influencing school nurse COP practice; the mediators of the influence of self-efficacy on school nurse COP practices; and the associations between school nurse personal/professional/job characteristics and COP perceptions and practices. Study findings are expected to contribute to tailoring interventions and changing policies that promote COP practices by school nurses.

Methods

Sample

A purposive sample of 171 Florida school nurses was recruited through the Florida Association of School Nurses (FASN), Florida School Health Association (FSHA), and 12 county school districts. Inclusion criteria required a participant be a RN currently employed as a school nurse or have worked as a school nurse during the 2010-2011 school year in Florida.

Participants self-identified as meeting inclusion criteria. A power analysis indicated that a sample size of 77 was required to provide sufficient power to detect a medium effect size (0.15) in the regression analyses, assuming an alpha of 0.05 and a power of 0.80.

Procedure

This study was approved as exempt human research by the Institutional Review Board of the University of Central Florida. A descriptive cross-sectional design was used to measure school nurses' COP perceptions and practices. Three undergraduate nursing students from a Florida university assessed the clarity of instructions and questions, ability to access and enter data into an online questionnaire, and time required to complete the entire survey. Online study procedures using the online survey were piloted with twelve RNs to evaluate recruitment strategies and data collection and retrieval methods using a secure Internet survey web server.

Participants self-identified as meeting inclusion criteria and completed an anonymous, self-administered, paper or online questionnaire between January 2012 and March 2012. Thirteen participants completed the online survey twice to evaluate test-retest reliability. A \$5 gift card was offered to participants as an incentive for completing the survey.

Participants were recruited using a paper recruitment-consent message provided at two FASN conferences. This message explained the purpose, inclusion criteria, and study participation requirements, and that by continuing to complete the survey, they were consenting to participate in this study with no more than minimal risks. Sixty participants completed and submitted the paper questionnaire onsite at these conferences.

The FASN, FSHA, and all 67 Florida county school districts were e-mailed a request to help recruit their school nurses to participate by completing the online survey. The FASN,

FSHA, and 12 Florida county school districts agreed to e-mail the recruitment-consent message to their school nurses. Participants accessed the online questionnaire through an embedded weblink in the e-mailed recruitment-consent message used to collect data through a secure Internet survey web server (SurveyMonkey.com). The FASN and three county school districts sent one reminder e-mail and the other organizations did not respond to the request or did not send a reminder due to data collection time limitations. A snowballing recruitment strategy was employed by adding a message at the end of the online questionnaire requesting participants to forward the recruitment-consent message to other interested RN school nurses in Florida.

Instruments

A 70-item closed-format questionnaire composed of 17 demographic items, two COP practices scales, and three COP perceptions scales, was implemented in this study. Permission to use these scales was obtained from the primary authors of two studies (Hendershot et al., 2008; Kubik et al., 2007). The COP perception scales that measure school nurse self-efficacy, perceived benefits, and perceived barriers were modified to include items to measure additional relevant COP perceptions and improve measurement accuracy. Participants took 10 -15 minutes to complete the survey.

COP practice scales

Two scales were used to measure the frequency with which school nurses performed nine different child-level COP practices and 10 school-level COP practices (Kubik et al., 2007). The child-level scale assessed COP practices targeting individual children regarding weight-related issues. The scale measuring school-level practices assessed COP aimed at the whole school population. Kubik et al. (2007) reported that content validity was determined for both COP

practice scales by experts in childhood obesity, school nursing, and school-based research. An acceptable internal reliability was previously reported with a Cronbach's alpha of 0.84 for child-level practices and 0.83 for the school-level practices (Kubik et al., 2007).

These two untitled scales were subsequently named "School Nurse Childhood Obesity Prevention Practices" with "child-level" and "school-level" subheadings for this study. Internal reliability improved in this study; the Cronbach's alpha increased to 0.87 for both child-level and school-level COP practices. Stability reliability was not previously reported, but a test-retest conducted in this study provided support for both child-level practices ($r = .78$) and school-level practices ($r = .77$).

COP perception scales

Content validity was originally determined for the three perception scales by seven experts in nursing, obesity, and survey research (Hendershot et al., 2008). After minor modifications to the scale, content validity was reevaluated as acceptable for all three scales by six experts in childhood obesity, school nursing, and/or school nurse research (Quelly, 2012).

Self-efficacy scale

The "School Nurse Efficacy Expectations Regarding Measurement of Body Mass Index" Likert-type scale measured school nurse perceived efficacy with conducting BMI screening activities and other COP practices (Hendershot et al., 2008). Internal reliability was originally estimated at a Cronbach's alpha of .89 and stability reliability was determined using a test-retest correlation coefficient ($r = .89$; Hendershot, 2008). This scale was modified by adding one item derived from previous studies, "recommend weight loss treatment for children" (Moyers et al. 2005; Nauta et al., 2009), and retitled, "School Nurse Childhood Obesity Prevention Self-

Efficacy Scale.” Internal reliability of this modified scale was supported in this study by a strong Cronbach’s alpha (.93) and stability reliability was supported with an acceptable test-retest correlation ($r = .70$).

Perceived benefits scale

To measure perceived benefits more accurately, the scale “Benefits of Measuring Children’s Body Mass Index (BMI) in Mandated and Non-Mandated Schools” (Hendershot et al., 2008) was modified from a dichotomous scale to a Likert-type scale. No measures of reliability or validity were reported for this scale. Another item involving a positive outcome expectation of various school nurse COP practices, “helps children maintain a healthy weight”, was added as a perceived benefit (Hendershot et al., 2008). This modified instrument was retitled, “Perceived Benefits of School Nurse Childhood Obesity Prevention Practices.” Robust internal reliability was determined for this modified scale with a Cronbach’s alpha (.94) and adequate stability reliability was determined with a test-retest correlation coefficient ($r = .55$).

Perceived barriers scale

The Barriers to Measuring Elementary Children’s Body Mass Index (BMI) in Mandated and Non-Mandated Schools Scale (Hendershot et al., 2008) was also modified from a dichotomous scale to a Likert-type scale. No previously reported measures of reliability and validity were found. This scale was modified and retitled, “Perceived Barriers to School Nurse Childhood Obesity Prevention Practices.” One item, “school nurses not prepared to participate in childhood obesity prevention”, was added based on findings from a previous study (Kubik et al., 2007). After analyses for reliability, this 13-item scale was further modified to an 8-item

scale due to inadequate inter-item correlations. Acceptable internal reliability was determined by Cronbach's alpha (.81), and stability reliability was supported ($r = .68$).

Data Analysis

Data were analyzed using Statistical Package for the Social Sciences Version 19.0. An a priori level of statistical significance ($p < .05$), unless otherwise reported, was established. Descriptive statistics were used to analyze the demographic characteristics of the sample and included frequencies, means, and standard deviations. Data were initially examined for random and systematic missing data, along with outliers from a box plot and stem leaf graph. Mean scores were determined prior to data analyses. Mean scores for all scales were computed for each case and calculated using only answered items for 34 cases missing $< 10\%$ of data. A mean scale score from a group with a comparable characteristic (highest nursing degree) was imputed for five cases with scales missing all data. Normal distribution was then assessed from histograms and skew values, the results of which indicated that the self-efficacy scale was negatively skewed at -1.21 . Therefore, self-efficacy data were transformed to achieve normal distribution with an acceptable skew value of $.70$.

To address the first two study aims, two separate linear regression model analyses were conducted to determine the influence of perceptions on COP practices. Then, four series of regression analyses were conducted according to established mediation analyses procedures (Baron & Kenny, 1986) to identify the potential mediation effects of perceived benefits and perceived barriers on the influence of self-efficacy on child-level and school-level practices.

The third study aim was addressed by conducting analysis of variance tests and t tests to determine significant differences between categorical demographic variables with parametric

practices and perceptions. The potential effect of demographic variables on practices and perceptions was assessed with correlations, and if no significant differences or correlations were found, further analyses with perceptions were not conducted.

Results

School Nurse Characteristics

School nurses with a mean age of 51.1 years ($SD = 10.5$) and different nursing experiences participated in the study (see Table 1). The majority of participants were white and held a BSN degree (see Table 2). Less than 25% of these nurses had earned a National Certified School Nurse (NCSN) credential and almost one third had not completed any hours of COP education. More than 50% of participants were FASN members and more than 20% were members of the FSHA. Most of these school nurses described their current position as clinic practice or a combination of both clinic practice and administrative/supervisory. The response rate was estimated at 33%, representing school nurses in 43% of Florida counties.

Perceptions and Practices

Substantial variations between school nurse perceptions and practices were reported (see Appendix C). Most school nurse participants reported they had sometime or often used BMI percentile for age/gender to assess a child's weight status, contacted a parent for a concern about a child's weight, and recommended that a parent contact a healthcare provider for a child-related weight concern. In contrast, most school nurses reported never or rarely providing counseling to a parent regarding a child's weight concern.

School nurses generally reported self-efficacy levels of moderately to very confident regarding performance of a variety of COP practices. The majority of school nurses agreed or

strongly agreed that 10 different positive outcomes were benefits of measuring BMI and/or other COP activities. Although most school nurses perceived benefits of COP practices, more than two-thirds agreed or strongly agreed that inadequate school and community resources, not enough time, potential for stigmatization, and inadequate or inappropriate parental responses were perceived barriers to COP activities, which included measuring BMI.

A mean score was calculated to measure school nurse COP perceptions and practices (see Table 5). School nurse members of the FASN and FSHA performed significantly more child-level practices ($t(169) = 2.36$, $t(169) = 2.78$, respectively) than did nonmembers (see Table 6). Likewise, NCSN school nurses engaged in significantly more child-level practices than did those school nurses without this certification ($t(73.21) = 3.82$, $p < .001$). School nurses with any COP education performed significantly more child-level practices than did those school nurses with none ($F(3, 49.31) = 17.46$, $p < .001$, Welch estimate). Furthermore, school nurses with graduate nursing degrees participated in significantly more child-level practices than did those school nurses with only BSN degrees or less ($t(164) = -2.61$). Those nurses working in schools where a sizable percentage ($\geq 41\%$) of students qualified for free or reduced lunches conducted child-level practices significantly more often than did those working in schools with $\leq 20\%$ of students qualifying ($F(4, 68.12) = 4.53$, $p < .01$, Welch estimate). School nurses participated in more child-level COP practices as the percentage of children qualifying for free or reduced lunches in their schools increased from 21% to 81% or more. Nurses who provided care to > 3000 students conducted significantly more child-level practices, $2.59 \pm .49$ (mean \pm *SD*) than did those caring for 501-1000 students, $2.05 \pm .64$ ($F(6, 157) = 3.24$, $p < .01$). There was also a significant positive correlation between child-level COP practices and years of nursing experience, school nursing experience, years in current position, and age (see Table 7).

Table 5. Descriptive Statistics for School Nurse Childhood Obesity Prevention Perception and Practices

Measurement	Child-level practices	School-level practices	Self-efficacy*	Perceived benefits	Perceived barriers
Mean	2.35	2.31	4.07	3.84	2.87
SD	.63	.67	.81	.73	.62
Median	2.44	2.30	4.18	3.90	2.88
Scale Range	1-4	1-4	1-5	1-5	1-5

*Raw data

Table 6. Professional/Job Characteristics and COP Practice Differences

Characteristics	Child-level practices (Mean ± SD)	School-level practices (Mean ± SD)
Highest nursing degree		
Associate/diploma/BSN	2.32 ± .63*	2.22 ± .68*
Masters/doctoral	2.69 ± .51*	2.61 ± .60*
COP education hours		
None	1.94 ± .58*	2.03 ± .66*
> 0-2	2.51 ± .55*	2.38 ± .62*
> 2-8	2.58 ± .56*	2.54 ± .67*
> 8	2.81 ± .41*	2.71 ± .63*
NCSN certification		
Yes	2.67 ± .52*	2.58 ± .64*
No	2.28 ± .63*	2.26 ± .67*
FASN member		
Yes	2.44 ± .63*	2.44 ± .66*

Characteristics	Child-level practices (Mean ± SD)	School-level practices (Mean ± SD)
No	2.22 ± .61*	2.11 ± .66*
FSHA member		
Yes	2.61 ± .51*	2.51 ± .63
No	2.29 ± .64*	2.25 ± .68
Percentage of students qualifying for free or reduced lunch		
0-20%	1.82 ± .63*	2.32 ± .62
21-40%	2.34 ± .64	2.25 ± .68
41-60%	2.42 ± .59*	2.14 ± .63
61-80%	2.48 ± .59*	2.38 ± .66
81% +	2.54 ± .68*	2.41 ± .71
Number of students provided care		
0-500	2.27 ± .72	2.45 ± .59
501-1000	2.05 ± .64*	2.28 ± .64
1001-1500	2.49 ± .73	2.36 ± .76
1501-2000	2.49 ± .57	2.27 ± .67
2001-2500	2.30 ± .55	2.24 ± .74
2501-3000	2.43 ± .62	2.17 ± .79
3001 +	2.59 ± .49*	2.40 ± .65

Note. * $p < .05$.

Table 7. Professional Experience and Practices Correlations

Experience (years)	Child-level	School-level
Years of nursing experience	.26**	.08
Years of school nursing experience	.29***	.16*
Years in current school nurse position	.24**	.14

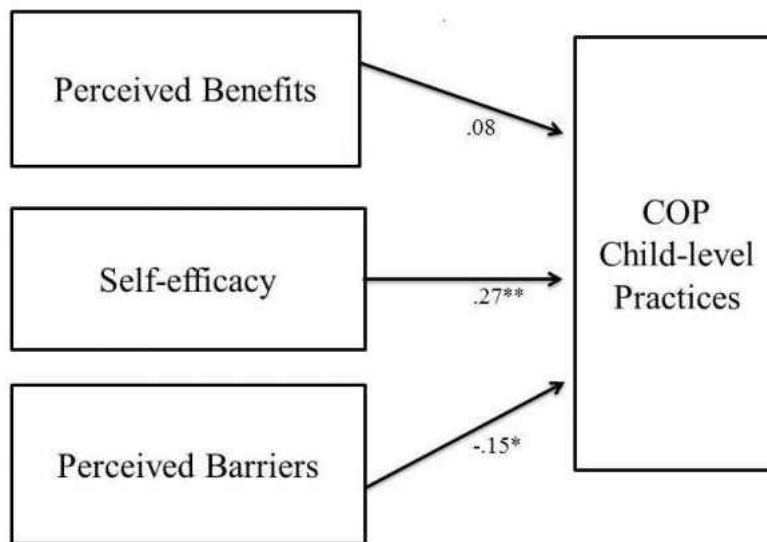
Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

There was a weak positive significant correlation between years of school nursing experience and school-level practices (see Table 7). Moreover, NCSN participants ($t(162) = 2.62, p = .01$) and FASN members ($t(169) = 3.22, p = .002$) engaged significantly more often in school-level practices than did those without this certification or those who were not FASN members, respectively (see Table 6). School nurses with graduate nursing degrees ($t(164) = 2.06$) or had completed any hours of COP education ($F(3,45.91) = 6.39, p < .01$, Welch estimate) participated in significantly more school-level practices than did those without this additional education.

School nurses with a BSN degree or less expressed significantly lower self-efficacy, $4.05 \pm .79$ (mean \pm SD) than did those nurses with a graduate nursing degree, $4.42 \pm .57$, ($t(164) = 2.15$). Those with > 8 hours of COP education indicated a significantly higher level of COP self-efficacy than did school nurses with no COP education ($4.55 \pm .55$ versus $3.80 \pm .98$; $F(3,46.70) = 4.41, p < .01$, Welch estimate). Non-NCSN school nurses reported significantly less COP self-efficacy ($4.01 \pm .80$) than did those school nurses with this certification ($4.36 \pm .62, t(162) = 2.54$). No significant differences were determined between demographic variables and perceived benefits or barriers.

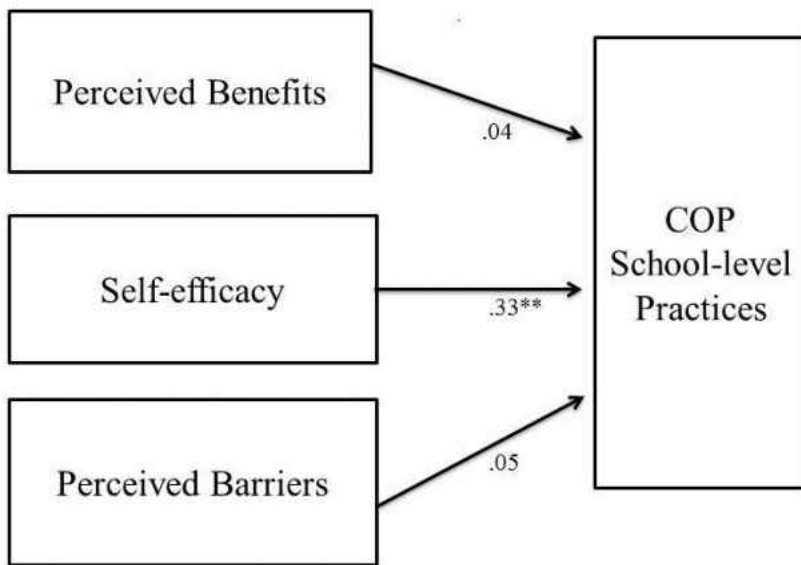
Significant correlations were found between several key study variables. Self-efficacy positively correlated with perceived benefits ($r = .18, p < .05$), and both child-level ($p = .33, p < .001$) and school-level ($r = .32, p < .001$) practices. Perceived barriers negatively correlated with both self-efficacy ($r = -.30, p < .001$) and child-level practices ($r = -.24, p < .05$).

The linear regression model of self-efficacy, perceived benefits, and perceived barriers (see Figures 2 and 3) significantly explained 12.0% of variance in the frequency school nurses performed child-level COP practices ($F(3,167) = 8.70, p < .001$) and 9.1% of school-level practices, ($F(3,167) = 6.69, p < .001$). Self-efficacy had the strongest effect on both child-level practices and school-level practices. Perceived barriers had a weaker, yet significant, negative beta coefficient in the model for child-level practices only, indicating that as perceived barriers increased, school nurses conducted significantly fewer child-level practices.



Multiple linear regression with perceived benefits, self-efficacy, and perceived barriers, beta coefficients with school nurse COP Child-level practices. * $p < .05$; ** $p < .001$

Figure 2: Linear Regressions with Perceptions and Child-level Practices

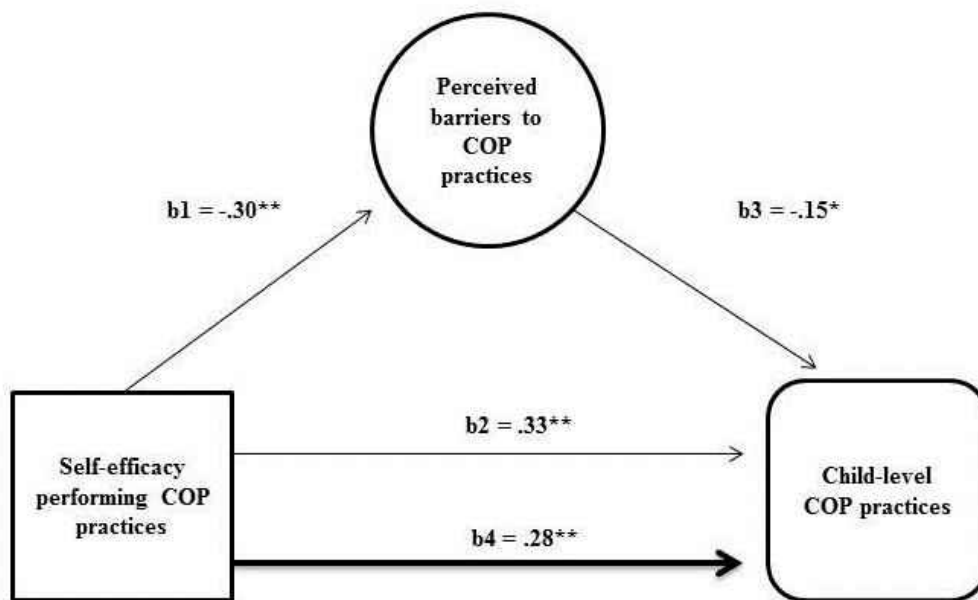


Multiple linear regression with perceived benefits, self-efficacy, and perceived barriers, beta coefficients with school nurse COP Child-level practices. * $p < .05$; ** $p < .001$

Figure 3: Linear Regressions with Perceptions and School-level Practices

Four mediation models with perceived benefits and perceived barriers as mediators on the influence of self-efficacy on child-level and school-level practices were analyzed using a series of regression analyses. Figure 4 depicts the only significant regression model in this mediation analyses. In this model, self-efficacy to perform COP activities significantly negatively correlated with perceived barriers; self-efficacy significantly positively correlated with engaging in child-level COP practices; perceived barriers significantly negatively correlated with performing child-level COP practices. The magnitude of the self-efficacy beta coefficient decreased .05 when child-level practices were regressed on both self-efficacy and perceived barriers in the same model. This finding indicated that perceived barriers partially mediated the influence of self-efficacy on child-level practices. However, perceived barriers did not mediate

the influence of self-efficacy on school-level practices and perceived benefits did not mediate the influence of self-efficacy with any COP practices.



Mediation analyses to determine the association between self-efficacy to perform COP practices and frequency conducting child-level COP practices. b1 = association between self-efficacy and perceived barriers. b2 = association between self-efficacy and child-level practices. b3 = association between perceived barriers and child-level COP practices. b4 = (mediation test) association between self-efficacy and child-level COP practices with perceived barriers included in the model. * p < .05 ** p < .001

Figure 4: Partial Mediation of Self-efficacy with Child-level Practices by Perceived Barriers

Discussion

Comprehensive strategies to prevent childhood obesity should include promoting school nurse involvement. As healthcare providers in the school setting, school nurses can play an integral part in obesity prevention, thereby supporting IOM (2012) recommendations. Various perceptions have been theorized and found to affect health behaviors and practices, particularly specific school nurse perceptions and influences on COP practices. In this study, school nurse

perceptions of self-efficacy to perform various COP practices were found to significantly influence perceived benefits, perceived barriers, and COP practices. Only perceived barriers partially mediated the influence of self-efficacy on COP practices, and then only on child-level practices. Significant differences in school nurse perceptions and practices were associated with job and professional characteristics. Findings provided insight as to which groups may benefit most from interventions and policy changes aimed to increase school nurse participation in COP.

School nurses working in more affluent schools (as indicated by $\leq 20\%$ of students qualifying for free or reduced lunches) conducted significantly fewer child-level practices than those working in schools where $\geq 41\%$ of students qualified for free or reduced lunches. Of clinical interest is that as the percentage of children eligible for free or reduced lunches increased, school nurses performed more child-level COP practices. One explanation for this finding may be that there is a greater need for COP because lower socioeconomic populations (as indicated by high percentages of students qualifying for free or reduced lunches) include a higher percentage of racial/ethnic minorities and both of these populations have an increased prevalence of childhood obesity (Koplan et al., 2005; Kumanyika & Grier, 2006). Nurses in schools with a lower socioeconomic population may be more actively engaged in child-level COP practices than those nurses working in schools with a high socioeconomic population where access to other healthcare providers may be greater. Schools with large underserved populations may need school nurses to take an active expanded role in COP and in providing other forms of healthcare. Interventions and policies that promote participation in COP practices should target nurses working in lower socioeconomic schools with students at higher risk for childhood obesity.

Previous studies indicated that heavy workloads, high student-to-school nurse ratios, competing health priorities, and insufficient time were deterrents to engaging in COP practices

(Hendershot et al., 2008; Kubik et al., 2007; Morrison-Sandberg et al., 2011; Stalter et al., 2010, 2011; Steele et al., 2011). This study did not completely support these earlier findings.

Surprisingly, school nurses who provided care to > 3000 students performed significantly more child-level practices than did school nurses caring for 501-1000 students. An explanation for this discrepancy may involve substantial differences in school nurse job descriptions, some of which involved conducting mass BMI screenings in numerous schools, which may have distorted the findings. Because several of the items on child-level practices scales involved BMI screening activities, it is possible that school nurses with this type of job description provided care for > 3000 students and still scored high on the child-level scale. No other significant school nurse differences were associated with student-to-school nurse ratios. Additional research with more detailed job descriptions might explain this unexpected finding.

High student-to-school nurse ratios should not be dismissed as a factor associated with COP practices. High ratios increase workloads, which may contribute to school nurses' perceptions of inadequate time for COP. Most school nurses in this study reported that "not enough time" was a perceived barrier for participating in COP activities and perceived barriers were negatively associated with child-level practices and partially mediated the positive influence of self-efficacy on these practices. Further research with analyses of student-to-school nurse ratios, perceived insufficient time, and COP practices is still needed.

School nurses with characteristics suggesting more education (highest nursing degree, NCSN credential, COP education, FASN and/or FSHA membership) conducted COP practices more than those nurses with less education, no certification, or no membership in these two professional organizations. The nearly one third of school nurses who reported to have had no COP education participated less frequently in practices than did those school nurses who had any

amount of COP education. It is possible that those school nurses who completed COP education were also more interested in COP and therefore more likely to engage in these practices. Similar to these significant associations with COP practices, school nurses with more education, as indicated by a graduate nursing degree, > 8 hours of COP education, or a NCSN certification, also reported higher levels of COP self-efficacy. These strong associations between education, self-efficacy, and practices suggest that an educational intervention to increase self-efficacy with performing COP practices may promote involvement in COP by school nurses. An effective educational intervention should include interactive experiences such as role-playing, observation, and verbal encouragement from instructors (Bandura, 1977, 1986, 1997) to promote self-efficacy in performing various COP practices. Because professional experience was also significantly related to school nurses conducting more COP practices, a mentorship program pairing highly experienced school nurses with less experienced school nurses may be another worthwhile potential strategy to increase school nurse COP self-efficacy and participation in COP practices.

Self-efficacy appeared to have the strongest influence on COP practices, a finding that supported the theoretical framework. Perceived barriers had a negative impact on child-level practices and partially mediated the influence of self-efficacy on child-level practices. The five items deleted from the perceived barriers scale because of their inadequate inter-item correlations (inappropriate/inadequate parental responses, potential for child stigmatization, invasion of child's privacy, inadequate community resources, and public opposition to school BMI screening) may be significant in explaining some of the variance in school nurse COP practices. Because perceived benefits were not a significant influence or mediator on COP practices, only part of this modified theoretical framework may be appropriate in explaining the relationships

between these constructs. Additional modification of the theoretical framework may help explain these relationships.

Perceived barriers negatively influenced child-level COP practices. Lobbying for policy changes targeted to mitigate perceived barriers may increase school nurse participation in COP practices. For instance, policies that address physical activity requirements, on-campus nutrition, and BMI screening mandates may increase administrative support for school nurse COP practices and reduce perceived barriers. Policies that potentially create more time for school nurses to engage in COP practices should also be promoted. These policies include reduced workloads for school nurses, such as staffing to achieve the recommended 750:1 student-to-school nurse ratio (NASN, 2010), so school nurses will have time to engage in COP practices.

Education at the professional level and from COP courses was positively associated with clinical practice. School nurses with any COP education conducted more COP practices than did those nurses who had had no such education. This finding provides evidence encouraging the call for funding and expansion of educational interventions such as the S.C.O.P.E. (School Nurse Childhood Obesity Prevention Education) program offered by the NASN (2012) and supports the IOM (2012) recommendation. Nurses working in schools with populations at higher risk for or higher percentages of childhood obesity may benefit most from educational programs and policy changes to facilitate and increase school nurse involvement in COP practices.

Limitations

There were several potential limitations to this study. Participants self-identified as meeting inclusion criteria which could result in unqualified participants. Professional organizations were instrumental in recruiting a sample with characteristics that may not be

representative of other groups of school nurses. The sample also included a disproportionate high percentage of FASN members who may be more interested in education and professional development than non-members, thus posing a threat to generalizability.

Since the perceived barriers scale required further modifications to achieve internal reliability, items were omitted that may be significant in explaining the variation in school nurse COP practices. Consequently, the omission of negative parental responses or other possible overlooked perceived barriers, may have resulted in missed significant findings.

Conclusions

School nurse perceptions were found to significantly influence participation in COP practices. Self-efficacy demonstrated the strongest positive influence on the engagement of school nurses in COP practices and perceived barriers negatively influence child-level COP practices. These findings support development and implementation of educational interventions and policy changes designed to alter those key perceptions.

To maximize the effectiveness of limited resources, interventions and policies need to target school nurses who work in schools with populations of students with the highest prevalence of or at greatest risk for childhood obesity. Based on the data from this study and its predecessors, facilitating the mobilization of school nurses to take actions to prevent childhood obesity may contribute to comprehensive strategic efforts to address this serious health issue.

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**APPENDIX A: SCHOOL NURSE CHILDHOOD OBESITY PREVENTION PRACTICES
AND PERCEPTIONS QUESTIONNAIRE**

School Nurse Childhood Obesity Prevention Practices

(Child-level)

When completing this questionnaire, place an “X” in the most appropriate response:

During the school year, how often do you:	Never	Rarely	Sometime	Often
Contact a parent because you have a concern about a child’s weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recommend that a parent contact a health provider for a child-related weight concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide counseling to a parent regarding a child-related weight concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide counseling to a child for his/her weight-related concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide consultation to a teacher about a student-related weight concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitor a child’s weight because of a weight concern?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the blood pressure of an overweight child?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the body mass index of a child you “think” might be overweight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use body mass index percentile, based on CDC age and gender growth charts to assess a child’s weight status?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adapted from Kubik et al., 2007

School Nurse Childhood Obesity Prevention Practices

(School-level)

When completing this survey, place an “X” in the most appropriate response:

During the school year, how often do you:	Never	Rarely	Sometime	Often
Provide written information to parents, teachers, and/or students about nutrition and physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide consultation to school administrators about health-related school policy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participate as a member of a school health council?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide classroom health teaching on nutrition?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide classroom health teaching on physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitor school nutrition practices, like the food used in school fundraising and as incentives and rewards for students?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitor school physical activity practices, like whether children have access to space and equipment for play before and after school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess the nutrient quality of foods and beverages offered students as part of school meals?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assess the nutrient quality of foods and beverages sold to student at school, such as foods offered a la carte, in vending machines and school stores for fund raising	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Write an article about healthy lifestyle habits for the school newsletter, website, or similar format?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adapted from Kubik et al., 2007

School Nurse Childhood Obesity Prevention Self-Efficacy

Place an “X” in the most appropriate box:

1 = Not confident; 2 = Slightly confident; 3 = Moderately confident;

4 = Confident; 5 = Very confident

How confident are you in your ability to:	1	2	3	4	5
Accurately measure height and weight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convert height and weight to BMI?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plot BMI on age/gender charts?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Track BMI on regular basis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help parents interpret BMI?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide parents with BMI on regular basis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recommend appropriate physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recommend eating patterns?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recommend changes in home environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recommend weight loss treatment for children?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use local data to convince administrators to implement programs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adapted from Hendershot et al., 2008

Perceived Benefits of School Nurse Childhood Obesity Prevention Practices

Place an “X” in the appropriate box

In your opinion, are the following benefits of measuring BMI and/or other activities to prevent childhood obesity?	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Creates awareness of obesity problem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provides evidence to change policy to reduce obesity levels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Educates students and their parents about potential problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provides BMI information to parents so they can monitor child’s weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provides an impetus for creation/improvement of programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helps create a coordinated effort to address the issue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encourages increased physical activity for students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encourages healthier food choices for students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provides motivation to students to take action to prevent obesity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helps children maintain a healthy weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adapted from Hendershot et al., 2008

Perceived Barriers to School Nurse Childhood Obesity Prevention Practices

Place an "X" in the appropriate box

In your opinion, are the following barriers to measuring BMI and/or other school nurse activities to prevent childhood obesity?	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Inadequate school resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate or inappropriate parental responses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intrusion of child's privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate community resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Potential for stigmatization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not enough time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do not have proper equipment to measure height and weight for calculation of BMI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inadequate administrative support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do not have a private area to measure height and weight for calculation of BMI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do not know how to measure height and weight for calculation of BMI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public opposition to measurement of height and weight for calculation of BMI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teachers will not release students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
School nurses not prepared to participate in childhood obesity prevention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adapted from Hendershot et al., 2008

**APPENDIX B: SCHOOL NURSE CHILDHOOD OBESITY PREVENTION PRACTICES
AND PERCEPTIONS DEMOGRAPHICS QUESTIONNAIRE**

If you are not currently employed as a school nurse, please answer questions based on your school nurse position during the 2010-2011 school year.

Years of nursing experience? _____

Years of school nurse experience? _____

Years in current school nurse position? _____

Which of the following professional organizations do you belong? (Check all that apply)

- Florida Association of School Nurses
- Florida School Health Association
- Florida School Nurses Association
- Other
- None of the above

Are you a National Certified School Nurse (NCSN)?

- Yes
- No

What county in Florida do you work as a school nurse? _____

Which *best* describes your current school nurse position?

- Administrative/supervisory
- Clinic practice
- Both administrative/supervisory and clinic practice
- Faculty/Educator

Which setting *best* describes the school(s) you work in?

- Rural
- Suburban
- Urban

Which grade level(s) of school(s) do you work in? (Check all that apply)

- Elementary School(s)
- Middle School(s)
- High School(s)

What percentage of students in your school(s) qualify for free or reduced lunches?

- 0 - 20%
- 21% - 40%
- 41% - 60%
- 61% - 80%
- 81% or >

In your current school nurse position, how many students do you provide care?

- 0 - 500

- 501 – 1000
- 1001 – 1500
- 1501 – 2000
- 2001 – 2500
- 2501 – 3000
- 3001 or >

How many hours of childhood obesity prevention continuing education have you earned?

- None
- > 0 to 2 hours
- > 2 hours to 8 hours
- > 8 hours

What is your highest nursing degree earned?

- Associate/Diploma
- Bachelor
- Masters
- Doctoral

Which *best* describes your racial/ethnic group?

- White
- Black/African-American
- Hispanic
- Asian/ Pacific Islander
- Multi-racial
- Other

What is your age? _____

What is your height? _____

What is your weight? _____

APPENDIX C: SCHOOL NURSE CHILDHOOD OBESITY PRACTICES AND PERCEPTIONS

School Nurse Childhood Obesity Prevention Practices

(Child-level)

During the school year, how often do you:	Never (n)%	Rarely (n)%	Sometime (n)%	Often (n)%
Contact a parent because you have a concern about a child's weight?	24(14.0)	65(38.0)	66(38.6)	16(9.4)
Recommend that a parent contact a health provider for a child-related weight concern?	23(13.5)	60(35.1)	71(41.5)	17(9.9)
Provide counseling to a parent regarding a child-related weight concern?	30(17.6)	71(41.8)	60(35.3)	9(5.3)
Provide counseling to a child for his/her weight-related concern?	23(13.5)	74(43.3)	68(39.8)	6(3.5)
Provide consultation to a teacher about a student-related weight concern?	38(22.6)	68(40.5)	58(34.5)	4(2.4)
Monitor a child's weight because of a weight concern?	53(31.2)	56(32.9)	54(31.8)	7(4.1)
Check the blood pressure of an overweight child?	46(27.4)	59(35.1)	50(29.8)	13(7.7)
Check the body mass index of a child you "think" might be overweight?	52(30.4)	43(25.1)	52(30.4)	24(14.0)
Use body mass index percentile, based on CDC age and gender growth charts to assess a child's weight status?	34(19.9)	25(14.6)	35(20.5)	77(45.0)

School Nurse Childhood Obesity Prevention Practices

(School-level)

During the school year, how often do you:	Never (n)%	Rarely (n)%	Sometime (n)%	Often (n)%
Provide written information to parents, teachers, and/or students about nutrition and physical activity?	21(12.4)	41(24.3)	73(43.2)	34(19.9)
Provide consultation to school administrators about health-related school policy?	16(9.4)	46(27.1)	69(40.6)	39(22.9)
Participate as a member of a school health council?	56(33.1)	39(23.1)	32(18.9)	42(24.9)
Provide classroom health teaching on nutrition?	33(19.8)	50(29.9)	62(37.1)	22(13.2)
Provide classroom health teaching on physical activity?	46(27.1)	56(32.9)	53(31.2)	15(8.8)
Monitor school nutrition practices, like the food used in school fundraising and as incentives and rewards for students?	64(37.9)	42(24.9)	48(28.4)	15(8.9)
Monitor school physical activity practices, like whether children have access to space and equipment for play before and after school?	68(40.7)	40(24.0)	48(28.7)	11(6.6)
Assess the nutrient quality of foods and beverages offered students as part of school meals?	51(30.4)	48(28.6)	43(25.6)	26(15.5)
Assess the nutrient quality of foods and beverages sold to student at school, such as foods offered a la carte, in vending machines and school stores for fund raising?	65(38.7)	43(25.6)	40(23.8)	20(11.9)
Write an article about healthy lifestyle habits for the school newsletter, website, or similar format?	67(39.6)	37(21.9)	47(27.8)	18(10.7)

School Nurse Childhood Obesity Prevention Self-efficacy

How confident are you in your ability to:	Not confident (n)%	Slightly confident (n)%	Moderately confident (n)%	Confident (n)%	Very confident (n)%
Accurately measure height and weight?	2(1.2)	0(0.0)	1(.6)	33(19.4)	134(78.8)
Convert height and weight to BMI?	4(2.4)	3(1.8)	12(7.1)	34(20.0)	117(68.8)
Plot BMI on age/gender charts?	5(2.9)	3(1.8)	13(7.6)	39(22.9)	110(64.7)
Track BMI on regular basis?	7(4.2)	3(1.8)	21(12.5)	36(21.4)	101(60.1)
Help parents interpret BMI?	5(3.0)	6(3.6)	24(14.3)	42(25.0)	91(54.2)
Provide parents with BMI on regular basis?	7(4.2)	13(7.8)	21(12.6)	46(27.5)	80(47.9)
Recommend appropriate physical activity?	3(1.8)	8(4.7)	24(14.2)	56(33.1)	78(46.2)
Recommend eating patterns?	4(2.4)	11(6.5)	23(13.6)	59(34.9)	72(42.6)
Recommend changes in home environment?	7(4.2)	16(9.6)	27(16.3)	59(35.5)	57(34.3)
Recommend weight loss treatment for children?	23(13.9)	32(19.3)	36(21.7)	36(21.7)	39(23.5)
Use local data to convince administrators to implement programs?	19(11.2)	34(20.1)	42(24.9)	42(24.9)	32(18.9)

Perceived Benefits of School Nurse Childhood Obesity Prevention Practices

In your opinion, are the following <i>benefits</i> of measuring BMI and/or other activities to prevent childhood obesity?	Strongly disagree (n)%	Disagree (n)%	Neither agree nor disagree (n)%	Agree (n)%	Strongly agree (n)%
Creates awareness of obesity problem	3(1.8)	7(4.2)	9(5.4)	101(60.5)	47(28.1)
Provides evidence to change policy to reduce obesity levels	3(1.8)	9(5.4)	23(13.8)	92(55.1)	40(24.0)
Educates students and their parents about potential problems	3(1.8)	8(4.8)	12(7.2)	105(63.3)	38(22.9)
Provides BMI information to parents so they can monitor child's weight	3(1.8)	11(6.6)	23(13.8)	95(56.9)	35(21.0)
Provides an impetus for creation/improvement of programs	3(1.8)	7(4.2)	30(18.1)	88(53.0)	38(22.9)
Helps create a coordinated effort to address the issue	4(2.4)	9(5.4)	36(21.6)	84(50.3)	34(20.4)
Encourages increased physical activity for students	4(2.4)	10(6.0)	34(20.5)	80(48.2)	38(22.9)
Encourages healthier food choices for students	3(1.8)	16(9.6)	35(21.0)	75(44.9)	38(22.8)
Provides motivation to students to take action to prevent obesity	7(4.2)	19(11.4)	35(21.0)	77(46.1)	29(17.4)
Helps children maintain a healthy weight	6(3.6)	15(9.1)	49(29.7)	67(40.6)	28(17.0)

Perceived Barriers to School Nurse Childhood Obesity Prevention Practices

In your opinion, are the following <i>barriers</i> to measuring BMI and/or other school nurse activities to prevent childhood obesity?	Strongly disagree (n)%	Disagree (n)%	Neither agree nor disagree (n)%	Agree (n)%	Strongly agree (n)%
Inadequate school resources	10(6.0)	27(16.1)	18(10.7)	67(39.9)	46(27.4)
†Inadequate or inappropriate parental responses	2(1.2)	5(3.0)	4(2.4)	72(42.9)	85(50.6)
‡Intrusion of child's privacy	10(6.0)	43(25.6)	50(29.8)	52(31.0)	13(7.7)
‡Inadequate community resources	8(4.8)	20(11.9)	21(12.5)	76(45.2)	43(25.6)
‡Potential for stigmatization	4(2.4)	22(13.1)	26(15.5)	78(46.4)	38(22.6)
Not enough time	6(3.6)	23(13.8)	22(13.2)	60(35.9)	56(33.5)
Do not have proper equipment to measure height and weight for calculation of BMI	40(24.0)	51(30.5)	17(10.2)	41(24.6)	18(10.8)
Inadequate administrative support	15(9.1)	32(19.4)	42(25.5)	52(31.5)	24(14.5)
Do not have a private area to measure height and weight for calculation of BMI	35(21.1)	61(36.7)	20(12.0)	35(21.1)	15(9.0)
Do not know how to measure height and weight for calculation of BMI	77(46.4)	50(30.1)	7(4.2)	19(11.4)	13(7.8)
‡Public opposition to measurement of height and weight for calculation of BMI	16(9.6)	38(22.8)	50(29.9)	47(28.1)	16(9.6)
Teachers will not release students	37(22.3)	69(41.6)	29(17.5)	25(15.1)	6(3.6)
School nurses not prepared to participate in childhood obesity prevention	36(21.6)	53(31.7)	35(21.0)	33(19.8)	10(6.0)

Note. †Item deleted due to poor interitem correlation, but analyzed as separate variable due to strong support as a perceived barrier in previous research. ‡Item deleted due to poor interitem correlation.

APPENDIX D: IRB APPROVAL OF EXEMPT HUMAN RESEARCH



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Susan B. Quelly**

Date: **October 10, 2011**

Dear Researcher:

On 10/10/2011, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: Perceptions Influencing School Nurse Behaviors to Prevent
Childhood Obesity
Investigator: Susan B Quelly
IRB Number: SBE-11-07911
Funding Agency: Florida Nurses Foundation
Grant Title:
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 10/10/2011 04:35:52 PM EDT

A handwritten signature in black ink that reads "Joanne Muratori".

IRB Coordinator



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Susan B. Quelly**

Date: **January 20, 2012**

Dear Researcher:

On 01/20/2012, the IRB approved the following minor modifications to human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Modification Type: Revised consent documents approved for use; minor changes to questionnaires; additional recruiting methods and total number of study participants increased to 300.
Project Title: Perceptions Influencing School Nurse Behaviors to Prevent Childhood Obesity
Investigator: Susan B Quelly
IRB Number: SBE-11-07911
Funding Agency: Florida Nurses Foundation
Grant Title:
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 01/20/2012 11:03:42 AM EST

IRB Coordinator

APPENDIX E: CONSENT FORMS

Online Version

Attention: Florida School Nurses

Are you interested in working to prevent childhood obesity? Volunteers are needed to participate in a research study examining school nurse perceptions and experiences with preventing childhood obesity. More than 150 school nurses are expected to participate. If you are a Registered Nurse currently employed (or were employed during the 2010-11 school year) as a school nurse in Florida, you are qualified to participate. If you already participated in this study by completing an online or paper questionnaire, you are not eligible to participate again.

What you will be asked to do in the study: Participants will be responsible for answering an online questionnaire as honestly as possible. You do not have to answer every question if there is something in it that concerns you. Your identity will not be linked to your questionnaire responses. Online survey software will be used to transmit data anonymously to a secure server. To thank you for your participation, a \$5 Starbucks e-gift card will be sent to your email address after completing the questionnaire. Simply write "Completed Survey" in a reply email to Susan.Quelly@ucf.edu and your e-gift card will be sent to the email address from your reply within one week.

This questionnaire should take approximately 10 - 15 minutes to complete. There are negligible risks to participating in this anonymous online questionnaire. By continuing with this questionnaire, you are giving your consent to participate in this study. Click on the following link to continue: *(weblink to be added here)*

The person doing this research is Susan Quelly, MSN, RN from the University of Central Florida, College of Nursing. Because the researcher is a doctoral student, she is being guided by Karen Dennis, PhD, RN, FAAN, her UCF faculty advisor. If you have questions, concerns, or complaints, or think the research has hurt you, please contact Susan Quelly, MSN, RN, at (407) 583-9094 or Susan.Quelly@ucf.edu, or Dr. Karen Dennis, (407) 823-1832 or kdennis@mail.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

Your participation in this research study is important to advancing school nurses' ability to prevent childhood obesity. Thank you for volunteering to participate.

Susan Quelly MSN, RN



University of Central Florida IRI
IRB NUMBER: SBE-11-07911
IRB APPROVAL DATE: 1/20/201

Paper Version

Attention: Florida School Nurses

Are you interested in working to prevent childhood obesity? Volunteers are needed to participate in a research study examining school nurse perceptions and experiences with preventing childhood obesity. More than 150 school nurses are expected to participate. If you are a Registered Nurse currently employed (or were employed during the 2010-11 school year) as a school nurse in Florida, you are qualified to participate. If you already participated in this study by completing an online or paper questionnaire, you are not eligible to participate again.

What you will be asked to do in the study: Participants will be responsible for answering a paper questionnaire as honestly as possible. You do not have to answer every question if there is something in it that concerns you. This is an anonymous questionnaire. You will need to submit your completed paper questionnaire into a slotted lock box at a designated vendor table (table with yellow balloons) at the conference. No names or other identifying information will be on the questionnaires. Your identity will not be linked to your questionnaire responses. These paper questionnaires will be secured in a locked box in constant possession of the principal investigator or a designated research assistant. To thank you for your participation, a \$5 Starbucks gift card will be handed to you at the time you submit your paper questionnaire.

This questionnaire should take approximately 10 - 15 minutes to complete. There are negligible risks to participating in this anonymous online questionnaire. By continuing with completing this paper questionnaire, you are giving your consent to participate in this study.

The person doing this research is Susan Quelly, MSN, RN from the University of Central Florida, College of Nursing. Because the researcher is a doctoral student, she is being guided by Karen Dennis, PhD, RN, FAAN, her UCF faculty advisor. If you have questions, concerns, or complaints, or think the research has hurt you, please contact Susan Quelly, MSN, RN, at (407) 583-9094 or Susan.Quelly@ucf.edu, or Dr. Karen Dennis, (407) 823-1832 or kdennis@mail.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

Your participation in this research study is important to advancing school nurses' ability to prevent childhood obesity. Thank you for volunteering to participate.

Susan Quelly MSN, RN

Pilot Study Consent Form

Attention: Florida School Nurses

Are you interested in working to prevent childhood obesity? Volunteers are needed to participate in a research pilot study examining school nurse perceptions and experiences with preventing childhood obesity.

If you are a Registered Nurse currently employed (or were employed during the 2010-11 school year) as a school nurse in Florida, you are qualified to participate. If you meet these criteria, you are invited to participate in an anonymous online questionnaire to be completed twice, approximately two weeks apart.

What you will be asked to do in the study: Participants will be responsible for answering the online questionnaire as honestly as possible. You do not have to answer every question if there is something in it that concerns you. The online survey program will indicate that you completed and submitted the questionnaire, but your identity will not be linked to your questionnaire responses. Online survey software will be used to transmit data anonymously to a secure server. To thank you for your participation, a \$5 Starbucks gift card will be sent to your email address within one week after completing each online questionnaire.

This questionnaire should take approximately 10 - 15 minutes to complete. You will be sent another email with a link to the online questionnaire approximately two weeks after completing the first questionnaire. There are negligible risks to participating in this anonymous online questionnaire. By continuing with this questionnaire, you are giving your consent to participate in this study. Click on the following link to continue: ([link to online questionnaire here](#))

The person doing this research is Susan Quelly, MSN, RN from the University of Central Florida, College of Nursing. Because the researcher is a doctoral student, she is being guided by Karen Dennis, PhD, RN, FAAN, her UCF faculty advisor. If you have questions, concerns, or complaints, or think the research has hurt you, please contact Susan Quelly, MSN, RN, at (407) 583-9094 or Susan.Quelly@ucf.edu, or Dr. Karen Dennis, (407) 823-1832 or kdennis@mail.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

Your participation in this research study is important to advancing school nurses' ability to prevent childhood obesity. Thank you for volunteering to participate.

Susan Quelly MSN, RN



University of Central Florida IRB
IRB NUMBER: SBE-11-07911
IRB APPROVAL DATE: 10/10/2011

Test-Retest Consent Form

Attention: Florida School Nurses

Are you interested in working to prevent childhood obesity? Volunteers are needed to participate in a research study examining school nurse perceptions and experiences with preventing childhood obesity. More than 150 school nurses are expected to participate. If you are a Registered Nurse currently employed (or were employed during the 2010-11 school year) as a school nurse in Florida, you are qualified to participate. If you already participated in this study by completing a questionnaire, you are not eligible to participate again.

If you meet these criteria, you are invited to participate in an anonymous online questionnaire to be completed twice, approximately two weeks apart. Please complete and submit this online questionnaire by *(date approximately one week after message is sent)* when this part of the study will be closed.

What you will be asked to do in the study: Participants will be responsible for answering the online questionnaire as honestly as possible. You do not have to answer every question if there is something in it that concerns you. Your identity will not be linked to your questionnaire responses. Online survey software will be used to transmit data anonymously to a secure server. To thank you for your participation, a \$5 Starbucks e-gift card will be sent to your email address after completing each questionnaire. Simply write "Completed Survey" in a reply email to Susan.Quelly@ucf.edu and your e-gift card will be sent to the email address from your reply within one week.

This questionnaire should take approximately 10 - 15 minutes to complete. You will be sent another email with a weblink to the online questionnaire approximately two weeks after completing the first questionnaire. There are negligible risks to participating in this anonymous online questionnaire. By continuing with this questionnaire, you are giving your consent to participate in this study. Click on the following link to continue: *(weblink to be added here)*

The person doing this research is Susan Quelly, MSN, RN from the UCF, College of Nursing. Because the researcher is a doctoral student, she is being guided by Karen Dennis, PhD, RN, FAAN, her UCF faculty advisor. If you have questions, concerns, or complaints, or think the research has hurt you, please contact Susan Quelly, MSN, RN, at (407) 583-9094 or Susan.Quelly@ucf.edu, or Dr. Karen Dennis, (407) 823-1832 or kdennis@mail.ucf.edu.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

Your participation in this research study is important to advancing school nurses' ability to prevent childhood obesity. Thank you for volunteering to participate.

Susan Quelly MSN, RN

APPENDIX F: PERMISSION FROM AUTHORS TO USE THEIR INSTRUMENTS

Permission from Dr. Marti Kubik to use her instrument to measure school nurse childhood obesity prevention practices:

Re: Childhood obesity prevention instrument

kubik002@umn.edu

Sent: Tuesday, August 23, 2011 3:30 PM
To: Susan Quelly

Hi Susan,

Thanks for your email and for your request. By all means, please feel free to use the scales in your dissertation work.

Best of luck with your research and doctoral studies.

Regards,
Marti

Marti Kubik, PhD, RN
Associate Professor
Director of International Programming
School of Nursing
University of Minnesota
5-140 Weaver Densford Hall
308 Harvard St SE
Minneapolis, MN 55455
email: kubik002@umn.edu
voice mail: 612.625.0606
fax: 612.625.7091
On Aug 23 2011, Susan Quelly wrote:

>Dr. Kubik,

My name is Susan Quelly and I am a PhD candidate in the College of Nursing at the University of Central Florida. I am planning to conduct my dissertation research involving school nurses and childhood obesity prevention. With your permission, I would like to use part of the instrument that you used in your study, "Obesity prevention in schools: Current role and future practice of school nurses" published in Preventive Medicine (2007) .

The two scales in your study that I would like to use measure "Child-level obesity prevention tasks" and "School-level obesity prevention tasks". I would certainly cite your study as the source of these instruments.

Please let me know if I have your permission to use these scales in my dissertation research. >Sincerely, > >Susan Quelly MSN, RN >PhD Candidate >University of Central Florida

Permission from Dr. Candace Hendershot to use her instrument to measure school nurse childhood obesity prevention perceptions:

>> "Candace H. Hendershot" <hendershot@findlay.edu> 04/11/10 7:07 AM

Yes, of course you may use the instrument that we developed (my dissertation team and I). However, you do need to reference it. Also the psychometric data will only be accurate for the instrument as it was tested. Let me find that part of my study and I will send it on.

Best of luck as you complete your journey. I defended in January 2008 and it was along journey.

If I can be of further help as you continue your journey, please let me know.

Candi

•— Original Message —

From: "Susan Quelly" <squelly@mail.ucf.edu>

To: hendershot@findlay.edu

Sent: Saturday, April 10, 2010 10:45:23 AM GMT -05:00 US/Canada Eastern

Subject: Permission to use instrument

Dr. Hendershot,

I am a PhD nursing student at the University of Central Florida conducting research involving the role of the school nurse in addressing childhood obesity. I would like your permission to use part of your instrument from your study "Elementary School Nurses' Perceptions and Practices Regarding Body Mass Index Measurements in School Children". If your permission is granted, could you send me any additional psychometric data available for this instrument?

Once my study is completed, I will be happy to share my results with you.

APPENDIX G: CURRICULUM VITAE

Susan Quelly, MSN, RN

1692 Wingspan Way
Winter Springs, FL 32708
(407) 583-9094 -- Cell/Office
(407) 977-1191 – Home
Susan.Quelly@ucf.edu – Email

EDUCATION

Year	Degree	Institution	Clinical Major	Role Preparation
2008 - Present		University of Central Florida	Nursing	PhD
2007	MSN	University of Central Florida	Nursing	Nurse Educator
1979	BSN	Eastern Kentucky University	Nursing	RN

LICENSURE/CERTIFICATION

RN Florida, # 3310842
RN Texas, # 452368

EMPLOYMENT

ACADEMIC APPOINTMENTS:

2008-Present Adjunct Nursing Instructor, University of Central Florida, College of Nursing

CLINICAL APPOINTMENTS:

09/2004-05/2005 OB/GYN outpatient office nurse, Women Partners in OB/GYN, San Antonio, TX
01/2003-09/2004 School nurse (PRN/Substitute), Schertz/Cibolo/Universal City Independent School District, Schertz, TX
01/1999-05/2000 Otolaryngology/Facial Plastic Surgeon outpatient office nurse, Dr. Joseph Parell, Panama City, FL
08/1996-05/1998 School nurse (PRN/Substitute), Department of Defense Dependents Schools, Seoul American Elementary School, Seoul, Korea
02/1996-06/1996 Labor and delivery staff nurse volunteer, American Red Cross, Lester Naval Hospital, Okinawa, Japan
11/1994-06/1996;
04/1992-06/1993: Healthy Pregnancy/Healthy Baby Instructor, American Red Cross, Kadena Air Base, Okinawa, Japan
10/1988-03/1990 Health education parent instructor/consultant, White Wilson Medical Center (pediatric department), Ft. Walton Beach, FL
07/1986-03/1990 Hospital Bill Regional Audit Specialist, Equifax Services, Mobile, AL
09/1984-01/1985 Obstetrical staff nurse (labor and delivery, postpartum, and newborn nursery), Gulf Coast Community Hospital, Panama City, FL
07/1983-07/1984 Neonatal Intensive Care Unit staff nurse, Fairfax Hospital, Falls Church, VA
04/1980-05/1983 Labor and Delivery/Postpartum staff nurse, Methodist Hospital, Lubbock, TX
01/1980-03/1980 Medical Surgical pool staff GN, Methodist Hospital, San Antonio, TX

PUBLICATIONS

Quelly, S. B., & Lieberman, L. S. (2011). Global prevalence of overweight and obesity in preschoolers. *Anthropologischer Anzeiger*, 68(4), 437-456.

RESEARCH and GRANTS

Research:

06/2010-Present Doctoral Dissertation: Perceptions Influencing School Nurse Practices to Prevent Childhood Obesity

Grants:

11/2011 Sigma Theta Tau/ Theta Epsilon chapter research grant -- \$500 award
Perceptions Influencing School Nurse Practices to Prevent Childhood Obesity
09/2011 Florida Nurses Foundation Imogene King research grant -- \$500 award
Perceptions Influencing School Nurse Practices to Prevent Childhood Obesity

PRESENTATIONS

04/2011 Oral presentation "Nursing Self-Efficacy: A Concept Analysis" at Sigma Theta Tau, Theta Epsilon chapter, Winter Park, FL
04/2011 Presented research poster "Online Health-Related Support Groups for Adolescents and Young Adults" at Sigma Theta Tau, Theta Epsilon chapter, Winter Park, FL
02/2011 Presented research poster "Nursing Self-Efficacy: A Concept Analysis" at Southern Nursing Research Society (SNRS) conference, Jacksonville, FL
02/2011 Presented research poster "Online Health-Related Support Groups for Adolescents and Young Adults" at Florida Association of School Nurses conference, Orlando, FL

HONORS AND AWARDS

2011 Honorable Mention award, research poster "Online Health-Related Support Groups for Adolescents and Young Adults" at Florida Association of School Nurses conference
2008 Provost Fellowship, University of Central Florida
2008 Phi Kappa Phi Honor Society membership
2007 Sigma Theta Tau Honor Society membership
2007 The National Scholars Honor Society
2006 SUCCEED grant scholarship for nurse educator students

PROFESSIONAL ACTIVITIES AND COMMUNITY SERVICE

2011 Guest lecturer for PhD course; Quantitative Methods for Nursing Research; Basic descriptive statistics and beginning SPSS utilization
2008-2011 Guest lecturer for BSN course; Nursing Care of Families; Postpartum and newborn nursing care
2008-2011 Guest instructor in BSN maternal-infant simulation lab
2011-present Florida School Health Association member
2010-2011 PhD curriculum committee student representative, UCF
2010-present Southern Nursing Research Society member
2009 Guest maternal-infant clinical instructor, Winnie Palmer Hospital
2009-2010 Organization of Doctoral Students in Nursing (ODSN), president
2008-present ODSN member
2010 Attended Sigma Theta Tau International research conference, Orlando, FL
2009-present Florida Association of School Nurses/National Association of School Nurses member
2009-2011 Teaching Incentives Program committee student representative, UCF
2008-present Florida Nurses Association member
2008-2010 American Red Cross of Central Florida Training and Business Development committee member
volunteer, Orlando, FL
2007-2011 Attended Sigma Theta Tau International, Theta Epsilon chapter, annual research conference, Winter Park, FL
2006-2007 MSN Curriculum committee student representative, UCF
2005 Childbirth Instructor seminar/workshop completed, International Childbirth Education Association, Orlando, FL.
2004 University Hospital nurse re-entry program completed, San Antonio, TX.

2000-2002 Happy Christmas Fund (Charitable organization to clothe needy children in local community) board member and volunteer, Columbus, MS

1998-2004 Church congregational care ministry (visiting home-bound members)

1988-2002 Officers' Spouses Club (Charitable and social organization providing college scholarships and numerous donations to local and national charities) member serving in multiple offices/positions; Honorary President, 07/2000 to 08/2002

1991-1993;
1994-1998 Elementary school health screening volunteer, Department of Defense Dependent Schools, Kadena Air Base, Okinawa, Japan; Yongsan Garrison, Seoul, Korea.

COURSES TAUGHT

University of Central Florida:

Fall 2011/Spring 2012/
Summer 2012/Fall 2012 NGR 6946 Internship and Residency (Nurse Educator track)

Summer/Fall 2009;
Summer/Fall 2010;
Summer/Fall 2011;
Fall 2012 NUR 3634L Community Health Nursing Clinical

Summer 2010;
Spring/Summer 2011

Spring 2012 NUR 4637L Public Health Nursing Clinical

Fall 2010 NUR 4604L Community/Public Health Practicum for RNs

Summer 2009 NUR 3805 Dimensions of Professional Nursing Practice

Spring/Fall 2008 NUR 3445L Nursing Care of Families Clinical (maternal-infant)

Spring 2008 NGR 5800 Theory for Advanced Practice Nursing (assisted Dr. Diane Andrews)