

THE DEVELOPMENT AND PSYCHOMETRIC TESTING OF THE  
SHARED DECISION-MAKING INVENTORY  
INSTRUMENT

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by  
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University of Missouri-Kansas City, 2012

ABSTRACT

Immunizations are a primary prevention intervention to prevent communicable diseases. The human papillomavirus (HPV) vaccine has been available to females in the United States since June 2006. However, the receipt of the HPV vaccine is suboptimal with only 50% of 13 to 15 year old females initiating the HPV vaccine and less than 25% completing the recommended series. The majority of HPV infections resolve spontaneously, however, some HPV types persist and predispose to cervical, vaginal, vulvar, or anal cancer. Healthy People 2020 established a goal that 80% of 13 to 15 year old females complete the HPV vaccine series. Previous research has focused on the medical provider and parents influence on HPV vaccine receipt and have excluded the school nurse who regularly manages the healthcare of females between 11 and 12 years of age. To fill this gap in knowledge, the aim of this research was to develop a psychometrically sound, theoretically based instrument to assess the four Shared Decision-Making (SDM) constructs of knowledge, attitude, self-efficacy, and intent.

The study sample of 1525 school nurses who were members of the National Association of School Nurses completed the SDM Inventory-Revised (SDMI-R) instrument. Proportions, correlation matrixes, Cronbach alpha, and principle component analysis with direct oblimin rotation were the primary methods used to determine the psychometric properties of the SDMI-R. The correlational matrixes indicated moderate to strong correlations between items, indicating adequate internal reliability. The overall reliability of the SDMI-R was judged to be very good ( $\alpha = .874$ ) with the three theoretically derived subscales (attitude, self-efficacy, and intent) achieving Cronbach's alpha of .828, .917, and .891, respectively. The exploratory factor analysis revealed five components that explained 75.96% of the variance.

While additional confirmatory analysis is required, the SDMI-R instrument will describe SDM perceptions of school nurse in nurse-client encounters. Resulting data will provide information for state and national nursing organizations to advocate with public policy makers for safe and effective preventive school health services. The SDMI-R has promise for advancing the understanding of SDM abilities of school nurses and to test interventions provided by school nurses to establish evidence-based SDM standards. (349 words)

## APPROVAL PAGE

The faculty listed below, appointed by the Dean of the School of Nursing have examined a dissertation entitled “The Development and Psychometric Testing of the Shared Decision-Making Instrument,” presented by Jacqueline Ann Bartlett, candidate for the Doctor of Philosophy degree, and certify that in their opinion it is worthy of acceptance.

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## DEDICATION

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## CHAPTER 1

### INTRODUCTION

#### **The Context of the Study**

Healthy People 2020 established a goal to have at least 80% of females between the ages of 13 to 15 years complete the human papillomavirus (HPV) vaccine series (Office of Health Policy, 2010). In 2006, the Advisory Committee on Immunization Practices recommended the series for 11 to 12 year old females to prevent cervical, vaginal, and vulvar cancer in later life (Centers for Disease Control and Prevention [CDC], 2007). In 2010, anal cancer was added to the HPV vaccine prevention list (United States [US] Food and Drug Administration [FDA], 2010). HPV vaccine receipt is suboptimal (Wong, Wai Lee, & Saraiya, 2010) with less than 50% of US adolescent females aged 13 to 15 years old having initiated the HPV vaccine series and less than 25% of this group having completed the series since 2006 (CDC, 2010b). While there is no cure for the HPV disease (CDC, 2009), if females 11 to 12 years old receive the HPV vaccine prior to the onset of sexual activity, they will have sustained high levels of antibodies that provide protection against specific HPV types for at least 6.4 years (Romanowski et al., 2009). Since the vaccine is relatively new, it remains unknown if a vaccine booster is needed (Harper et al., 2006; Hilton, Hunt, Langan, Bedford, & Petticrew, 2010).

With HPV vaccine receipt rates remaining low, researchers must continue to search for evidence-based approaches to increase this receipt. Kathleen Sebelius (2010), Secretary of Health and Human Services, identified school nurses' as the only consistent source of healthcare services for the uninsured child. In 2009, 8.2% (6.1 million) of children had no healthcare insurance, and just over half of these children (4.8%) were without insurance for more than a year (Cohen, Martinez, & Ward, 2010). It is unknown what guides school

nurses' behavior in relation to discussing or not discussing the HPV vaccine with parents and females between 11 and 12 years of age (Bartlett & Peterson, 2011). In order to determine school nurses' behavior related to the HPV vaccine, it is necessary to measure school nurses' ability to counsel females between 11 and 12 years of age and their parents about the HPV disease and vaccine. Because no measurement tool is available, the purpose for this dissertation study was to develop and analyze the psychometric properties of the Shared Decision Making Inventory-Revised (SDMI-R) to determine school nurses' ability to actively counsel parents and females between 11 and 12 years of age about HPV vaccine recommendations. For the remainder of this document, the parents or legal guardians will be referred to as parents.

### **The Problem**

HPV is the most commonly diagnosed sexually transmitted infection (STI) with an approximate prevalence rate of 20 million Americans and an estimated annual incidence rate of six million individuals (CDC, 2009; Moscicki, 2005; Steinbrook, 2006; Trottier & Franco, 2006; Weinstock, Berman, & Cates Jr, 2004). Almost 75% of HPV infections occur within the 15 to 24 year old population. While the majority of HPV infections (90%) resolve spontaneously (CDC, 2007; Moscicki, 2005; Trottier & Franco, 2006; Weinstock et al., 2004), some HPV infections persist and can result in cervical, vaginal, vulvar and / or anal cancer later in life (CDC, 2010a). Vaccinating younger adolescents (10 to 15 years of age) against HPV results in a higher anti-HPV type-specific immune response than would result from HPV vaccination in the 16 to 23 year old age-range or from the natural immune response resulting from the acquired HPV disease (Block et al., 2006). The first HPV vaccine was approved in 2006 (CDC, 2007) and is not typically a school-entry mandated vaccine,



with the exception of Virginia and Washington, DC (CDC, 2007; Colgrove, Abiola, & Mello, 2010). To achieve the targeted HPV vaccine goal, a first step would be for parents to be aware that a vaccine exists and that the vaccine can protect females between 11 and 12 years of age against specific types of HPV. Secondly, parents must make an informed healthcare decision with the assent of his/her 11 to 12 year old daughter to seek and comply with administration of the vaccine.

### **Healthcare Discussions Resulting in Decisions**

Traditionally, discussions leading to healthcare decisions have been paternalistic in nature in which the provider dictates the care, negating the client's participation in healthcare decision-making (Charles, Whelan, & Grafni, 1999; Kremer & Ironson, 2008; Morgan, 2003). With the recognition that individuals should play an active role in the management of their own health, organizations have suggested clinicians use informed and shared decision-making discussions when relating healthcare options to the clients (Centers for Medicare and Medicaid Services, 2008; Institute for Healthcare Improvement, 2011; Institute of Medicine US Committee on Quality of Health Care in America, 2001; The Joint Commission, 2008).

Informed decision-making (IDM) is a range of community or healthcare system interventions that encourage individuals to make decisions at a person level or defer the decision to a later time (Briss et al., 2004; Charles et al., 1999). IDM interventions include, but are not limited to, educational materials delivered through a wide array of resources such as mass media, informatics, and group education (Briss et al., 2004). This type of intervention provides enough information for individuals to make an informed choice or they seek a healthcare provider and enter into a shared decision-making discussion to gain an understanding of the interventions in greater depth. IDM allows the client to determine who

should be involved and who will make healthcare decisions (Briss et al., 2004; Charles et al., 1999).

Shared decision-making is a mechanism for the provider to partner with the client in the decision-making process to inform the client and share information that will assist the client in making a knowledgeable healthcare decision (Briss et al., 2004; Charles et al., 1999). Typically, shared decision-making interventions are comprehensive and personalized to meet the needs of the individual client, leading to improved client outcomes (Briss et al., 2004). For the healthcare provider entering into a shared decision-making discussion, she/he must possess the knowledge, attitudes, self-efficacy, and intent to provide the health information and viable options to assist the client in making care decisions.

In a review of the literature regarding the receipt of the HPV vaccine, the study participants have been primarily medical providers and parents (Bartlett & Peterson, 2011). The review also identified that if the medical provider recommended the HPV vaccine to parents of a female between 11 and 12 years of age, then the HPV vaccine initiation was higher (Gerend, Weibley, & Bland, 2009; Gottlieb et al., 2009; Hughes et al., 2009; Reiter, Brewer, Gottlieb, McRee, & Smith, 2009). However, not all medical providers recommend the HPV vaccine and among those that do, not all consistently recommend the vaccine to parents (Bartlett & Peterson, 2011). Realizing the importance of immunizations as an intervention to mitigate preventable diseases, the American Nurses Association (ANA) and the National Association of School Nurses (NASN) recommend that nurses, particularly school nurses, use every clinical encounter to promote health by discussing immunizations with parents and females between 11 and 12 years of age (ANA, 2011a; Burch, Inderbitzin, Robarge, & Zacharski, 2010).

## **Nursing Decisions Related to Interventions**

Nurses practicing in the US are guided in their professional role by the document entitled “Nursing: Scope and Standards of Practice” (ANA, 2010). The six ANA (2010) standards that describe the competent nurse and support each nurse’s decision-making are (a) assessment, (b) diagnosis, (c) outcomes identification, (d) planning, (e) implementation, which includes care coordination, health teaching and promotion, consultation and prescriptive authority, and (f) evaluation.

Nurses determine interventions based on the needs of the client. Interventions can occur in all care settings, including ambulatory, inpatient, public health, and school. Interventions can be developed at a system-wide level or for a specific client (Melnik & Fineout-Overholt, 2011). Interventions that occur system-wide are typically policy-driven and are derived to achieve care standards. Interventions at the client level are designed to meet standards, but may be modified by the nurse to best meet the needs of the client (Melnik & Fineout-Overholt, 2011).

There were over 66,000 practicing school nurses (National Association of School Nurses [NASN] & American Nurses Association [ANA], 2011) among an estimated 3 million nurses in the US (Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing at the Institute of Medicine, Robert Wood Johnson Foundation, & IOM US, 2011). The unique role of the school nurse encompasses the responsibilities of community health and public health nursing (NASN & ANA, 2011). The community health nurse focuses on the individual client within the community and indirectly affects the health of the community, whereas the public health nurse focuses on the community and indirectly influences individuals within the community (NASN & ANA, 2011). The school nurse uses

the same nursing process outlined previously to develop plans of care for school-aged children and adolescents. School nurses are responsible for healthcare consumers within the school community, including the student, the “student’s family, the educational employees of the school, the school population at large, and the community” (NASN & ANA, 2011, p. 20). The school nurse maintains the health and well-being of the school community at large by providing comprehensive services. These services include (a) health services, (b) health education, (c) environment, (d) nutrition, (e) physical education/activity, (f) counseling/mental health, (g) family/community involvement, and (h) staff wellness. As community and public health nurses, school nurses are charged to understand, guide, and counsel students and their parents about new and non-mandated immunization therapies and to enforce mandated immunizations (NASN & ANA, 2011).

A paucity of literature is currently available that measures nurses’ impact on the receipt of immunizations. One study ( $N = 224$ ) used sexually transmitted infection (STI) scenarios based on either available vaccines or vaccines being studied in clinical trials to measure pediatric nurse practitioners’ (PNPs) recommendations or interventions provided to parents regarding the pre-adolescents’ or adolescents’ receipt of specific vaccines (Mays & Zimet, 2004). In this cross-sectional, descriptive study design, study participants self-reported vaccine recommendations based on age and gender of the adolescent or if the vaccine was endorsed by a professional organization. This study identified that PNPs preferred recommending STI vaccines to older adolescents rather than females between 11 and 12 years of age (part-worth utilities = 4.6 and -5.7, respectively) (Mays & Zimet, 2004). PNPs demonstrated minimal preference related to gender (part-worth utilities = 0.6 and -.6, respectively) in their recommendations (Mays & Zimet, 2004). The most significant factor

influencing the PNPs' recommendations was whether the American Academy of Pediatrics endorsed the vaccine or not (part-worth utilities = 9.8 and -9.8, respectively) (Mays & Zimet, 2004). The shared decision-making constructs of knowledge, attitudes, self-efficacy, and intent were not measured in this study.

A second study surveyed school personnel, non-nurses and nurses, responsible for reviewing students' immunization status for receipt of mandatory immunizations (Salmon et al., 2004). Non-nurses were identified as paraprofessionals, clerks, principals, or others. Nurses were not further defined. Using self-report, surveys were sent to 250 schools (150 schools with the highest vaccine exemptions, 50 with the lowest exemptions and 50 randomly selected schools) in four states (Colorado, Massachusetts, Missouri, and Washington) (Salmon et al., 2004). The study had a 69.6% response rate. Schools with a nurse ( $n = 413$ ) reviewing immunization status was .39 times less likely 95% CI [0.28, 0.56] to have vaccine exemptions, compared to schools without a nurse ( $n = 181$ ) reviewing the status (Salmon et al., 2004). Though the authors reported there was significant variation in disease- and vaccine-specific beliefs between the two groups, they did not report the specific data (Salmon et al., 2004). Additionally, nurses' had a higher knowledge and more positive attitude for mandatory childhood immunizations than the non-nursing group. The students' determination of vaccinated or exempt status was related with the training, immunization knowledge, attitudes, and beliefs of the individual reviewing the immunization status.

Briss et al. (2004) purported that besides the constructs of attitude and knowledge, two additional constructs, self-efficacy and intent, are essential when clinicians adopt the shared decision-making behavior in order to inform individuals about preventive interventions or services. Preventive researchers have begun to use integrated models to

guide the complexities of shared decision-making in prevention behavior (Entwistle & Watt, 2006). With school nurses as the only consistent source of healthcare services for the uninsured child (Sebelius, 2010), school nurses should employ shared decision-making behaviors with parents and students regarding all forms of prevention interventions (NASN & ANA, 2011). The HPV vaccine is one of these preventive interventions. To date, researchers have not studied school nurses' shared decision-making behavior when discussing with the parents and females between 11 and 12 years of age receipt of the HPV vaccine.

### **Informed and Shared Decision-Making Framework**

This study will be guided by the integrated, conceptual framework developed by Briss et al. (2004) called the Informed and Shared Decision-Making Framework (ISDM) (Entwistle & Watt, 2006). The Informed and Shared Decision-Making framework (see Figure 1) was developed by the Task Force on Community Preventive Services to promote cancer prevention interventions (Briss et al., 2004). This task force was an independent, nonfederal, voluntary group of public health and disease prevention experts appointed by the Director of the CDC to make recommendations to the US Preventive Services Task Force, the public health community, and healthcare delivery organizations (CDC, 2011a).

The ISDM framework is composed of two types of decision-making supported by the Centers for Medicare and Medicaid Services (2008), the Institute for Healthcare Improvement (2011), the Institute of Medicine US Committee on Quality of Health Care in America (2001), and The Joint Commission (2008). As described by Briss et al. (2004) both types of decision-making are interventions focused at either the community level, informed decision-making, or the healthcare provider level, shared decision-making. Informed

decision-making promotes informed healthcare decisions needed to maintain a disease-free population. Shared decision-making promotes healthcare decisions comprised of provider-oriented interventions that promote individual healthcare decisions needed to maintain a disease-free individual. Both types are mutually supportive. These two types of decision-making are similar to the information models discussed previously (Charles et al., 1999). These decision-making types will be further explored.

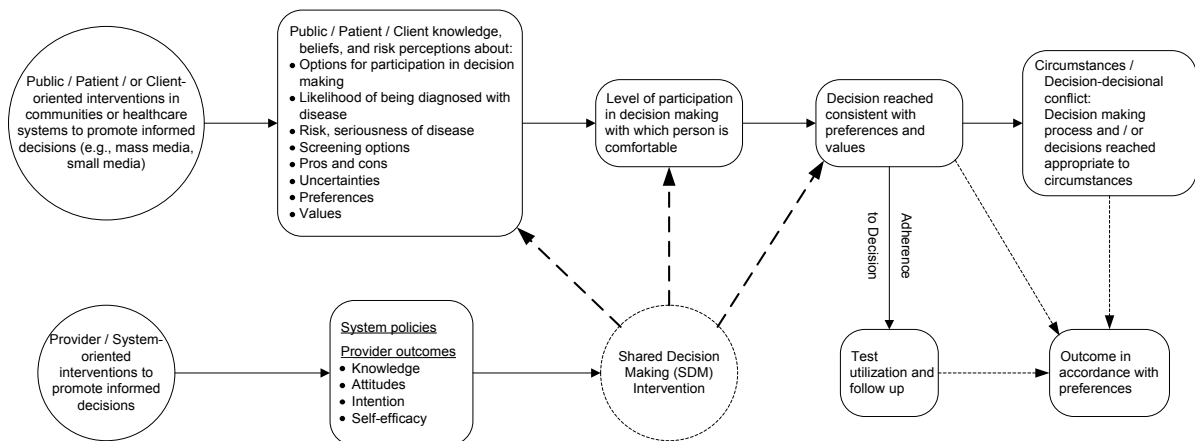


Figure 1. Informed and Shared Decision-Making framework (Briss et al., 2004).

Community-level IDM interventions are conducted typically through a public health agency or a healthcare system (Briss et al., 2004). Information is channeled from the agency or system through media. The information communicated includes the risk of being diagnosed with a disease, the interventions available, the pros and cons of the intervention, and the uncertainties associated with the disease and associated treatments (Briss et al., 2004). IDM interventions can have a widespread affect on the community. IDM interventions do not usually or primarily involve those who provide healthcare to individual clients and they are not limited to a clinical environment (Briss et al., 2004). However, IDM

interventions can facilitate an individual to initiate a shared decision-making discussion with a healthcare provider.

Thus shared decision-making can be elicited by an informed decision-making intervention, or the healthcare provider could elect to engage an individual in a discussion about prevention interventions. Shared decision-making interventions occur only if the healthcare provider is able to engage an individual in a discussion that encompasses (a) the risk or seriousness of the disease to be prevented, (b) the prevention intervention being offered including risks, benefits and uncertainties, (c) seeking to understand what role the individual's values have on the disease or the prevention intervention, and (d) serving as the individual's partner in the decision-making process (Sheridan, Harris, & Woolf, 2004). As the Department of Health and Human Services views the school nurse as the uninsured child's healthcare provider (Sebilus, 2010), this means the school nurse must be able to engage the parent and females between 11 and 12 years of age in a discussion related to preventing cervical cancer through the receipt of the HPV vaccine. From this discussion, the parent and the female between 11 and 12 years of age (a) understand the long-term risk of the cervical cancer disease, (b) understand the risks, benefits and uncertainties of the HPV vaccine, (c) weigh the risks of the disease, along with the risks, benefits, and uncertainties of the vaccine within their value system, and (d) engage, with the school nurse, in a decision at the level the parent and female between 11 and 12 years of age feels comfortable.

The area of interest for this dissertation research was school nurses' shared decision-making intervention to discuss the HPV vaccine with females between 11 and 12 years of age and their parents. The remainder of this study will focus on the shared decision-making aspect of the ISDM framework. The constructs, or variables, of interest in shared decision-



making are knowledge, attitudes, self-efficacy, and intent (Briss et al., 2004). Minimal research was found that measures these constructs, as conceptualized in the framework, in relationship to the school nurses' role and HPV disease and the vaccine.

### **Knowledge**

Nurses utilize knowledge to provide clients with healthcare consumer information within the implementation step of the nursing process. New knowledge is being generated from nursing and other disciplines on a frequent basis and nurses must incorporate this evidence into their practice (ANA, 2010). Knowledge is the construct describing how nurses integrate data points, such as current literature, insights from previous experiences, and professional standards of practice, to change their behavior to promote effective and efficient care evidenced by improved outcomes (ANA, 2010). With nursing knowledge continually growing (Roy & Jones, 2006), it is unknown if nurses have integrated new HPV knowledge into their practice. The translation of nursing knowledge into practice needs to be understood and enhanced for dissemination and application to occur (Melnik & Fineout-Overholt, 2011).

### **Attitude**

Attitude is described as an individual's inner propensity to express their evaluation of a particular object or entity with some degree of preference either favorably or unfavorably (Eagly & Chaiken, 2007; Insko & Butzine, 1967; Insko & Schopler, 1967). Individuals view attitudes as important, and the success or failure of accepting new objects or entities is dependent on the negative or positive nature of the individual's attitude (Eagly & Chaiken, 2007). Psychologists believe an individual's intent to perform a behavior can be predicted from attitudes and past behaviors. As sexual connotations are associated with the HPV

disease and vaccine (Mishra & Graham, 2012), it is important to measure school nurses attitudes to identify if they bear favorable or unfavorable attitudes to these entities.

### **Counseling Self-efficacy**

An important role for the nurse is to assist individuals or groups in optimizing their health (ANA, 2010). Counseling self-efficacy is defined as one's beliefs or judgments about their capability to counsel another in the near future (Larson & Daniels, 1998). These counseling sessions can occur either between a nurse and an individual or between a nurse and a group. To be effective in counseling, the counselor must plan, assess, and change the plan in real time in order to manage each counseling session. The counselor's self-efficacy is affected as the counselor judges how well she/he has executed the counseling session. The counselor's self-efficacy can increase or decrease based on if the counselor (a) was successful regarding a specific behavior, (b) had observed a behavior and then performed it successfully, (c) was able to verbally persuade a behavior change, and (d) was inhibited by her/his own self-efficacy (Larson & Daniels, 1998). As self-efficacy is different within each domain of functioning and performance context (Zimmerman, 2000), school nurses' self-efficacy to counsel parents and females between 11 and 12 years of age on the HPV disease and vaccine will need to be measured within the context of individual and group counseling sessions.

### **Intention**

Intention is the cognitive aspect of an individual that mediates what intervention is chosen (Hill & O'Grady, 1985). As in the case of shared decision-making, HPV disease, and vaccine counseling with the parent or female between 11 and 12 years of age, the school nurse must determine specific aspects of the counseling session (such as the session level,

individual or group, and what information aids are needed) (Kivlighan & Kivlighan, 2004). However, the nurse's intention does not stop when the shared decision-making session begins, the nurse continues to take in data based on the nursing process to refine the intervention to meet the needs of the individual or group (Hill & O'Grady, 1985). With school nurses being the healthcare provider for the student and community at large, little is known about their intent to counsel parents and females between 11 and 12 years of age related to the HPV disease and vaccine.

There is a paucity of published literature measuring how school nurses are affecting the receipt of the HPV vaccine. Without the capacity to measure school nurses' ability to counsel parents and females between 11 and 12 years of age on the HPV disease and vaccine, this aspect of school nursing remains invisible. Developing the SDMI to include the constructs of knowledge, attitudes, self-efficacy, and intent and testing the instrument's reliability and validity is an important step in measuring school nurses' ability to counsel parents on the HPV disease and vaccine. This instrument development could lead to interventions that would promote shared decision-making in the school nurses' role.

### **Study Purpose**

The purpose of this research was to develop and determine the psychometric properties of the SDMI-R instrument, including alpha coefficient and factor structure. The SDMI-R is used to measure school nurses' ability to discuss HPV disease and vaccine with parents and females between 11 and 12 years of age. The primary research questions for this research study were:

- 1) To what extent did the SDMI-R demonstrate internal consistency and reliability?

- 2) To what extent were the components of the SDMI-R, created from an integrative synthesis of the literature regarding HPV disease, vaccine characteristics and receipt, demonstrated in exploratory factor analysis (EFA)?
- 3) To what extent did the resulting factors demonstrate reliability as independent factors?

Testing the psychometric properties of the SDMI-R will establish construct validity, reliability, and factor structure.

### **Definition of Terms**

**Attitude.** Attitude is conceptually defined as an individual's inner propensity to express his/her evaluation of a particular object or entity with some degree of preference either favorably or unfavorably (Eagly & Chaiken, 2007; Insko & Butzine, 1967; Insko & Schopler, 1967).

**Counseling self-efficacy.** Counseling self-efficacy is conceptually defined as one's beliefs or judgments about his/her capability to counsel another in the near future (Larson & Daniels, 1998). As self-efficacy is different within each domain of functioning and performance context (Zimmerman, 2000), counseling self-efficacy will be further defined as the school nurses' ability to counsel parents and females between 11 and 12 years of age on the HPV disease and vaccine.

**Human Papillomavirus (HPV).** Human papillomavirus (HPV) is a group of viruses that is comprised of over 100 types, or strains, with approximately 40 of these types infecting the genital tract (CDC, 2009; Muñoz, Castellsagué, de González, & Gissmann, 2006; Trottier & Franco, 2006).

**Informed and Shared Decision-Making framework (ISDM).** Informed and Shared Decision-Making framework (ISDM) is a hypothesized, integrated framework developed by the Task Force on Community Preventive Services to measure community (Informed) and individual (Shared) preventive initiatives. The ISDM framework is composed of two types of decision-making interventions, Informed Decision Making and Shared Decision Making. Informed decision-making promotes informed healthcare decisions to maintain a disease-free population and shared decision-making promotes individual level healthcare decisions to maintain a disease-free individual (Briss et al., 2004).

**Intention.** Intention is conceptually defined as the cognitive aspect of an individual that mediates what intervention is chosen (Hill & O'Grady, 1985).

**Knowledge.** Knowledge is conceptually defined as a person's ability to integrate many data aspects. Data aspects could include, but are not limited to, data gleaned from current literature, insights gained from previous experiences, and professional standards of practice, to promote effective and efficient care evidenced by improved client outcomes (Briss et al., 2004).

**National Association of School Nurses (NASN).** The National Association of School Nurses (NASN) is a professional organization serving school nurses by developing and providing leadership to advance school nursing practice (NASN & ANA, 2011).

**Parent.** Parent is a person who is entrusted by law to care for a person, in this case a female between 11 and 12 years of age.

**School Nurse.** A school nurse is a licensed professional "...that advances the well-being, academic success, and lifelong achievement of students. A school nurse facilitates positive student responses to normal development, promotes health and safety, intervenes

with actual and potential health problems, provide case management services, and actively collaborates with school officials and healthcare professionals to build student and family capacity for adaptation, self-management, self-advocacy, and learning” (NASN, 2011, para. 1). School nurses can be Registered Nurses (RN), Licensed Practical Nurses (LPN), or Advanced Practice Registered Nurses (APRN).

**Shared Decision-Making.** Shared Decision-Making is one component of the ISDM framework that focuses on the provider’s intent to adopt preventive initiatives at the individual level. This application of the shared decision-making aspect of the ISDM framework measures the provider’s knowledge of the HPV disease and vaccine including the risks and benefits, his/her attitude towards the HPV disease and vaccine, and also the self-efficacy and intention to execute this discussion to produce vaccine receipt (Briss et al., 2004).

**Web-based Mail Surveying.** Web-based mail surveying is a web-based survey program that will allow the participants to answer the proposed survey via an electronic format eliminating the need for pen and paper surveys. The web-based survey program that used in this research was SurveyMonkey™.

### **Study Assumptions**

This study was based on the following assumptions:

- 1) The shared decision-making component of the ISDM framework was a satisfactory guiding structure for the study.
- 2) The study participants were capable of reading and responding in English.
- 3) Findings from this study have worth to school nurses and the students they serve.

- 4) Participants have had sufficient computer skills that enable them to access the survey and complete the steps required for study participation.
- 5) Study participants were school nurses.

### **Gaps in Knowledge**

Nursing's response to the Advisory Committee on Immunization Practice recommendation for HPV vaccine receipt has been sub-optimal (Kahn et al., 2009). In response to the HPV vaccine and other vaccine recommendations, the ANA unveiled a public service announcement demonstrating commitment to maximize nursing's role in increasing vaccination rates to reduce vaccine-preventable diseases (ANA, 2011b). HPV is the most commonly diagnosed STI with the highest amount of diagnosed infections occurring among 15 to 24 years of age (Moscicki, 2005; Weinstock et al., 2004). After five years, the HPV vaccine receipt remains low with less than 50% of females between 13 to 15 years initiating the HPV series and less than 25% of this group actually completing the series (CDC, 2010b). This study, guided by the shared decision-making component of the ISDM framework, was used to determine the school nurses' knowledge, attitudes, self-efficacy, and intent to discuss HPV vaccine with the parents and females between 11 and 12 years of age.

### **Conclusion**

The Healthy People 2020 initiative (Office of Health Policy, 2010), the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, the American Academy of Family Physicians (CDC, 2008), the ANA (ANA, 2011a), and the NASN (Burch et al., 2010) recommend the HPV vaccine series for females between 11 and 12 years of age to prevent cervical, vaginal, vulvar, and anal cancer later in life (CDC, 2010a). The current receipt of the HPV vaccine in the female between 11 and 12 years of age is sub-

optimal, with less than 50% of US adolescent females, aged 13 to 15 years of age, having initiated the HPV vaccine series and less than 25% of this group having completed the series (CDC, 2010b).

This chapter provided an overview of how healthcare decisions have changed from a paternalistic approach to that of informed and shared decision-making (Charles et al., 1999; Kremer & Ironson, 2008). The HPV vaccine receipt was higher when the healthcare provider recommended the vaccine to the parents (Dempsey, Abraham, Dalton, & Ruffin, 2009; Gerend et al., 2009; Gottlieb et al., 2009; Reiter et al., 2009; Yeganeh, Curtis, & Kuo, 2010). However, research indicates that healthcare providers are not consistently recommending the vaccine to parents (Yeganeh et al., 2010). No supporting data have been found measuring school nurses' discussions with parents related to the HPV disease or vaccine. Professional nursing associations, ANA and NASN, recommend that females between 11 and 12 years of age receive the HPV vaccine and that it is the school nurses' responsibility to inform, recommend and implement interventions to promote the HPV vaccine (ANA, 2011a; Burch et al., 2010).

It is unknown what guides school nurses' behavior in relation to discussing or not discussing the HPV vaccine with parents and females between 11 and 12 years of age (Bartlett & Peterson, 2011). This research project will fill this gap in knowledge and will provide a foundation for future interventional research efforts to promote vaccine receipt in females between 11 and 12 years of age by school nurses. The ISDM framework was proposed as the guiding theory for this research project as the school nurse is in a key role to promote the health for individual children, adolescents, their families and communities, and the public at-large through immunization advocacy and policy-change initiatives (NASN &



ANA, 2011). As an initial step in achieving these goals, it is necessary to determine school nurses' ability to counsel females between 11 and 12 years of age and their parents about the HPV disease and vaccine. Guided by the theoretical underpinnings of the shared decision-making framework, the SDMI-R was scientifically developed from the literature. The theoretically supported constructs measured in the SDMI-R are knowledge, attitudes, self-efficacy, and intent to discuss the HPV disease and vaccine with the parents and females between 11 and 12 years of age.

### **Organization of Remaining Chapters**

Chapter Two contains a literature review providing the background and significance of this proposed study. The literature related to the measurement of school nurses' knowledge, attitudes, self-efficacy, and intent is presented in Chapter Two along with the current state of the science related to the HPV disease and vaccine. Chapter Three explains the methods and procedures for the preliminary study specifically the recruitment of participants, data collection procedures, instrumentation, preliminary study finding. Chapter Four integrates the preliminary study findings and provides the methods, data analysis plan and ethical considerations for the dissertation study. The results of the dissertation study are presented in Chapter Five. The final chapter, Chapter Six, discusses the findings of the dissertation study, along with the contributions and implications of the study findings, and provides direction for further research.

## CHAPTER 2

### REVIEW OF THE LITERATURE

#### **Introduction**

School nurses “...facilitate positive student responses to normal development, promote health and safety, intervene when actual and potential health problems [are identified], ... and actively collaborate with school officials and healthcare professionals to build student and family capacity for adaptation, self-management, self-advocacy, and learning” (National Association of School Nurses [NASN], 2011, para. 1). The school nurses’ scope of practice is based on the nursing process (NASN & American Nursing Association [ANA], 2011). As discussed in Chapter One, the school nurses’ knowledge, attitudes, self-efficacy, and intent may affect their ability to discuss the human papillomavirus (HPV) disease and vaccine with females between 11 and 12 years of age and their parents. This chapter will provide a review of the current literature and the state of the science related to the measurement of school nurses’ knowledge, attitudes, self-efficacy, and intent related to the HPV disease and vaccine. In order to promote gynecologic health and minimize the potential health problems associated with HPV transmission, especially cervical cancer, the school nurse must understand the complexities of the HPV disease and recommend the HPV vaccine to the female between 11 and 12 years of age and her parents (NASN & ANA, 2011).

#### **School Nurses**

Nurses encompass the largest group of healthcare providers with over 3 million in the United States (US) (Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing at the Institute of Medicine, Robert Wood Johnson Foundation, & Institute of Medicine US, 2011), compared to 954,000 working physicians (Sataline & Wang, 2010).

School nurses are required to assess a female between 11 and 12 years of age immunization record and to counsel her and her parents on vaccination recommendations and enforce vaccine mandates required for school attendance. In addition to informing parents which vaccines are required for school attendance, it is important that females between 11 and 12 years of age and their parents understand why these and other vaccines are important for their health and the health of the public. HPV vaccine is recommended for females between 11 and 12 years of age, although this vaccine is not typically mandated for school attendance (ANA, 2011b). Only two states, Virginia and Washington, DC, have a HPV school-entry mandated vaccine (Colgrove et al., 2010). Yet, major health organizations, such as Healthy People 2020 (Office of Health Policy, 2010), Centers for Disease Control and Prevention (CDC) (2007) and the World Health Organization (Andre et al., 2008) recommend that females between 11 and 12 years of age receive the HPV vaccine. Meanwhile, the ANA and the NASN (Burch et al., 2010) recommend that school nurses use every clinical encounter to discuss immunizations with the parents or students.

There is a dearth of literature reporting the measurement of nurses' vaccine recommendations to pediatric clients and their parents. In the two studies identified, one study measured Pediatric Nurse Practitioners' (PNPs) ability to counsel parents on potential sexually transmitted infections (STI) related vaccines that were currently under development (Mays & Zimet, 2004), while the other study measured nurses' HPV vaccine recommendations for their own daughters (Kahn et al., 2009). Mays and Zimet surveyed PNPs ( $N = 224$ ) to measure the group's willingness to recommend STI vaccines to parents of adolescents. Overall, PNPs were willing to recommend the vaccines if they are endorsed by professional organizations; however, PNPs did not believe that females between 11 and 12

years of age should be included in the STI vaccine recommendations (Mays & Zimet, 2004). The second study sampled a national representation of nurses ( $N = 7207$ ) and reported that less than half of the participants (48%) would agree to have their own daughter between 11 and 12 years of age receive the HPV vaccine (Kahn et al., 2009).

With HPV vaccine receipt rates remaining low, researchers must continue to explore this problem to identify evidence-based approaches to increase the HPV vaccine receipt. Secretary of Health and Human Services, Kathleen Sebelius (2010), identified school nurses as the uninsured child's only consistent source of healthcare services. In 2009, 8.2% (6.1 million) of children were reported to have no insurance and just over half of these children (4.8%) were reported to be without insurance for more than a year (Cohen et al., 2010). School nurses are in a unique position to affect the receipt of HPV vaccine; however, no literature was found which measured school nurses' recommendations related to the HPV vaccine. It is unknown if school nurses follow the recommendation set forth by major nursing organizations to use each encounter with females between 11 and 12 years of age to counsel her and her parents on the Advisory Committee on Immunization Practices HPV vaccine recommendations and the associated risks and benefits in order to increase the receipt of the vaccine. With a thorough knowledge of the HPV disease, the negative health consequences associated with HPV and an understanding of the vaccine, school nurses may be able to effectively increase the receipt of the HPV vaccine in females between 11 and 12 years of age.

### **Human Papillomavirus Pathogenesis**

In 1983, the first HPV types were detected by DNA hybridization in tumor cells (Durst, Gissmann, Ikenberg, & zur Hausen, 1983). Since that time researchers have identified

that HPV is actually a group of viruses comprised of over 100 types or strains, and that approximately 40 of these types have the potential to infect the human genital tract (CDC, 2009; Muñoz et al., 2006; Trottier & Franco, 2006). For HPV infection to occur, the virus requires access to squamous epithelial cells. It is believed that HPV infections arise through microscopic mucosal tears, which allow the virus access to the squamous epithelial cells (Moscicki, 2005). Squamous epithelial cells are found on the surface of the skin, cervix, vagina, vulva, anus, head of the penis, mouth, and throat. In the adolescent female, HPV risk is higher than in adult women because the area surrounding the cervix begins to transform from columnar epithelium to squamous epithelium (Moscicki, 2005). All of the cells developed during this squamous metaplasia process support HPV replication (Moscicki, Burt, Kanowitz, Darragh, & Shiboski, 1999).

These transforming cells can experience virus-induced genetic alterations and with persistent infections, have a high propensity of developing into high-grade squamous intraepithelial lesions (Moscicki, Schiffman, Kjaer, & Villa, 2006). Due to the risk of cervical, vaginal, and vulvar precancers and cancers from HPV infections, the healthcare community's primary focus has been to decrease this risk in the female population. The National Cancer Institute provides laboratory research and vaccine development technology to continue disease risk reductions (National Cancer Institute at the National Institutes of Health, 2006). The US Food and Drug Administration (FDA) has the organizational responsibility for reviewing the data associated with the HPV study trials designed to determine HPV vaccine safety. Based on the epidemiology of disease and age of likely HPV acquisition, the optimal age for use of preventive vaccines is determined (C. J. Harrison, personal communication, March 1, 2012). The FDA in concert with vaccine manufacturers

then develop a protocol for study of a prescribed dosing schedule to ensure safety and efficacy of that schedule at the desired ages. The resulting data is used to obtain FDA approval for the vaccine. Once approved, the Advisory Committee on Immunization Practices (ACIP) advisory panel reviews the data and makes recommendations to the CDC as to what is the best schedule and dosing of the vaccine. There is then an internal review at the CDC which can accept or change the recommendations of the advisory panel. After the ACIP/CDC recommendations are revealed, they are reviewed by various organizations such as the American Academy of Pediatrics and the American Academy of Family Physicians which may agree or make varied suggestions. Post-marketing data continue to be collected and may result in changes in dosing or schedules. Additionally, the CDC has developed tools for the healthcare provider to use when discussing the HPV disease and vaccine (CDC, 2007, 2009, 2010a). The World Health Organization (WHO), the Society of Adolescent Medicine, the American Academy of Pediatrics and the NASN have developed HPV position papers supporting the use of the HPV vaccine in females between 11 and 12 years of age (American Academy of Pediatrics, 2011; Burch et al., 2010; Friedman, Kahn, Middleman, Rosenthal, & Zimet, 2006; WHO, 2009). In summary, many research hours, multiple reviews of the pre- and post-marketing data, and large expenditures of commercial biopharmaceuticals plus federal monies have been invested to assure the safety and efficacy of the HPV vaccine, yet the vaccine receipt remains suboptimal. Researchers must look at all the populations that provide care to females between 11 and 12 years of age to identify novel approaches to increase the receipt of the HPV vaccine.

The school nurse should be aware of the national and international organizations that support the receipt of the HPV vaccine and the associated decision aids developed by these

organizations that would assist the nurse in fostering the necessary conversations regarding vaccination recommendations (Briss et al., 2004). However, behaviors, capabilities and attitudes of school nurses have not been studied to learn what HPV recommendations they are currently providing to females between 11 and 12 years of age and her parents. The school nurse, as a disease prevention manager, should be able to engage females between 11 and 12 years of age and her parents in shared decision-making counseling sessions to share the HPV pathogenesis information to help them set the foundation to discuss the incidence and prevalence of the HPV disease (NASN & ANA, 2011).

### **Incidence and Prevalence of Human Papillomavirus**

Human Papillomavirus (HPV) is the most commonly diagnosed STI (CDC, 2009; Moscicki, 2005; Steinbrook, 2006; Trottier & Franco, 2006; Weinstock et al., 2004). According to the CDC's 2009 Youth Risk Behavior Surveillance System (YRBSS) Report, high school students indicate that (a) 47% have had sex at least once, (b) 34% have had sex at least once during the three months prior to the survey, (c) 14% have had sex with four or more individuals and (d) 38% used a condom during the last sexual encounter (Eaton et al., 2010). These percentages are relatively unchanged from 2007 data. An estimated 18% of adolescents report having engaged in sexual activity before the age of 15, with approximately 4 to 5% having initiated in sexual activity before the age of 12 (Marín, Kirby, Hudes, Coyle, & Gómez, 2006; Rose et al., 2005). In more recent data (Markham, Fleschler Peskin, Addy, Baumler, & Tortolero, 2009), the prevalence of vaginal, oral and anal intercourse in a large southeastern US public school district ( $N = 1,279$ ) was reported to be 12%, 7.9% and 6.5%, respectively. Adjusted odds ratios for this population indicated that male,  $OR = 3.1$ , 95% CI [2.12, 4.44],  $OR = 4.3$ , 95% CI [2.73, 6.94],  $OR = 3.5$ , 95% CI [2.13, 5.75], and black,  $OR =$

4.2, 95% CI [2.57, 6.63], *OR* = 2.5, 95% CI [1.48, 4.17], *OR* = 1.9, 95% CI [1.09, 3.16], students were significantly more likely to report engaging in vaginal, oral, and anal intercourse when compared to female and Hispanic students, respectively (Markham, et al., 2009). As only one school district was included in this study, the data are not generalizable to the population at large. However, the populations studied were predominantly Afro-Americans (43.6%, *n* = 447) and Hispanics (41.8%, *n* = 535), providing insights for school nurses regarding the sexual behaviors and the need for prevention programs among minority adolescents between 12 and 14 years of age (Markham, et al., 2009).

It is unknown if school nurses realize HPV is transmitted by genital contact, most frequently during vaginal and anal sex, but it can also be transmitted during oral-genital, manual-genital, and genital-genital contact (CDC, 2009). Individuals usually do not realize they have been infected with HPV and may unknowingly transmit the virus to others while engaging in sexual activity (CDC, 2009). Most HPV infections (74%) occur within the 15 to 24 year old population (Moscicki, 2005; Weinstock et al., 2004).

The CDC (2009) reports that approximately 20 million Americans are infected with HPV and an additional 6.2 million individuals are newly infected with the disease each year. Moscicki (2005) reported an HPV prevalence rate of 54.5% in female teens between 15 and 17 years of age. In a 27-month longitudinal study, Brown et al. (2005) found a HPV cumulative prevalence rate of 81.7% for female teens between the ages of 14 to 17 years. In a cross-sectional study, the prevalence rate for HPV infection was 24.5% for 14 to 19 year old females (Dunne et al., 2007). This same study identified a statistically significant increase in HPV prevalence with each year of age between 14 and 24 years. Thus, the available research data indicate that HPV infections remain an important sexual health concern for females.



When discussing health promotion with the parents, females between 11 and 12 years of age, and school administration, school nurses need to be able to articulate currently available research findings regarding the prevalence of not only sexual activity but unprotected sexual activity and HPV prevalence. With 4 to 6% of adolescents reporting their sexual encounters began before the age of 12 years and the continued high incidence of sexual activity in the adolescent age group (Marín et al., 2006; Markham et al., 2009; Rose et al., 2005), school nurses must advocate for school-based programs related to sexual activity (NASN & ANA, 2011).

### **Human Papillomavirus and Cancer**

The majority of HPV infections (90%) resolve spontaneously within two years (CDC, 2007; Trottier & Franco, 2006). However, among those that persist, some HPV types are predispositions for cervical and anal cancer and/or anogenital warts. HPV types are classified into high and low oncogenic risk. Typically, HPV high-risk types are carcinogenic and persist in the body longer, while low-risk types result in genital warts and can clear faster (Trottier & Franco, 2006). The International Agency for Research on Cancer (2007) identified the HPV high-risk and low-risk types (see Table 1). When the data, reported in two pooled samples, ( $N = 13,000$ ) were analyzed (Clifford, Smith, Plummer, Muñoz, & Franceschi, 2003; Muñoz et al., 2004) eight high-risk HPV types were found to be responsible for approximately 90% of cervical cancers worldwide (Muñoz et al., 2006).

Table 1.  
HPV Risk Types

	Identified HPV Types	Abnormalities Linked with HPV Types
Low-Risk Types	6, 11, 40, 42, 43, 44, 54, 61, 70, 72, 81, CP6108	Genital Warts
High-Risk Types	16*, 18*, 26 <sup>□</sup> , 31*, 33*, 35*, 39, 45*, 51, 52*, 53 <sup>□</sup> , 56, 58*, 59, 66 <sup>□</sup> , 68 <sup>□</sup> , 73 <sup>□</sup> , and 82 <sup>□</sup>	Low-grade cervical lesions High-grade cervical lesions Anogenital cancers

\* HPV types responsible for approximately 90% of all cervical cancers worldwide

□ Probably HPV High-Risk type.

HPV-16 and HPV-18 account for about 70% of cervical, vaginal, and anal cancers and approximately 30 to 40% of vulva, penis, and oropharynx cancers (Muñoz, et al., 2006). Infections with HPV-16 or HPV-18 were highly associated with an increased risk of squamous-cell carcinoma and adenocarcinoma of the cervix,  $OR = 218.9$ , 95% CI [196.3, 404.8] and  $OR = 222.5$ , 95% CI [130.8, 378.4], respectively (Muñoz, et al., 2006). The risk of cervical intraepithelial neoplasia (CIN) increases as the length of the HPV infection persists, though the definition of persistence has yet to be determined (Trottier & Franco, 2006). In addition, epidemiological studies are underway to better understand the effect reoccurring infections have on CIN.

The mortality rates for cervical cancer have decreased over the last several decades and have remained essentially unchanged since 2003 (American Cancer Society, 2011a). However, cervical cancer, in the US, still ranks as the fourth most frequent cancer among women between 15 and 44 years of age (World Health Organization [WHO]/Information Centre on [ICO] on HPV and Cervical Cancer, 2010). Despite Papanicolaou test (Pap) screening, cervical cancer remains a leading cause of death (WHO/ICO HPV and Cervical Cancer, 2010). Nearly 12,710 new cases of cervical cancer were expected to be diagnosed in

2011 and approximately 4,290 women were expected to die as a result of HPV infections (American Cancer Society, 2011a).

Anal cancer, or anal intraepithelial neoplasia (AIN), affects both males and females. Seventy two percent of AIN is associated with HPV-16 and HPV-18 (Oon & Winter, 2010). Anal cancer affects both sexes however, it is diagnosed more frequently in men than women (Johnson, Madeleine, Newcomer, Schwartz, & Daling, 2004). This is hypothesized to be due to the increased screening of high-risk men and that anal cancers in women occur deeper within the canal than in men, making the cancerous lesions harder to detect. In the US there has been an increase in the incidence of anal cancer between 1973 (when data were first available) and 2000. Between 1973 and 1979, men had a lower anal cancer incidence than women (1.06 per 100,000 compared to 1.39 per 100,000), but now the incidence between the two sexes is similar (2.04 per 100,000 in men as compared to 2.06 per 100,000 in women) (Oon & Winter, 2010). The American Cancer Society (2011a) has projected that in 2011, 5,820 new cases of anal cancer were diagnosed in both genders and approximately 770 individuals were expected to die from this disease.

In females and males, HPV-6 and HPV-11 are present in nearly 100% of all genital warts and 90% of respiratory papillomatosis (Lacey, Lowndes, & Shah, 2006; Muñoz et al., 2006; Steinbrook, 2006). Within the US at any given time, approximately 1% of sexually active adults have anogenital warts (CDC, 2009).

HPV infections on the cervix typically clear within six months to two years, though approximately 10% of HPV infections persist or become latent (CDC, 2007; Trottier & Franco, 2006). For the persistent and latent infections, the woman has a marked increased risk of developing cervical cancer later in life if the infections are related to HPV-16 or HPV-

18 (Trottier & Franco). These two HPV types are also responsible for 72% of anal cancers in both males and females (Oon & Winter, 2010). The US continues to see a rise in cervical and anal cancer diagnoses and deaths, even with the development of the Pap test and anal cancer screening, respectively. The Pap test and the anal cancer screening are diagnostics used to determine if the individual has the disease, whereas, the HPV vaccine is a primary prevention intervention to decrease the risk of becoming infected with the disease.

### **Risk Factors for Contracting Human Papillomavirus**

HPV is transmitted through direct skin-to-skin contact with the highest incidence through penetrative genital contact (CDC, 2009). In Cleveland et al.'s (2011) review of the literature, study findings linked oral HPV infection with a history of open-mouthed kissing and oral sex. These findings augment Winer et al.'s (2003a) study findings that identified other types of genital contact (manual-genital and genital-genital) lead to HPV infection. However, none of these types of HPV transmission are as common as the transmission through sexual intercourse (Winer et al., 2003a). Therefore, risk factors associated with HPV infections include sexual contact with an infected partner, number of sexual partners, the younger age at first sexual intercourse, the non-use of condoms, HPV infection with other STIs present, smoking, and uncircumcised males (Ho et al., 2002; Moscicki, 2005; Oon & Winter, 2010; Schiffman & Kjaer, 2003; Winer et al., 2008; Winer et al., 2003b).

The hazard risk of becoming HPV infected was associated with the time interval between new partners being less than eight months ( $OR = 1.8$ , 95% CI [1.2, 2.7]) (Winer et al., 2003b). Of women diagnosed with HPV infection, 20% reported one lifetime male sexual partner and 69% reported more than 10 lifetime partners (Moscicki, 2005). There is an inverse relationship with age at first sexual encounter and HPV risk. As the individual's age

decreases, the risk of HPV infection increases due to the cervical mucosal changes along with the increased probability of the woman having more than one sexual partner (Moscicki, 2005; Winer et al., 2008). Though the use of condoms has not been shown to be 100% effective in preventing an HPV infection, the literature does support the possibility that condoms may prevent some HPV infections and therefore decrease the risk of genital warts, CIN, and invasive cervical cancer (Ho et al., 2002; Manhart & Koutsky, 2002; Winer et al., 2003a).

The HPV risk seems to increase with the presence of other STIs. Genital warts, herpes simplex virus (HSV) or human immunodeficiency virus therapy (HIV) allow the HPV to penetrate to the basal epithelial cells of the cervix or the anus and HIV decreases host ability to resolve the infection (Moscicki, 2005; Oon & Winter, 2010; Winer et al., 2003a). For the individuals with genital warts and HSV infections, these infections either disrupt or inflame the epithelial layer allowing the HPV access to the basal epithelial cells (Moscicki, 2005; Winer et al., 2003a). HIV infected individuals on highly active antiretroviral therapy were not able to clear their HPV infections (Oon & Winter, 2010).

In a two year study from Uganda ( $N = 5534$ ) the prevalence of high-risk HPV types was 18% in circumcised men and 29.9% in uncircumcised men (adjusted risk ratio = 0.65, 95% CI [0.46, 0.90]) (Tobian et al., 2009). However, further research is needed to identify the linkages between uncircumcised males and HPV infections. Researchers suggest possible HPV linkages could be the increased surface area with the prepuce coming into contact with vaginal secretions, or the prepuce lining is not keratinized and could have an increased HPV vulnerability (Castellsague et al., 2002). Another possibility is that the HPV virus could access the basal cells through minute tears in the epithelium.

As HPV incidence continues to grow, it could have serious implications on public health initiatives as the HPV disease burden is also rising. School nurses' scope of practice integrates aspects of community and public health nursing into their practice (NASN & ANA, 2011). This guiding document, acknowledges the need for school nurses' practice to be grounded in scientific literature (NASN & ANA, 2011). This stance could be strengthened by exploring the school nurses knowledge about HPV and developing interventions based on scientific evidence.

### **Prevention of Human Papillomavirus**

To date, no iatrogenic cure for the HPV disease has been identified (CDC, 2009). As information related to the incidence of HPV and subsequent related cancers began to infiltrate communities, attention turned from secondary prevention to primary education prevention. Initially, in 2006, media and religious organizations increased abstinence campaigns in an effort to prevent HPV transmission (Guttmacher Institute, 2011). Researchers developed measures to determine the effect abstinence campaigns had on the community.

With abstinence programs in place, a national study surveyed 15 to 19 year old adolescents ( $N = 2,767$ ) about their sexual encounters between 2006 and 2008 (Abma, Martinez, & Copen, 2010). Forty-two percent of females 15 to 19 years of age reported having sexual intercourse at least once (Abma et al., 2010). In males 15 to 19 years of age, 43% reported having had sexual intercourse at least once. When comparing the sexual intercourse rates prior to, and after, the abstinence program a statistically significant decrease in sexual activity was not found.

If other HPV transmission venues (oral-genital, manual-genital, or genital-genital) had been investigated in Abma et al.'s study (2010), it would have potentially elevated the percentage of 15 to 19 year olds involved in sexual acts that could facilitate HPV transmission to one another (Guttmacher Institute, 2011). More than half of the 15 to 19 year old participants in this national study reported their first sexual encounter occurred when they were under 15 years of age and they also reported having four or more sexual partners to date (Abma et al., 2010). Based on these study findings, the federal government added the teen pregnancy program and a personal responsibility program in 2010 to the existing abstinence-only program in an effort to delay adolescents' first sexual encounter, reduce sexual activity frequency, or reduce the number of sexual partners (Guttmacher Institute, 2011).

School nurses are in a pivotal care delivery position for a majority of children in the US schools, including females between 11 and 12 years of age and the remainder of the adolescent population (Sebelius, 2010). Implementing HPV primary prevention can decrease HPV infections and therefore, cervical cancer prevalence in the future. With the efficacy of the HPV vaccine being nearly 100%, determining school nurses' recommendations and practices regarding the HPV vaccination is imperative (Saslow et al., 2007). Knowledge, attitudes, self-efficacy and intent are theoretical constructs that will measure school nurses ability to engage in HPV disease and vaccine shared decision-making counseling sessions with parents and pre-adolescents. A valid and reliable instrument is needed to measure school nurses' knowledge, attitudes, self-efficacy, and intent to engage in HPV shared decision-making counseling sessions.

## **Diagnosing or Detecting Human Papillomavirus**

In the US, over the last 30 years, the CIN mortality rates have decreased more than 50% within the female population overall (American College of Obstetricians and Gynecologists [ACOG] Committee on Practice Bulletins, 2009). The decrease in CIN is directly related to the development and routine use of the Pap cervical cytology screening test, a secondary prevention strategy (American Cancer Society, 2011b; World Health Organization, 2009). In 2009, ACOG adopted the care standard that sexually active females less than 21 years of age should be counseled and tested for STIs and should not receive a routine Pap test. The incidence of cervical cancer is extremely low in this population while cervical dysplasia, which usually clears, is high. The rationale for this decision was to develop an evidenced-based cervical cancer screening program (Feldman, 2011).

For females between 21 and 29 years of age, ACOG (2009) recommends Pap tests occur every other year. For women greater than 30 years with three consecutive negative Pap screening results repeat Paps are recommended every three years (ACOG, 2009). However, when a woman greater than 21 years of age receives a cytology diagnosis of atypical squamous cells of undetermined significance (ASC-US), the next screening test would be HPV DNA (ACOG, 2009). The HPV DNA test will determine the HPV type of infection. ACOG (2009) recommends that the HPV DNA testing can be used as a primary screening tool for women greater than 30 years but should not be used for younger women due to likelihood the infection will resolve without further intervention being required. The HPV DNA test is used as a follow-up test for females who receive either negative or CIN 1 (mild dysplasia) findings from a colposcopy and who previously were diagnosed with ASC-US (ACOG, 2009). Atypical squamous cells cannot exclude high-grade squamous intraepithelial



lesions (ASC-H), low-grade squamous intraepithelial lesions (LSIL), or atypical glandular cells. The HPV DNA test is also used as a follow-up test for women who have received treatment for CIN 2 or CIN 3 (previously identified as moderate or severe dysplasia or carcinoma in situ) (ACOG, 2009).

Screening techniques for anal dysplasia are: patient risk factor interview, digital rectal examination, anal Pap smear and/or anal high resolution anoscopy (Oon & Winter, 2010). However, unlike cervical cancer, a screening protocol has not been established for anal dysplasia. Furthermore, there is a lack of clinicians trained in anal cytology sampling and high-resolution anoscopy.

### **Human Papillomavirus Vaccine**

In the US there are two HPV vaccines, Gardasil® and Cervarix®. Each has been recommended by the CDC to be administered routinely to females between 11 and 12 years of age (CDC, 2007; FDA, 2010). Both vaccines target HPV-16 and HPV-18, the two HPV types that can cause cervical cancer, vaginal and vulvar cancer precursors, some anogenital warts, and most recently anal cancer (CDC, 2007; FDA, 2010). The Gardasil® vaccine also protects against HPV-6 and HPV-11, the HPV types responsible for causing most genital warts. The CDC recommended “catch up” dosing for females 13 to 26 years of age and it has been FDA approved for girls as young as nine years of age. Because of the risk of anal cancer in both sexes the Advisory Committee on Immunization Practices initially gave permissive recommendation for the use of the quadrivalent HPV vaccine in males (CDC, 2010). More recently, the CDC (2011c) accepted the Advisory Committee on Immunization Practices recommendation to vaccinate all males between the ages of 11 to 12 years of age routinely with the quadrivalent HPV vaccine, Gardasil®. The CDC (2011c) also accepted the

newer Advisory Committee on Immunization Practices recommendation to “catch up” males between 13 and 21 years of age with the same vaccine if they have not already been vaccinated or they had not completed the series. National health agendas and professional organizations support these HPV vaccine recommendations (National Cervical Cancer Coalition, 2012; American Academy of Pediatrics, 2011; National Cancer Institute, 2006; National Association of School Nurses, 2010).

Both vaccines, Gardasil® and Cervarix®, are administered intramuscularly in a series of three injections. The timeframe for the second doses are one (Gardasil®) and two months (Cervarix®) after the first dose, and the third dose for both vaccines is administered six months after the first dose (CDC, 2010a). The two HPV vaccines are included in the Vaccines for Children program (CDC, 2011b). For the uninsured female between 11 and 12 years of age, the vaccines can be obtained from healthcare providers caring for Medicaid-eligible clients. The underinsured preadolescent can receive either of the vaccines from Federally Qualified Health Centers or Rural Health Centers. The consumer purchase cost of the vaccination series is approximately \$130 per injection or \$390 for the series (CDC, 2012).

Gardasil® and Cervarix® are based on the HPV capsid protein L1 (Stanley, Lowy, & Frazer, 2006). When the L1 protein is expressed in a recombinant yeast or recombinant baculovirus, the L1 protein assembles into an empty capsid, or virus-like particle (VLP); these VLP are not infectious and cannot replicate (Stanley et al. 2006; Touzé, Dupuy, Mahé, Sizaret, & Coursaget, 1998). In the case of Gardasil®, the L1 protein for the four VLP HPV types were developed using recombinant yeast methodology, but the two VLP HPV proteins for Cervarix® were developed using the recombinant baculovirus process (Stanley et al.

2006; Touzé et al., 1998). To heighten the immune response, both vaccines use an adjuvant. The adjuvant used by Gardasil® is amorphous aluminum hydroxyphosphate sulfate, and Cervarix® uses aluminum hydroxide plus 3-deacetylated monophosphorylated lipid A (Monk & Herzog, 2008).

When an individual receives either of the two vaccines, the immune system reacts to the VLP HPV proteins and the adjuvant in the vaccine. Both vaccines induce robust T-cell dependent B-cell response, which in turn generates high levels of L1-specific serum antibodies and immune memory (Stanley, 2008). These protein specific B-cells produce antibodies to the L1 protein of each of the types included in the vaccine serum and likely at mucosal surfaces. These antibodies neutralize virus particles and prevent their ability to attach to and/or replicate within host cells. Replication of the virus is necessary to have a persistent HPV infection, which in turn is necessary for cancerous cell development (Mescher, Curtsinger, & Jenkins, 2006). There are two kinds of B-cells – those actively secreting antibodies (these B-cells change into plasma cells and have a finite life span) and those that remain in a residual pool of memory B-lymphocytes that have the capability to later evolve into plasma cells after re-exposure to L1 antigen and thereby to provides a longer immunity (C. J. Harrison, personal communication, March 1, 2012). With repeated exposure to L1 proteins the antibodies produced by the resulting plasma cells have a higher affinity for the L1 antigens present in the vaccines.

Studies have demonstrated both vaccines, Gardasil® and Cervarix®, are highly effective in preventing infections from the targeted HPV types (National Cancer Institute, 2011). Gardasil® has been found to prevent cervical cell changes caused by the specific HPV types for up to 6.4 years post-vaccination among those women who did not present with an

HPV infection at the time of vaccination (Romanowski et al., 2009). The efficacy for the vaccine for incident infection with HPV-16/18 was 95.3%, 95% CI [87.4, 98.7]; for 12-month persistent infection 100%, 95% CI [81.8, 100]; and for CIN2 or higher neoplasms associated with HPV-16/18, 100%, 95% CI [51.3, 100] (Romanowski et al., 2009).

Cervarix® follow-up for HPV types have been reported for 8.4 years of testing (Roteli-Martins et al., 2012). The efficacy for the vaccine for incident infection was 95.1%, 95% CI [84.6, 99.0]; for 12-month persistent infection 100%, 95% CI [56.1, 100]; and for CIN2 or higher neoplasms associated with HPV-16/18, 100%, 95% CI [ $< 0$ , 100] (Roteli-Martins et al., 2012).

Based on data obtained prior to September 2011 from the national vaccine safety surveillance program, Vaccine Adverse Event Reporting (VAERS), there have been approximately 40 million Gardasil® doses distributed while the distributed doses of Cervarix® are reported as low (CDC, 2011d). Of these distributed doses, VAERS has received 20,096 Gardasil® adverse event reports and 52 Cervarix® reports. Eight percent ( $n = 1608$ ) and 2% ( $n = 1$ ), respectively, of the VAERS reports were considered to be serious (CDC, 2011d). The VAERS database is not designed to establish a causal association between vaccines and adverse effects. However, additional investigations into the serious adverse effects reported in the VAERS data by other groups, such as the Clinical Immunization Safety Assessment Network, have determined that the only serious or life threatening adverse effects attributed causally to the HPV vaccines were those of a hypersensitivity or anaphylaxis nature (CDC, 2011d).

When the HPV vaccines were first approved by the FDA and the vaccine recommendations were established by the CDC, parents were concerned about the safety and

efficacy of the vaccines (Gerend et al., 2009; Gottlieb et al., 2009; Hughes et al., 2009; Reiter et al., 2009). The school nurse should share the information gleaned from current research with the female between 11 and 12 years of age and her parents to assist them in the HPV vaccine decision-making process. It is essential that school nurses have a thorough understanding of HPV and the HPV vaccine in order to share the information with parents and females between 11 and 12 years of age.

### **The Problem**

At the time of this study the Advisory Committee on Immunization Practices and the CDC HPV vaccine recommendations varied by gender. The CDC recommended that females between 11 and 12 years of age receive the vaccine while males could receive the vaccine, if desired (CDC, 2007; FDA, 2010). Despite these evidence-based recommendations by the CDC, the receipt of the HPV vaccine among the US female population between 11 and 12 years of age remains suboptimal (Wong et al., 2010). Initiation of the HPV vaccine is higher when parents have received a provider's recommendation to vaccinate (Dempsey et al., 2009; Gerend & Barley, 2009; Gottlieb et al., 2009; Reiter et al., 2009; Rosenthal et al., 2008; Yeganeh et al., 2010), although reports concerning medical providers inconsistently recommend the vaccines to parents of females between 11 and 12 years of age (Daley et al., 2010; Schnatz, Humphrey, & O'Sullivan, 2010). Research investigating the receipt of the HPV vaccine has been conducted primarily targeting parents and physicians (Chao, Slezak, Coleman, & Jacobsen, 2009; Chao, Velicer, Slezak, & Jacobsen, 2009, 2010; Daley et al., 2010; Dempsey et al., 2009; Gerend et al., 2009; Gottlieb et al., 2009; Perkins, Pierre-Joseph, Marquez, Iloka, & Clark, 2010; Reiter et al., 2009; Rosenthal et al., 2008; Yeganeh et al., 2010; Ziarnowski, Brewer, & Weber, 2009). The Secretary of Health and Human Services

identified school nurses, especially for the uninsured child, to be the child's only consistent source of healthcare services (Sebilius, 2010). Only two studies (Kahn et al., 2009; Mays & Zimet, 2004) have measured whether nurses would counsel parents and females between 11 and 12 years of age with regard to facilitating HPV vaccine receipt and school nurses were identified as part of the one study's sample while the other study focused on Pediatric Nurse Practitioners (PNP).

In conclusion, it is known that nurses' knowledge, attitudes, self-efficacy, and intent to perform a specific behavior are associated with behavior change. It is also known that scientific evidence shows that the two available vaccines prevent nearly all persistent HPV infections and CIN (National Cancer Institute, 2011). Moreover, even with three federal programs in place to decrease adolescents' risky sexual behavior, there has not been a significant decrease in sexual behavior (Abma, Martinez, & Copen, 2010). HPV incidence and prevalence remains high. What is not known is how, or if, school nurses adhere to the HPV vaccine recommendations set forth by the FDA, the CDC, the Advisory Committee on Immunization Practices, the World Health Organization, the American Academy of Pediatrics, the ANA and NASN. It is also unknown if school nurses utilize opportunities with females between 11 and 12 years of age to assess and counsel females between 11 and 12 years of age and her parents on the risks and benefits of the HPV vaccine with the intent to increase the vaccine's receipt. Since there is no cure for the HPV disease, receipt of the HPV vaccine is imperative for 11 to 12 year old females to reduce risks for HPV and resulting disease sequela. Currently, receipt of the HPV vaccine is suboptimal in this group and in order to attain Healthy People 2020's goal to have at least 80% of females between the ages of 13 to 15 years complete the human papillomavirus (HPV) vaccine series (Office of Health

Policy, 2010), effective strategies to increase HPV vaccination are essential. A theoretically-based measurement instrument is needed to explore school nurses' knowledge, attitudes, self-efficacy and intent to counsel parents and the female between 11 and 12 years of age on the HPV vaccine, testing of the SDMI-R will meet this need. Once the SDMI-R is in place, this instrument can be used to measure school nurses ability to engage the parents and the 11 to 12 year old female in shared decision-making HPV receipt discussions.

## CHAPTER 3

### PRELIMINARY STUDY

#### **Introduction**

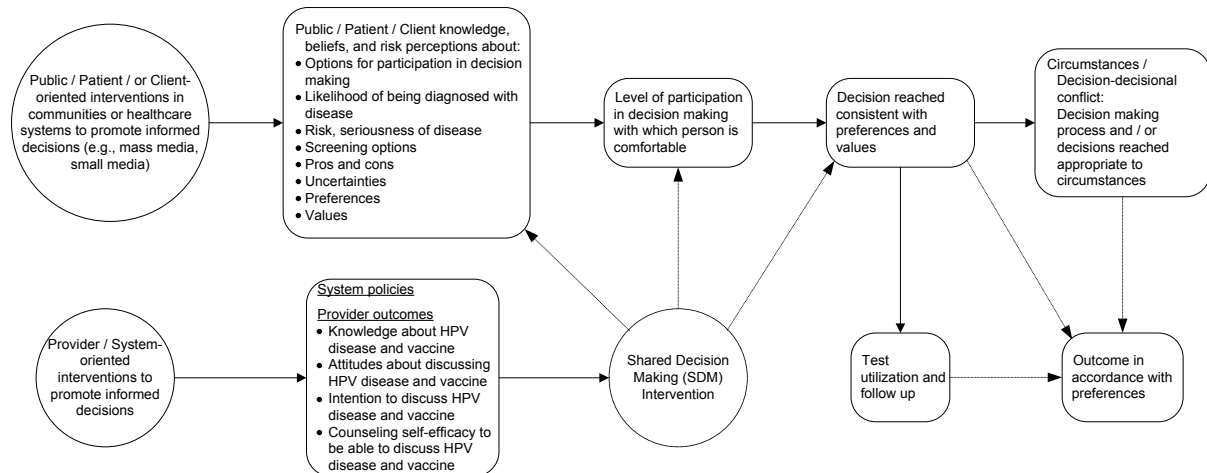
Little is known about school nurses' ability to initiate shared decision-making discussions with parents and females between 11 and 12 years of age related to the human papillomavirus (HPV) vaccine receipt. Measuring shared decision-making would require the development of an instrument. Prior to using an instrument to identify school nurses' shared decision-making barriers and facilitators, normal values for the instrument need to be derived. The Shared Decision-Making Inventory (SDMI) instrument was developed in two phases. The first phase encompassed reviewing the literature to theoretically develop the SDMI and preliminary testing. Utilizing the results of phase one testing, the SDMI was revised to formulate the SDMI-Revised (SDMI-R) in Phase Two. The SDMI and the SDMI-R followed the phases of instrument development delineated by Pett, Lackey, and Sullivan (2003). Phase One includes the Shared Decision-Making framework, item development, instrument format, and preliminary study results.

#### **Shared Decision-Making Framework**

Recognizing that the individual should be the center of decision-making, regulatory and healthcare organizations have recommended clinicians use shared decision-making discussions when relating healthcare options to their client (Centers for Medicare and Medicaid Services, 2008; Institute of Healthcare Improvement, 2011; Institute of Medicine United States [US] Committee on Quality of Health Care in America, 2001; The Joint Commission, 2008). The Shared Decision-Making framework posits that for a healthcare provider to engage in a shared decision-making intervention this action is determined by the



healthcare provider's knowledge, attitude, self-efficacy, and intent. This is the case for a school nurse engaging in a discussion with females between 11 and 12 years of age or their parents regarding the HPV disease and vaccine. The four shared decision-making constructs serve as the framework for the preliminary and dissertation study. Figure 2 illustrates the Shared Decision-Making framework in relation to this study.



*Figure 2.* Informed and Shared Decision-Making Framework as Conceptualized by J. A. Bartlett, for The Development and Psychometric Testing of the Shared Decision-Making Inventory Instrument Study.

## Instrument Development and Preliminary Study

### Item Development

The constructs or variables of knowledge, attitude, self-efficacy, and intent found in the Shared Decision-Making component of the ISDM framework are latent variables. Latent variables are defined as abstract concepts that researchers are unable to directly observe (Pett et al., 2003). With variables that cannot be directly measured other surrogate measures are employed such as an instrument that contains attributes, or items, that study participants identify as a construct attribute and rate accordingly (Pett et al., 2003). The shared decision-making component of the ISDM framework was theoretically and deductively developed and

purposefully did not include inductive, intuitive or biased items. Several questions were adapted from or modeled after sample questions used in other HPV instruments (Beatty, O'Connell, Ashikaga, & Cooper, 2003; Daley et al., 2010; Gerend et al., 2009; Kahn et al., 2009; Ozer et al., 2004). For the items obtained from the literature review, the authors gave consent to use the items from published instruments (Beatty et al., 2003; Daley et al., 2010; Gerend et al., 2009; Kahn et al., 2009; Ozer et al., 2004). The SDMI constructs, items and item origin are found in Appendix A.

Within the realm of methodologic research, there is wide variability in the number of items recommended for instrument development (Pett et al., 2003). The number of acceptable items range from 10 to 15 initial items per subscale or up to 3 to 4 times larger than the final instrument (DeVellis, 1991). Nunnally (1978) recommends that one begins with a smaller number of items and if the coefficient alpha is less than 0.60 additional items would be tested until a coefficient alpha of 0.80 is obtained.

**Knowledge items.** There were twenty knowledge items in the SDMI. Ten of the items measure HPV disease knowledge (DK) and ten measure HPV vaccine knowledge (VK). Of the knowledge items, five DK items (DK3, DK4, DK6, DK7, and DK10) and three VK items (VK4, VK9, VK10) were reverse coded to minimize response set bias. Response set bias occurs when a study participant answers a series of questions in a certain direction regardless of the content (Pett et al., 2003).

***Disease knowledge items.*** The HPV Disease Knowledge items derived from a synthesis of the literature were:

- DK1, HPV is a sexually transmitted infection (STI) (Daley et al., 2010);
- DK2, The primary cause of cervical cancer is HPV (Perkins et al., 2010)

- DK5, The most common STI among adolescents is HPV (Beatty et al., 2003);
- DK7, Pre-teens who have been diagnosed with HPV should not be given the HPV vaccine (Daley et al., 2010);
- DK8, Condoms may reduce the risk of HPV infection (Beatty et al., 2003); and
- DK10, A pregnancy test should be performed prior to giving HPV vaccine (Daley et al., 2010).

Disease knowledge items added based on this researcher's deductive reasoning were:

- DK3, Genital HPV infections tend to be symptomatic;
- DK4, The same HPV genotypes that cause cervical cancer cause genital warts;
- DK6, HPV status, determined by testing, should occur before a HPV vaccine is given; and
- DK9, Risk factors associated with HPV infections include: other STIs, being immunocompromised, and the age at first sexual activity.

***Vaccine knowledge items.*** Within the Vaccine Knowledge domain, these items were derived from the literature (a) VK2, "The HPV vaccines protect against cervical cancer" (Kahn et al., 2009) and (b) VK5, "Even though the HPV vaccine was obtained, Pap tests should be obtained every three years if a female has been sexually active for three years or more, or if they are over 21 years old" (Kahn et al., 2009). With the vaccine receipt being suboptimal, it seems prudent to assess basic knowledge about the vaccine hence the addition of the following items (a) VK1, "The HPV vaccine is recommended for females 11-12 years of age" and (b) VK3, "Both HPV vaccines require a series of three injections to be given over a six-month period."

Based on the literature and deductive reasoning related to the school nurses' scope of practice (ANA, 2010) regarding immunizations, the nurses broad client population (children, parents, and staff), and the two vaccines in the marketplace the following four items were added:

- VK4, Both HPV vaccines protect against genital warts;
- VK6, HPV vaccines only protect against specific HPV genotypes;
- VK7, HPV vaccines are not a HPV treatment; and
- VK8, HPV vaccines are most effective if completed before any sexual activity.

The final two vaccine knowledge items are urban legends that parents have asked clinicians for clarification (E. Carlson, personal communication, April 7, 2011) (a) VK9, "HPV vaccines could cause a female to acquire HPV" and (b)VK10, "HPV vaccines could cause a female to become sterile."

**Attitude items.** The six items within the Attitude (A) construct, were identified in literature but have not been tested in the school nurse population (Gerend et al., 2009; Kahn et al., 2009):

- A1, Vaccinations are an important part of pre-teen's healthcare (Gerend et al., 2009; Kahn et al., 2009);
- A2, The FDA approved the HPV vaccines, they are safe to administer (Gerend et al., 2009);
- A3, If a pre-teen receives the HPV vaccine they are more likely to have sex at an earlier age (Gerend et al., 2009; Kahn et al., 2009);
- A4, It is important to keep pre-teens up-to-date on their vaccinations (Gerend et al., 2009);

- A5, Vaccinating pre-teens against HPV will prevent them from acquiring HPV (Kahn et al., 2009); and
- A6, If pre-teens do not ever receive the HPV vaccine, it is likely that they will acquire the HPV infection someday (Gerend et al., 2009).

**Health counseling self-efficacy items.** Within the realm of health counseling self-efficacy, it is imperative to realize the strengths and limitations of the population of interest (Bandura, 1977; 1997). As the ten self-efficacy items were based within domains and the context of interest, the items were modeled after other self-efficacy instruments related to nurses and health counseling (Borrelli, Lee, & Novak, 2008; Buckelew, Adams, Irwin, Gee, & Ozer, 2008; Ozer et al., 2004). With school nurse to student ratios remaining higher than the recommended 1:750 (American Nurse Association [ANA] & National Association of School Nurses [NASN], 2011), self-efficacy limitations may be due to the nurse's belief they have limited time to perform all the required tasks (Bergren & Monsalve, 2012). Based on this information, SE1, "I can complete an HPV vaccine assessment at each pre-teen encounter" was developed.

Realizing that parents continue to defer the vaccine, school nurses must provide other education modalities to meet the needs of these students (Tryon, Harrison, Neilan, & Bartlett, 2011). The following items were developed to measure school nurses' ability to provide other HPV education modalities (a) SE2, "I can teach the pre-teen and her parents/guardians about behaviors and skills that will reduce their risk for HPV" and (b) SE4, "I can access written materials (i.e. brochure) on how to prevent the HPV disease for parents and pre-teens to review."

With the existence of two different vaccines protecting against two and four HPV genotypes, the school nurse must be able to explain the differences in the vaccines. Therefore item SE3, “I can discuss with the parents/guardians how the two vaccines are interchangeable,” was developed. Additionally, it will be useful for future interventions to determine if the school nurse has initiated looking for written materials related to the vaccine, hence the development of SE5, “I can access written materials (i.e. brochure) about the HPV vaccine for parents and pre-teens to review.”

In order to measure the school nurse’s ability to discuss the HPV disease and vaccine with the parents and females between 11 and 12 years of age using teaching aids, which in turn will provide insights for future interventions, the following items were added:

- SE6, I can provide parents one-on-one education about their pre-teen’s risk of HPV;
- SE7, I can provide parents one-on-one education about their pre-teen’s risk of HPV aided by computer-generated decision aids (such as a video or program);
- SE8, I can provide parent group education about pre-teens’ risk of HPV; and
- SE9, I can provide parent group education about pre-teens’ risk of HPV aided by computer-generated decision aids (such as a video or program).

Item SE10, “I can provide a HPV vaccine report to the pre-teen’s primary care provider” was used to measure whether school nurses were able to collaborate with primary care providers.

**Intention items.** Three intention items were developed from previous literature measuring pediatrician intentions to discuss the HPV vaccine with clients and school and student nurses’ intent to change roles (Chabot, Godin, & Gagnon, 2010; Feemster, Winters, Fiks, Kinsman, & Kahn, 2008; Jones & Cook, 2008). The intent items were:

- I1, I use every encounter with pre-teen females to discuss the HPV vaccine with their parents if they have not begun or completed the series;
- I2, I am able to determine if the pre-teen is in need of the HPV vaccine; and
- I3, I am able to discuss issues of sexuality before administering the HPV vaccine to the pre-teen.

### **Instrument Format**

**Closed-ended items.** Closed-ended items are multiple choice or yes/no questions used to measure knowledge (Instructional Assessment Resources, 2007). The closed-ended items measured participants' knowledge of the HPV disease and vaccine. The *Yes* response was on the left, *No* was in the middle and *Don't know / Not Sure* was on the right. The right answer was coded 5, the wrong answer 0, and the uncertain answer 1. The maximum score was 100 and the minimum score was 0.

**Scaled items.** Scaled items, such as Likert scales, measure opinion, beliefs, and attitudes (Pett et al., 2003). The five-point Likert scaled items measured the participants' attitudes, self-efficacy, and intent related to the disease and vaccine. All the scales started with the positive response on the left and the negative response on the right to decrease participant confusion.

For Likert scaled items as found in the attitude, self-efficacy, and intent constructs, the number of response options in a continuous scale is usually either five or seven (Pett et al., 2003). The five-point response option was chosen to minimize the chaotic attributes of the instrument. An odd number in the responses allowed for a *Neutral* position for the attitudes and intent constructs. The anchors for the attitudes and intent Likert scaled items were *Strongly Agree* to *Strongly Disagree*. In the self-efficacy construct, the responses were

in a step-down pattern from *Extremely Confident* to *Not at all Confident* with the neutral position titled *Confident*. The anchors for the self-efficacy construct were *Extremely Confident* to *Not at all Confident*.

For the *Strongly Agree* and *Extremely Confident* scales a value of five was awarded for these responses, while a value of one was awarded for *Strongly Disagree* or *Not at all Confident*. As provided above, verbiage was used for all the scales and maintained a similarity in response direction to minimize participant confusion (Pett et al., 2003). A maximum score for attitudes, self-efficacy, and intent were 30, 50, and 15, respectively, while the minimum scores for the three constructs were six, ten, and three.

**Reverse scoring.** As previously discussed, reverse scoring was used primarily within the knowledge construct. Reverse scoring was used to mitigate response set bias (Idaszak & Drasgow, 1987). In the Knowledge construct for HPV disease five items (DK3, DK4, DK6, DK7, and DK10) were reverse scored. For the Knowledge construct related to the vaccines items VK4, VK9, and VK10 were reverse scored. Item A3 in the Attitudes construct was reverse scored. The reverse coding occurred during data analysis.

**Face Validity.** Prior to testing the instrument, the Primary Investigator (PI) sought expert review of the SDMI to validate the content. Content validation was obtained from NASN researchers, as well as local infectious disease and adolescent health experts. For this critique, these experts were asked to evaluate how well the SDMI measured the constructs of knowledge, attitudes, self-efficacy, and intent related to the HPV disease and vaccine. Based on the review, minor revisions were made to the SDMI prior to the preliminary study. Furthermore, this researcher's personal experience with abnormal Pap results and treatment interventions assisted in the validation of the SDMI.



**Content validity.** Content validity measures if the instrument has the appropriate amount of sample items measuring the constructs (Polit & Beck, 2012). Because content validity is based on judgment, there is no objective method of ensuring adequate content coverage of an instrument (Polit & Beck, 2012). Content validity in this study occurred following a thorough review of the literature and instrument appraisal by experts from infectious diseases, adolescent healthcare, and school nurses.

### **Preliminary Study**

A preliminary study was designed to identify potential flaws in the study instrument. University of Missouri—Kansas City Social Science Institutional Review Board approval was secured prior to any study activity (see Appendix B), and study consent was implied upon the participants' return of the SDMI to the Primary Investigator. The SDMI consisted of 39 total items that aimed to assess HPV knowledge (20 items with 10 disease knowledge items, and 10 vaccine items), attitude (six items), self-efficacy (ten items), and intent (three items).

**Setting and Sample.** There were 202 attendees at the Mid-America Immunization Conference in June 2011. One hundred and sixty-two (162) attendees received the SDMI packet that included a solicitation letter (see Appendix C) and the SDMI survey (see Appendix D) with 138 attendees providing study data. This response rate, reflects an 85% response rate.

**Knowledge analysis.** Analyses of the total item responses ( $N = 5520$ ) identified 150 (2.7%) missing responses which indicated there were no reported difficulties associated with completing the SDMI.

To place the knowledge items on a 0 to 100 scale, each correct knowledge item was awarded five points to create a standardized knowledge level (Shultz & Whitney, 2005) (see Table 2). The standardized knowledge items within the SDMI were then summed. Descriptive statistics determined the mean knowledge score to be 80.15 ( $SD = 11.63$ ) with a median score of 80. These results reflect adequate knowledge with respect to the HPV disease and vaccine. However, variability does exist within the disease, vaccine and total knowledge sums as evidenced by the standardized deviations of 8.16, 6.04 and 11.43, respectively, indicating potential knowledge intervention areas.

*Table 2*  
Knowledge Descriptive Statistics

	Mean	Standardized Mean to Scale	Median	Standardized Median to Scale	Standardized SD
Disease Knowledge Sum	7.45 <sup>1</sup>	37.24 <sup>2</sup>	8 <sup>1</sup>	40 <sup>2</sup>	8.16
Vaccine Knowledge Sum	8.58 <sup>3</sup>	42.9 <sup>4</sup>	9 <sup>3</sup>	45 <sup>4</sup>	6.04
Total Knowledge Sum	16.03 <sup>5</sup>	80.15 <sup>6</sup>	16 <sup>5</sup>	80 <sup>6</sup>	11.63

*Note: Higher scores denote greater levels of the variable.*

<sup>1</sup>Maximum score = 10. <sup>2</sup>Maximum score = 50. <sup>3</sup>Maximum score = 10. <sup>4</sup>Maximum score = 50.

<sup>5</sup>Maximum score = 20. <sup>6</sup>Maximum score = 100.

The disease knowledge item which assessed HPV as a sexually transmitted infection was correctly identified by 125 (91%) participants with 3 (2%) *Not Correct* responses, 4 (3%) *Unsure* responses and 4% missing responses. Participants ( $n = 125$ , 91%) knew that the primary cause of cervical cancer was HPV though 2 (1%) participants had *Not Correct* responses, 4 (3%) participants had *Unsure* responses with 5% missing responses. Only 45 (33%) participants knew that the same HPV genotypes that cause cervical cancer did not cause genital warts and 72 (52%) participants knew that HPV is the most common sexually transmitted disease among adolescents.

The majority of these participants were able to correctly identify that: HPV vaccines protect against cervical cancer ( $n=128$ , 93%), HPV vaccination requires a series of three injections given over a six-month period ( $n=127$ , 92%), HPV vaccines are not a HPV treatment ( $n=129$ , 93%), HPV vaccinations are most effective if completed before any sexual activity ( $n=128$ , 93%), HPV vaccinations would not cause a female to acquire HPV ( $n=129$ , 93%), and HPV vaccinations would not cause a female to become sterile ( $n=128$ , 93%).

An inter-item correlation table was developed using all knowledge items from the SDMI (see Table 3). This analysis revealed each item correlated at least once with other items. Correlations ranged from 1 to 6. As the participants were not all school nurses, it seems prudent to retain all knowledge items.

Table 3  
*Preliminary Study Correlations of Knowledge Items*

Item Number	DK1	DK2	DK3	DK4	DK5	DK6	DK7	DK8	DK9	DK10	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK8	VK9	VK10
DK1	1	.112	-.045	.018	-.003	-.026	-.111	.025	.178*	-.274**	.066	-.057	.414**	-.062	-.078	.058	-.054	.017	-.017	-.040
DK2		1	-.239**	.001	.000	-.062	-.077	.189*	-.063	-.075	.113	.040	-.004	.029	.074	.124	-.060	.181*	.090	.160
DK3			1	-.066	.138	-.065	-.044	-.115	.094	.123	-.075	-.153	.001	.029	.053	.198*	.093	.001	.118	.070
DK4				1	.137	-.026	.053	.060	-.106	-.033	-.018	.050	-.090	.305**	.026	-.167	.058	-.085	.044	-.074
DK5					1	-.007	.185*	-.010	-.083	-.039	.182*	-.114	-.048	.078	-.043	.187*	-.042	-.045	.133	.083
DK6						1	.444**	-.043	.131	.306**	-.137	.115	-.107	.091	.024	-.141	.037	-.147	-.068	.027
DK7							1	-.037	.043	.026	.087	.026	-.136	.150	.163	-.045	.025	-.022	.169	.245**
DK8								1	.001	-.100	.002	-.099	-.106	.019	.021	.159	.096	.155	.046	.072
DK9									1	.003	.074	.163	.098	.031	.221*	.116	.122	.015	-.030	.059
DK10										1	-.133	.090	-.067	-.128	-.014	-.145	.111	-.146	.080	.083
VK1											1	-.049	-.040	.007	.188*	.203*	-.019	.046	-.036	-.015
VK2												1	.031	-.096	-.076	-.070	.044	-.060	-.018	-.042
VK3													1	-.071	-.070	.107	-.060	.048	-.019	-.045
VK4														1	.147	.035	.054	-.067	.166	.040
VK5															1	.038	-.047	.131	.097	.227*
VK6																1	.126	.316**	.132	-.050
VK7																	1	.061	-.017	-.039
VK8																		1	.170	.311**
VK9																			1	.615**
VK10																			*	1

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

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

**Attitude, self-efficacy, and intent analysis.** Surveys missing greater than two (10%) responses were removed from the data set prior to attitude, self-efficacy, and intent item analyses (Pett et al., 2003), resulting in a study population of 126. For the remaining 126 participants, a calculated mean was inserted for missing data points (Tabachnick & Fidell, 2007). These data were examined to determine the normality of distribution of scores on each variable. Data for all participants were examined and then the data were aggregated by variable. The aggregate variable data are presented in Table 4 with associated skewness and kurtosis data. As seen in Table 4, the variables of intent and self-efficacy were acceptable in terms of skewness (skewness < +/- 2.0) and kurtosis (kurtosis < +/- 2.0) (Field, 2009), the data was slightly kurtotic (kurtosis = 3.29) for attitudes. As this is a preliminary study to identify appropriate items, this researcher determined to include the data in the exploratory factor analysis.

Table 4  
*Means, Standard Deviations, Skewness, and Kurtosis for Assessed Variables (N = 126)*

Variable	Mean	SD	Skewness	Kurtosis
Attitude	12.94 <sup>1</sup>	2.44	.999	3.29
Self-efficacy	26.53 <sup>2</sup>	10.38	.369	-.280
Intent	6.5 <sup>3</sup>	3.03	.555	-.446

*Note: Higher scores denote greater levels of the variable.*

<sup>1</sup>Maximum score = 30. <sup>2</sup>Maximum score = 50. <sup>3</sup>Maximum score = 15.

Data from individual participants were examined to determine if any outliers existed. The attitude score of one participant ( $z = 4.54$ ) was found to be more than three standard deviations from the mean. As the participant's intent and self-efficacy scores were within the acceptable range, this researcher elected to retain the participant in the data analysis.

The knowledge items were excluded from this aspect of the analysis, as only variables on a continuum, such as a Likert scale, are analyzed through and factor analysis

(Pett et al., 2003). With the eigenvalue set at 1.0, the results of the principal component factor analyses identified four factors (see Table 5). While these factors accounted for 68.8% of the variance, the intent items loaded within the self-efficacy construct (see Table 6). This item loading indicates that the self-efficacy and intent items measured the same construct. In further reviewing the items, this researcher determined the intent items measured the construct of self-efficacy. Therefore, the intent items would need to be refined prior to the dissertation study. Intent items should be revised and tested prior to naming any factors (T. Murdock, personal communication, August 26, 2011). The intent items were removed from the remainder of this analysis.

Table 5  
*Preliminary Study Total Variance Explained*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.124	42.759	42.759	8.124	42.759	42.759
2	2.607	13.722	56.481	2.607	13.722	56.481
3	1.266	6.661	63.142	1.266	6.661	63.142
4	1.088	5.725	68.866	1.088	5.725	68.866
5	.817	4.300	73.167			
6	.808	4.255	77.421			
7	.731	3.850	81.271			
8	.632	3.324	84.595			
9	.507	2.670	87.265			
10	.469	2.469	89.734			
11	.432	2.276	92.010			
12	.343	1.804	93.814			
13	.299	1.573	95.387			
14	.222	1.167	96.554			
15	.207	1.090	97.643			
16	.157	.825	98.468			
17	.147	.773	99.242			
18	.086	.453	99.695			
19	.058	.305	100.000			

Extraction Method: Principal Component Analysis.

Table 6  
*Preliminary Study Pattern Matrix<sup>a</sup>*

		Component		
	1	2	3	4
A1		.821		
A2		.722		
A3		-.419	.430	
A4		.604		
A5		.466	.543	
A6		.412	.578	
SE1	.844			
SE2	.852			
SE3	.699			
SE4	.784			
SE5	.769			
SE6	.866			
SE7	.770			
SE8	.791			
SE9	.761			-.406
SE10	.787			
I1	.504	.479		
I2	.842			
I3	.811			

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

The reliability for Attitude and Self-efficacy were determined with Cronbach's alpha. The reliability for the two scales together attained a Cronbach's alpha of .874 with the Attitude sub-scale attaining .701 and the Self-efficacy sub-scale attaining .939. These reliability levels are sufficient for basic research and indicate a strong consistency of response (Carmines & Zeller, 1979). As the aim of the preliminary study was to identify potential flaws in the study instrument, the factors were not rotated nor were the components named. This analysis will occur in Chapters Four and Five.

## **Conclusion**

Based on the preliminary study analysis, the intent items were removed from the SDMI and were replaced with new items prior to the dissertation study. However, it seemed premature to discard any of the knowledge items as the study population were not all school nurses. No changes were made to the attitude and self-efficacy items due to the sufficient reliability levels attained for the combined sub-scales ( $\alpha = .87$ ) and the separate subscales (attitude  $\alpha = .70$  and self-efficacy  $\alpha = .94$ ). With HPV being a sensitive social issue, it was essential to add a social desirability item from the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964). Pett et al. (2003) suggest adding one or two social desirability items that are suitable for the subject matter. Social desirability items ascertain if the study participants are answering questions based on social or personal norms (Crowne & Marlowe, 1964). With these revisions identified and made, the instrument was renamed to the SDMI-Refined instrument (SDMI-R) for the dissertation study.



## CHAPTER 4

### DISSERTATION METHODS

#### **Introduction**

To date, theoretically supported rigorous research evaluating school nurses' ability to enter into a shared decision-making discussion with the parents or the females between 11 and 12 years of age about the human papillomavirus (HPV) disease and vaccine remains is unknown. It is known that the school nurse may be the only healthcare provider females between 11 and 12 years of age see on a regular basis (Sebelius, 2010). Currently, there is no valid and reliable instrument to measure the school nurse's capacity to initiate a shared decision-making discussion (Bartlett & Peterson, 2011).

The aim of the research study was to develop a psychometrically sound instrument capable of measuring the four shared decision-making constructs of knowledge, attitude, self-efficacy, and intent. The preliminary study findings, discussed in Chapter Three, were incorporated to formulate the Shared Decision-Making Instrument-Revised (SDMI-R) instrument. The dissertation study was designed to answer the following research questions: (1) To what extent did the SDMI-R demonstrate internal consistency and reliability?; (2) To what extent were the components of the SDMI-R, created from an integrative synthesis of the literature regarding HPV disease, vaccine characteristics and receipt, demonstrated in exploratory factor analysis (EFA)? and (3) To what extent did the resulting factors demonstrate reliability as independent factors?

This chapter has two sections and follows the phases of instrument development and psychometric analysis for the Shared Decision-Making Inventory-Revised (SDMI-R) instrument (Pett et al., 2003). As item development has previously been discussed in Chapter Three it will not be recounted in this chapter. Therefore the first section of this chapter, will detail how the instrument was refined, along with the instrument format and participant instructions. The second section provides the psychometric analysis plan that includes the study design, the sample and setting, the procedure for data collection, data analysis, and ethical considerations.

## **Instrument Refinement**

### **Item Development**

The SDMI-R consisted of 39 items. The knowledge (K), attitudes (A), and self-efficacy (SE) items remain unchanged from the original instrument. A maximum score for knowledge, attitudes, and self-efficacy, remained unchanged 100, 30, and 50, respectively, while the minimum scores for these three constructs were 0, 6, and 10. Intent and social desirability items were added to the SDMI-R.

**Intent items.** In developing intent questions for the SDMI-R, Ajzen and Fishbein (2005) recommended that researchers prepare items that have the participant look backward in time to identify if a behavior is already part of their role. In addition, the participant should be asked to project into the future to determine if she/he are considering incorporating the action into their work. The following two items were added to the SDMI-R (see Appendix E): Item I1, “In the next 60 days, I intend to regularly encourage the parents of 11-12 year old females to get their daughters vaccinated against HPV,” and I2, “In the last 60 days, I regularly encouraged the parents of 11-12 year old females to get their daughters vaccinated

against HPV.” These two items were adapted from an instrument that measured providers recommending the HPV vaccine to parents (Roberto, Krieger, Katz, Goei, & Jain, 2011). Roberto et al. (2011) reported a significant correlation between intention and behavior,  $r = .70$ , based on a sample size of 406 providers. The anchors for the revised intent items Likert scales remained the same as the SDMI, *Strongly Agree* to *Strongly Disagree*. These items had a maximum score of 10 and a minimum score of two.

**Social desirability item.** A social desirability (SD) item from the Marlowe-Crowne Desirability Scale was added (Crowne & Marlowe, 1964) (see Appedix E). The item SD1, “No matter who I am talking with, I am always a good listener,” was positioned after the intent questions. The Likert scale, for this item, was the same used for the revised intent items. This item had a maximum score of five and a minimum score of one.

### **Instrument Format**

The instrument was not available to the study participants until the University of Missouri—Kansas City (UMKC) Social Sciences Institutional Review Board (SSIRB) approval was secured (see Appendix F). The SDMI-R instrument was distributed via an electronic web-based tool, SurveyMonkey™. SurveyMonkey™ was chosen due to the availability of services such as progress bar, stop-and-return, anonymous data collection, secure servers, ease of data downloading, and because participants were able to access the survey once (SurveyMonkey, 2011). The SDMI-R was hosted under the Survey Monkey membership of the Children’s Mercy Hospitals and Clinics Patient Care Services Research Department (see Appendix G). The SDMI-R was displayed in Arial 12 point font on the webpage based on recommendations from Pett et al. (2003) to maximize instrument readability.

## **Participant Instructions**

The participant instructions had two goals (a) to give the subjects directions for using the instrument and (b) to provide the same point of reference for all the subjects (Pett et al., 2003). The potential study participants provided their e-mail addresses to the NASN and self-identified school genre (elementary, middle or high school) in which they worked.

Instructions on how to participate in the study were shared in an e-mail to the potential participants (Appendix H) and reiterated in subsequent reminder e-mails (Appendix I).

## **Psychometric Analysis Plan**

This section includes the study design, the sample and setting, the procedure for data collection, data analysis, and ethical considerations. The purpose of this study was to develop, evaluate, and test psychometric properties of a new instrument, the Shared Decision-Making Inventory-Revised (SDMI-R). Described within the sample and setting section are the participants, sample size, and setting. The procedure for data collection includes the instrument and the demographic data to be collected. The data analysis section includes tests for reliability and validity. The ethical considerations section discusses the protection of human participants and SSIRB approval.

## **Design of the study**

This study used a psychometric instrument development design. The results obtained from this study will be used to determine the validity and reliability of the SDMI-R. This process of measurement occurs when the researcher defines the abstract concept through instrument items and the participants quantify their behavior related to the items (Carmines & Zeller, 1979). Validity is described as the degree to which the items within the instrument measure the construct (Polit & Beck, 2012). Methods for determining validity within this

study were face validity, content validity, and construct validity. Reliability is the degree to which the instrument consistently measures an attribute (Polit & Beck, 2012). The statistical method used to determine instrument reliability was the Cronbach alpha (Polit & Beck, 2012). Exploratory factor analysis was used to determine if participant responses support the theoretical framework used to develop the SDMI-R (Pett et al., 2003).

### **Sample and Setting**

The population of interest was all school nurses who were members of National Association of School Nurses (NASN). As this research focused on the capacity of school nurses caring for females between 11 and 12 years of age, the sample was narrowed to NASN members who self-identified their practice site to be elementary and middle schools (see letter of support in Appendix J). NASN is a national nursing organization established in 1979 (NASN, 2010). The membership of NASN (2010) includes public school nurses, private school nurses, and nurses in other school health services. Approximately 25% of the school nurses in the United States (US) are members of NASN (2010).

NASN provided the e-mail addresses of 10,421 elementary and middle school nurse members that were electronically solicited for this study. Within the last four years, three studies reported using the NASN elementary or middle school nurses mailing list and reported a return rate on paper and pen surveys between 31 and 80% (Adams, 2009; Hendershot, Dake, Price, & Lartey, 2006; Kubik, Story, & Davey, 2007) and one electronic survey with a 42% return rate (Hendershot, Telljohann, Price, Dake, & Mosca, 2008). The most recent published NASN electronic survey response rate was 21% (Bergren & Monsalve, 2012).

Statisticians debate the appropriate sample size needed for factor analysis. The range of sample sizes found in the literature was between 10 to 15 participants per item (Pett et al., 2003), or at least 300 participants (Tabachnick & Fidell, 2007). Another source recommends between 500 to more than 1000 total participants (Comrey & Lee, 1992). Using the sample size of 10,421 elementary and middle school nurses and a response rate of 20%, a sample size of 2084 would exceed the largest sample size identified for instrument development.

The sample of school nurses was solicited by an e-mail (see Appendix H), and the survey was administered via SurveyMonkey™. Inclusion criteria consisted of school nurses living in the US reporting they work in an elementary or middle school environment with students that are female between 11 and 12 years of age. The nurses must be NASN members with a valid e-mail address and able to read English. Participants could choose not to take the survey or elect to stop taking the survey at any time. This information was provided in the initial e-mail (see Appendix H) to the potential participant and the informed consent screen of SurveyMonkey™.

### **Data Collection Procedure**

**Group permission.** The Primary Investigator approached Dr. M. Bergren, Director of Research for NASN, and sought permission to purchase e-mail addresses for the NASN members that meet the study's inclusion criteria. A formal letter of permission to solicit the study participants was obtained (see Appendix J) and was included in the UMKC SSIRB study proposal. Data collection commenced after UMKC SSIRB approval was secured.

**Procedure.** Upon receipt of the UMKC SSIRB approval, the investigator adhered to the recruitment protocol found in Appendix K. Surveys received up until one month after the last reminder was sent were included in the analysis.

## **Instruments**

**SDMI-R.** The SDMI-R (see Appendix L) was linked within the text of the solicitation e-mail. The instrument's reverse coding occurred after the data was exported into SPSS.

**Demographic data collection tool.** As the primary focus of this study was to develop a valid and reliable tool, the demographic characteristics of the participants were placed at the end of the study. The demographic data included age, gender, the questions "Have you initiated/completed the HPV vaccine series?," "Have you been diagnosed with an abnormal Pap?," and "Have any of your relatives, or friends, been diagnosed with an abnormal Pap?," employment status, state of employment, education level, years worked as a Registered Nurse (RN), Licensed Practical Nurse (LPN), Advanced Practice Nurse (APRN), years worked as school nurse, school location (Urban/Suburban or Rural) as defined by the United States Census Bureau (2010), and school district size (Small < 999; Medium 1,000-4,000; Very large, > 4,000).

Age was collected to compare to the general population of school nurses. Instead of asking the participant to report his/her current age, age was divided into generational age groups so participants could check a box. Gender, school location, and school district size was also collected. The demographic data was used to describe the study participants.

## **Data Analyses Plan**

### **Internal Consistency and Reliability**

Instruments that examine behavior are prone to measurement error therefore, if an instrument is reported to be reliable, random error has been minimized (Pett et al., 2003). Internal consistency, reliability, and temporal stability measure the dependability of the instrument (Pett et al., 2003). Due to the logistic considerations, temporal stability testing was not considered for the SDMI-R as the instrument would need to be administered to the same group within a one to two week period (Nunnally, 1978).

**Internal consistency.** With internal consistency, the inter-item correlation matrix identifies items that do not correlate, or items with multiple correlations, as they may be considered for deletion (Pett et al., 2003). The range for inter-item correlations is between -1.0 to +1.0. The Pearson  $r$  has a range of weak (0.00-0.08), low (0.09-0.24), moderate (0.25-0.48), strong (0.49-0.80), and very strong ( $> 0.81$ ) (Nunnally, 1978).

**Reliability.** Reliability measures how well the instrument items measure the constructs found within the instrument (Nunnally, 1978). Reliability of an instrument can be measured by either the split-half technique or the Cronbach alpha (Pett et al., 2003). Due to inherent drawbacks to the split-half technique, Cronbach alpha was used to measure the SDMI's internal consistency in this study (Pett et al., 2003). Cronbach alpha represents the proportion of total variance attributed to the true score (Pett et al., 2003). A Cronbach alpha greater than 0.80 reflects a high reliability and an alpha greater than 0.95 is indicative of item redundancy, in which case the researcher may want to decrease the items measuring the construct (Nunnally, 1978). A Cronbach alpha for the Likert scaled constructs (attitudes, self-efficacy, and intent) as a whole, were measured along with analyzing the reliability of each



construct separately. Pedhazur and Schmelkin (1991) indicate that the Cronbach alpha for new instruments vary widely and can be as low as 0.50. However, the most cited alpha for all instruments is 0.70 (Pett et al., 2003). It was expected that the overall reliability of the SDMI-R will be lower than the separate constructs as each construct will be used to measure one concept in its entirety (Pett et al., 2003).

### **Validity**

Validity is defined as how well the instrument measures what it purports to measure (Pett et al., 2003). Validity is not a property of a study design or method, rather it is how well the inferences drawn from the study are true (Shadish, Cook, & Campbell, 2001). The types of validity examined for the SDMI-R were face validity, content validity, and construct validity.

**Face validity.** Face validity occurs when the instrument's items are read and appear to measure the constructs of choice instead of a similar construct (Polit & Beck, 2012). As members of the NASN research committee, adolescent nurse clinicians and medical practitioners analyzed the SDMI and 36 of the items were repeated in the SDMI-R face validity was not sought again from this group. The dissertation committee members provided face validity for the SDMI-R that included the three new items (two intent and one social desirability).

**Content validity.** Content validity measures if the instrument has the appropriate amount of sample items measuring the constructs (Polit & Beck, 2012). As content validity is based on judgment and "there are no completely objective methods of ensuring the adequate content coverage of an instrument" (Polit & Beck, 2012, p. 459). Content validity occurred with a thorough review of the literature. The content validity can be assumed as experts from

the field of infectious diseases, adolescent healthcare, and school nurses were asked to review and strengthen the instrument.

**Construct validity.** Construct validity refers to whether a scale or test measures the constructs adequately (Polit & Beck, 2012). The review of the literature analyzed the essence of the constructs measured in the instrument. Exploratory factor analysis will examine the construct relationships within the tool and also between the items within each construct.

**Exploratory Factor Analysis.** Exploratory factor analysis (EFA) was used to examine the latent factor structure of the SDMI-R. The purpose of EFA is to establish meaningful factors underlying the SDMI-R with the following criteria established to identify the initial factor structure (a) items with a factor loading  $\geq .40$  and (b) factors that have a minimum of two to three items loaded on it (Williams, Onsman, & Brown, 2010). To discriminate items loading on more than one factor, varimax and direct oblimin rotation were used to identify the most interpretable factors for the items. Factors meeting the criterion of an eigenvalue greater than 1.00 were named (Field, 2009). Total explained variance was reported. The reliability of the survey was computed with Cronbach's alpha. To determine the strength of correlation, or the internal consistency of the items, Nunnally (1978) criteria of an alpha greater than or equal to 0.7 was applied. The coefficient alphas for the different scale computations were plotted against scale size to determine if the additions of the items net a higher coefficient alpha (Pett et al, 2003). When the plotted scree-line appeared to flatten, the remaining factors were not named.

### **Statistical Analyses**

**Data preparation.** All data from the SDMI-R was exported from Survey Monkey™ into the Statistical Package for the Social Sciences (SPSS), Windows Version 19.0 (SPSS,

Chicago, IL, US) for analyses. Prior to performing any statistical analyses, the negatively worded items of the SDMI-R were re-coded. This means, that for the knowledge items (DK3, DK4, DK6, DK7, DK10, VK14, VK19, VK20) *Yes* was coded as 5 and *No* was coded as 0. Item A23 was re-coded as: *Strongly Agree* = 1, *Agree* = 2, *Disagree* = 4 and *Strongly Disagree* = 5. For Likert scaled items, participants with greater than 10% missing responses were deleted from the data set (Pett et al., 2003). Additionally, a score that best represented the mid-range response was considered for items that had less than 10% missing data (Pett et al., 2003). All relevant variables were screened for normality.

Descriptive statistics of study variables were used to compute systematic missing data, outliers, and distinct data skewness and kurtosis (Warner, 2008). Descriptive statistics were performed to describe the sample population. The constructs of interest for this study were knowledge, attitudes, self-efficacy, and intent for the school nurse to discuss with the parents of a female between 11 and 12 years of age in a discussion about the HPV disease and vaccine receipt.

**Research Question 1.** The first research question was: To what extent did the SDMI-R demonstrate internal consistency and reliability? Subscale internal consistency and reliability values were analyzed differently for the closed-ended and Likert scaled constructs. Knowledge items (*Yes, No, Don't know/Not sure*) responses underwent measures of central tendency and correlational techniques. Internal consistency and reliability for the three remaining constructs (attitude, self-efficacy, and intent) were determined by developing a correlational matrix, and establishing Cronbach's alpha for the combined subscales, and each separate subscale.

Responses on the knowledge items were summed. Measures of central tendency, were used to determine the range of knowledge for the study participants (Warner, 2008). An inter-item correlation was performed to identify trends among responses. This allows the researcher to develop theme-focused interventions which include all of the necessary information surrounding a particular knowledge deficit. The inter-item correlation matrix was also used to identify items that do not correlate, or items with multiple correlations, as they may be considered for deletion (Pett et al., 2003).

The social desirability item, SD1, was analyzed with the attitude, self-efficacy, and intent items. The alpha coefficient, or Cronbach alpha, was measured to determine if the answered items reflected the study participants' personal norms or a socially correct answer (Pett et al., 2003). If the study participants' answered the remaining construct items truthfully the construct item alphas would remain stable or increase when the social desirability item was removed. If the Cronbach's alpha remains stable or increases with the removal of the social desirability item, the analysis would continue with this item removed from the data set (Nunnally, 1978). If the Cronbach's alpha fell dramatically it would indicate the study findings are based on social norms which would bias the methodologic results and the remainder of the analysis would not occur (Pett et al., 2003).

For the remaining constructs (attitude, self-efficacy, and intent) reliability was measured using the alpha coefficient, or Cronbach alpha, to determine how well multiple items fit together (Pett et al., 2003). The Cronbach alpha was calculated for the SDMI-R items measuring Attitude, Self-efficacy, and Intent as a whole and the three discrete subscales. For an instrument or a subscale to be internally consistent higher Cronbach Alpha values, usually greater than 0.70, indicate greater reliability (Nunnally, 1978).

**Research Question 2.** The second research question was: To what extent were the components of the SDMI-R, created from an integrative synthesis of the literature regarding HPV disease, vaccine characteristics and receipt, demonstrated in exploratory factor analysis (EFA)? EFA is the most common form of factor analysis used in healthcare research when the researcher is uncertain how many factors explain the interrelationships among a set of items (Pett et al., 2003). The tests prior to EFA included the evaluation of the correlation matrix, Bartlett's Test of Sphericity, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Pett et al., 2003). The Pearson  $r$  correlation was computed to identify redundancy between items. The Pearson  $r$  has a range of weak (0.00-0.08), low (0.09-0.24), moderate (0.25-0.48), strong (0.49-0.80), and very strong ( $> 0.81$ ) (Pett et al., 2003). A very strong relationship indicates potential redundancy between items (Pett et al., 2003).

Principal component analysis (PCA) was completed on the constructs of Attitude, Self-efficacy, and Intent items. In order to determine the truest factor representation, PCA without rotation was executed followed by PCA with varimax rotation, then PCA with direct oblimin rotation were performed. Factors meeting the criterion of an eigenvalue greater than 1.00 were named to establish the percentage of explained variance in the instrument (Field, 2009). Factor loading  $\geq .40$  was considered acceptable (Pett et al., 2003).

**Research Question 3.** The third research question was: To what extent did the resulting factors demonstrate reliability to stand as independent factors? Reliability testing was conducted on each of the resulting factors, and the final instrument. Each factor with a Cronbach's alpha of  $> .70$  was adequate to stand as an independent scale.

## **Ethical Considerations**

Formal letters of permission were obtained from (a) NASN to solicit the school nurse population and (b) the Co-Chief Operating Officer to use the Patient Care Services Research Department's SurveyMonkey™ program. The dissertation proposal was approved by the dissertation committee and SSIRB was attained prior to initiating the research study. To maintain confidentiality, data from electronic surveys were anonymous and reported in aggregate form only. Electronic data were stored on the researcher's secure, password-protected personal folder at UMKC. Instrument completion served as implied consent for study participation.

## CHAPTER 5

### RESULTS

#### **Introduction**

The purpose of this study was to develop, evaluate, and test the psychometric properties of a new instrument, the Shared Decision-Making Inventory-Revised (SDMI-R) (Appendix L). The SDMI-R was designed by the principal investigator to measure school nurses knowledge, attitudes, self-efficacy, and intent to discuss the HPV disease and vaccine with parents and females between 11 and 12 years of age. Psychometric analysis of the SDMI-R, including factor structure and alpha coefficient, followed data collection. Results of this research are presented in this chapter as follows: (a) demographic description of the study population, (b) data assumption validation description, (c) the knowledge, as self-described by the study population will be discussed, (d) the reliability estimates of the SDMI-R, and each theoretically-derived sub-scale of the SDMI-R were determined, (e) the results of the exploratory factor analysis (EFA) of the SDMI-R were reported, which answers study question one, and (f) compare items on the SDMI-R, using the correlational matrix and data tests (Bartlett's Test of Sphericity, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy), which were used to answer study question two and three. Finally, these results are summarized to provide a description of the ability of the SDMI-R to be used to develop intervention(s), specific to the school nurse, aimed at guiding clinical decision-making surrounding the applicability of HPV vaccine among females between 11 and 12 years of age.

### **Demographic Description of the Sample**

Potential participants for this study were selected from the National Association of School Nurses (NASN) database of members who provided their e-mail address to the Association. Of the 10,416 e-mail invitations which contained a link to the SDMI-R survey, 507 emails were removed due to incorrect e-mail addresses and 71 e-mails were deleted from the distribution lists due to recipient or school district requests. Forty-two individual recipients requested their names be deleted from the distribution list citing she/he did not want to participate in the study and the participant's e-mail address was removed without further contact between the participant and this researcher. Two school districts (Omaha, NE & Hillsborough County, FL) requested 29 e-mail addresses ending in either ops.org and sdhc.k12.fl.us, respectively, be removed from the mailing list. The e-mail invitation to participate in the study was sent to 9,838 participants with 2,199 survey responses (22.4% response). Of the 2,199 returned surveys, 1,832 responded yes to the screening question "Are there females between 11 to 12 years of age in the school in which you work?" Of the 1,832 positive respondents, 307 participants did not answer four or more of the questions, or greater than 10% of the study items, and were removed from statistical analyses resulting in 1,525 study participants (Pett et al., 2003). Forty-nine of the remaining study participants did not complete the demographic portion of the survey and they were included in the statistical analyses as the primary aim of this research project was to test the psychometric properties of the SDMI-R instrument.

Demographically, data were collected on a variety of variables including gender, generational age group, number of years as a nurse and as a school nurse, employment status, school type, educational level, number of schools served, location of school, and the number



of students to whom they are assigned. These data were analyzed to portray the study participants. As is typical of the nursing profession, the participants were primarily female ( $n = 1464$ , 96%). A majority ( $n = 1009$ , 66.2%) of the participants were born between 1946 and 1964, while the remainder of the birth dates fell between 1965 and 1979 ( $n = 387$ , 25.4%), 1980 and 1990 ( $n = 57$ , 3.7%), 1909 and 1945 ( $n = 18$ , 1.2%), and 5 (0.3%) participants were born after 1991.

Over half of the population reported being in the nursing profession between 31 and 40 ( $n = 526$ , 34.3%) or 21 and 30 years ( $n = 392$ , 25.7%) and have worked as a school nurse between 0 and 10 years ( $n = 793$ , 52%) and 11 and 20 years ( $n = 505$ , 33.2%). Principally the participants worked full time ( $n = 1329$ , 87.1%) in a public school ( $n = 1327$ , 87%), as a school nurse with a bachelor's degree ( $n = 806$ , 52.9%), were responsible for either one ( $n = 686$ , 45%) or two schools ( $n = 234$ , 15.3%) in either an urban area ( $n = 613$ , 40.2%) or an urban cluster ( $n = 554$ , 36.3%), and were responsible for between 1,000-9,999 ( $n = 580$ , 38%), 10,000-99,999 ( $n = 421$ , 27.6%) or 100-999 ( $n = 385$ , 25%) students (see Table 7).

Biennially, the NASN invites their membership to complete a survey to self-identify demographic and professional issues related to school nursing (Bergren & Monsalve, 2012). The NASN analyzes the data to obtain demographic trends and determine strategic initiatives for the organization. The NASN survey was last completed in March 2011. The demographic results as they apply to the SDMI-R demographics are reported in Table 7.

Table 7  
Participant Demographics

	Sample (%)	NASN Membership Survey* Sample (%)
	1,525 (15.5)	3,138 (21)
Gender		
Male	12 (1)	14 (1)
Female	1464 (96)	3124 (99)
Missing	49 (3)	
Birth year range		
1964-1909 (47 to 102 years old)	1027 (67)	1977 (63) <sup>T</sup>
1979-1965 (32 to 46 years old)	387 (25)	815 (26) <sup>T</sup>
1990-1980 (21-31 years old)	57 (4)	314 (10) <sup>T</sup>
After 1991 (less than 20 years old)	5 (1)	63 (2) <sup>T</sup>
Missing	49 (3)	
Employment Status		
As needed	8 (1)	Not reported
Part Time	139 (9)	
Full Time	1329 (87)	
Missing	49 (3)	
Education		
LPN	27 (2)	
ADN / Diploma	207 (14)	408 (13)
Bachelor (BS, BA, BSN)	806 (53)	1632 (52)
Advanced Degree (Nurse Practitioner, Masters, Clinical Nurse Special, Doctorate)	410 (26)	973 (31)
Other	26 (2)	
Missing	49 (3)	126 (4)
Years		
0-10		
As a nurse	160 (10) <sup>¥</sup>	251 (8)
As a school nurse	793 (52) <sup>¥</sup>	1475 (47)
11-20		
As a nurse	296 (19) <sup>¥</sup>	722 (23)
As a school nurse	506 (33) <sup>¥</sup>	1192 (38)
21-30		
As a nurse	392 (26) <sup>¥</sup>	1004 (32)
As a school nurse	149 (10) <sup>¥</sup>	408 (13)
31+ years		
As a nurse	628 (41) <sup>¥</sup>	1161 (37)
As a school nurse	23 (2) <sup>¥</sup>	1161 (37)
Missing		
As a nurse	49 (3) <sup>¥</sup>	5 (<1)
As a school nurse	54 (4) <sup>¥</sup>	101 (3.2)

	Sample (%)	NASN Membership Survey* Sample (%)
School Description		
Department of Defense	3 (1) <sup>¥</sup>	
Charter, Parochial, Private	138 (8) <sup>¥</sup>	188 (6)
Public	1327 (87) <sup>¥</sup>	2532 (81)
Other	8 (1) <sup>¥</sup>	
Missing	49 (3) <sup>¥</sup>	408 (13)
Responsible for		
Other (Special Education, Substitute Nurse)	30 (2) <sup>¥</sup>	Not reported in same way
1 school	686 (45) <sup>¥</sup>	
2 schools	234 (15) <sup>¥</sup>	
3 schools	156 (10) <sup>¥</sup>	
4 schools	109 (7) <sup>¥</sup>	
Greater than 5 schools	211 (14) <sup>¥</sup>	
Administrative	50 (3) <sup>¥</sup>	
Missing	49 (3) <sup>¥</sup>	
Location of school		
Rural	309 (20) <sup>¥</sup>	Not reported in same way
Urban cluster (2,500-49,999)	554 (36) <sup>¥</sup>	
Urban area (Greater than 50,000)	613 (40) <sup>¥</sup>	
Missing	49 (3) <sup>¥</sup>	
Student Lives Responsible For:		
1-99	6 (1) <sup>¥</sup>	Not reported in same way
100-999	385 (25) <sup>¥</sup>	
1,000-9,999	580 (38) <sup>¥</sup>	
10,000-99,999	421 (28) <sup>¥</sup>	
>100,000	84 (6) <sup>¥</sup>	
Missing	49 (3) <sup>¥</sup>	

\*(Bergren & Monsalve, 2012)

<sup>T</sup>Due to percentage rounding participants do not equal 3138.

<sup>¥</sup>Due to rounding percentages do not equal 100%

In comparing the demographic responses of the participants of this study to the NASN membership description (Bergren & Monsalve, 2012), the study population mirrors the NASN survey participants. Thus, it may be assumed that there was homogeneity between the participants of this study to the NASN membership description. While generalizability of

these results cannot be assured, this homogeneity does provide a level of validity for the SDMI-R (Engel & Schutt, 2005).

### **Shared Decision Making Inventory-Revised Item Characteristics**

The data were examined to determine the normality of distribution of scores on each of the variables. The data for all participants were examined and then the data was aggregated by variable. The aggregate variable data are presented in Table 8 with associated skewness and kurtosis data. With large sample sizes, small changes in the data can cause data to move outside of the accepted skew ( $> 2$ ) and kurtosis ( $> 7$ ) (Fabrigar, Wegener, MacCallum, & Strahan, 1999). All variables had an acceptable skewness and kurtosis for EFA.

Table 8

*Means, Standard Deviations, Skewness, and Kurtosis for Assessed Variables (N = 1,525)*

Variable	Mean	SD	Skewness	Kurtosis
Knowledge	75.03	12.03	-1.488	4.23
Attitude	9.56 <sup>2</sup>	3.17	1.857	5.143
Self-efficacy	32.95 <sup>3</sup>	9.35	-.327	-.438
Intent	5.47 <sup>4</sup>	2.41	-.181	-.907

*Note: Higher scores denote greater levels of the variable.*

<sup>1</sup>Maximum score = 100. <sup>2</sup>Maximum score = 30. <sup>3</sup>Maximum score = 50. <sup>4</sup>Maximum score = 10.

### **Knowledge Variable**

The SDMI-R (see Appendix L) contains 20 knowledge items. The first 10 items (DK1-DK10), assess knowledge related to the HPV disease, and the remaining 10 items (VK1-VK10), assess knowledge related to the HPV vaccine. Each participant was asked to describe their knowledge regarding each individual item using the responses of *Don't know / Not sure*, *No*, and *Yes*. Prior to analysis reverse coded items (DK3, DK4, DK6, DK7, DK10, VK4, VK9, and VK10) were recoded. The responses were then coded from *Don't know / Not*

*Sure to Uncertain, No to Incorrect Answer, and Yes to Correct Answer.* Based on a five-point correct scale, when summed potential knowledge scores within the SDMI-R could range from 0 (lowest) to 100 (highest). Responses for the 20 knowledge items within the SDMI-R reflect a mean score of 75, a median score of 75, with a standard deviation of 12.03. Out of a possible 50 points for each knowledge subscale, the Disease Knowledge subscale mean was 34.01 ( $SD = 8.16$ ) with a median of 35 and the Vaccine Knowledge subscale mean was 41.02 ( $SD = 6.5$ ) with a median of 40. When the two subscales were combined the mean was 75 ( $SD = 12.03$ ) with a median of 75. Table 9 reflects the participants' answers to the knowledge items.

Table 9

*Knowledge Items with Uncertain, Incorrect, and Correct Answers (N = 1,525)*

Item Number	Uncertain (%)	Incorrect Answer (%)	Correct Answer (%)
Disease Knowledge	9 (.6)	24 (1.6)	1492 (97.8)*
(DK) 1			
DK2	95 (6.2)	96 (6.3)	1334 (87.5)*
DK3	89 (5.8)	177 (11.6)	1259 (82.6)*
DK4	249 (16.3)	1053 (69.0)#	223 (14.6)
DK5	370 (24.3)#	357 (23.4)#	798 (52.3)
DK6	278 (18.2)	231 (15.1)	1016 (66.6)
DK7	573 (37.6)#	235 (15.4)	717 (47)
DK8	49 (3.2)	101 (6.6)	1375 (90.2)*
DK9	119 (7.8)	87 (5.7)	1319 (86.5)*
DK10	403 (26.4)#	283 (18.6)	839 (55)
Vaccine Knowledge	26 (1.7)	73 (4.8)	1426 (93.5)*
(VK) 1			
VK2	27 (1.8)	162 (10.6)	1336 (87.6)*
VK3	179 (11.7)	148 (9.7)	1198 (78.6)
VK4	349 (22.9)#	820 (53.8)#	356 (23.3)
VK5	85 (5.6)	200 (13.1)	1240 (81.3)*
VK6	195 (12.8)	37 (2.4)	1293 (84.8)*
VK7	30 (2.0)	24 (1.6)	1471 (96.5)*
VK8	69 (4.5)	58 (3.8)	1398 (91.7)*
VK9	86 (5.6)	13 (.9)	1426 (93.5)*
VK10	136 (8.9)	21 (1.4)	1368 (89.7)*

\* denotes greater than 80% of the study participants answered the question correctly

# denotes greater than 20% of the study participants answered the question with uncertainty or incorrectly

**Disease knowledge items.** The participants answered five of the ten disease knowledge items (DK1, DK 2, DK 3, DK 8, DK 9) with greater than 80% accuracy. Items DK6, DK10, DK5 and DK7 were answered correctly 66.6, 55%, 52.3%, and 47% of the time, respectively. Of note, for these same items the participants answering “uncertain” ranged between 18.2% and 37.6%. Item DK4, the same HPV genotypes that cause cervical cancer cause genital warts, was answered incorrectly by 69% of the participants and 16.3% were uncertain about the correct answer.

**Vaccine knowledge items.** A majority of the VK items (VK1, VK2, VK5, VK6, VK7, VK8, VK9, VK10) were answered with greater than 80% of the accuracy. VK3 was answered with 78.6% accuracy. VK4, both HPV vaccines protect against genital warts, was answered incorrectly by 53.8% while 22.9% of these participants were uncertain about the correct answer.

Data related to the knowledge items indicate that school nurses are knowledgeable about the disease and the vaccine. There are some knowledge areas that could be improved upon particularly related to genital warts and the differences between the two vaccines. The next data analysis step related to the knowledge items will identify item redundancy.

**Statistical analyses of knowledge items.** An inter-item correlation grid (see Table 10) was developed using all knowledge items from the SDMI-R. This analysis revealed each item correlated with at least 12 of the other items. There were a total of 108 weak correlations (range 0.00-0.08), 196 low correlations (range 0.09-0.24), seven moderate correlations (0.25-0.48), two strong correlations (0.49-0.80), and there were no very strong correlations ( $> .81$ ). Item VK10 had a significant correlation with all items reflecting item redundancy and indicates this item could be removed from future instruments.

Table 10

*Correlations of Knowledge Items*

Item Number	DK1	DK2	DK3	DK4	DK5	DK6	DK7	DK8	DK9	DK10	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK8	VK9	VK10
DK1	1																			
DK2	.045	1																		
DK3	.094**	.097**	1																	
DK4	.026	.112**	.115**	1																
DK5	.064*	.104**	.104**	.099**	1															
DK6	.082**	.077**	.169**	.121**	.073**	1														
DK7	.033	.135**	.127**	.233**	.192**	.365**	1													
DK8	.162**	.017	.082**	.038	.041	.086**	.056*	1												
DK9	.170**	.075**	.071**	.082**	.099**	.065*	.092**	.078**	1											
DK10	.059*	.062*	.125**	.107**	.053*	.383**	.251**	.005	.066*	1										
VK1	.056*	.123**	.065*	.028	.074**	.108**	.021	.055*	.134**	.108**	1									
VK2	.051*	.140**	.002	.096**	.053*	.033	.060*	.031	.108**	.110**	.112**	1								
VK3	.030	.063*	.025	.063*	.060*	.063*	.111**	.009	.041	.133**	.040	.082**	1							
VK4	.050	.083**	.079**	.259**	.157**	.100**	.214**	.041	.060*	.121**	.051*	.010	.142**	1						
VK5	.042	.031	.084**	.071**	.062*	.083**	.041	.045	.117**	.038	.127**	.078**	.084**	.044	1					
VK6	.085**	.075**	.110**	.169**	.059*	.139**	.234**	.065*	.094**	.110**	.091**	.109**	.163**	.171**	.040	1				
VK7	.052*	.013	.086**	.037	.028	.088**	.066**	.077**	.084**	.068**	.086**	.072**	.087**	.091**	.118**	.175**	1			
VK8	.108**	.081**	.100**	.096**	.095**	.121**	.092**	.026	.134**	.070**	.150**	.170**	.047	.122**	.108**	.214**	.165**	1		
VK9	.142**	.073**	.090**	.093**	.115**	.185**	.180**	.046	.137**	.150**	.122**	.119**	.049	.113**	.090**	.137**	.120**	.159**	1	
VK10	.104**	.091**	.140**	.104**	.124**	.200**	.217**	.096**	.111**	.199**	.134**	.130**	.114**	.148**	.090**	.149**	.086**	.147**	.491**	1

\*  $p < 0.05$ \*\*  $p < 0.01$

### **Reliability Estimates**

Reliability for the SDMI-R was calculated using the inter-item correlation matrix and the alpha coefficient, or Cronbach alpha, to determine how well multiple items fit together (Pett et al., 2003). The inter-item correlation matrix identifies items that do not correlate, or items with multiple correlations, as they may be considered for deletion (Pett et al., 2003). The Cronbach alpha is a measurement used on items scored on a continuum such as a Likert scale. Cronbach alpha, calculated for the SDMI-R, was .871 (see Table 11). The social desirability item (SD1) was inserted into the SDMI-R to determine if the participants were answering the instrument in accordance with social norms or if their responses reflect their personal norms (Crowne & Marlowe, 1964). This item was analyzed by reviewing the overall Cronbach alpha to the Cronbach alpha statistic if the social desirability item was deleted. Removing this item from the SDMI-R did not alter the overall Cronbach alpha ( $\alpha = .874$ ). Thus, the responses in this study reflect the personal norms of the participants and removing this item from further analysis was acceptable.



Table 11

*Reliability Statistics for the SDMI-R with Social Desirability Item*

Cronbach's Alpha	N of Items
.871	19

*Item-Total Statistics*

Item Number	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	58.33	124.313	.167	.872
A2	58.63	122.826	.186	.872
A3	58.42	124.702	.079	.874
A4	58.30	124.783	.175	.872
A5	59.47	120.929	.187	.874
A6	59.64	121.306	.167	.875
SE1	61.08	109.079	.616	.859
SE2	60.38	107.489	.684	.856
SE3	61.17	110.860	.555	.861
SE4	59.63	109.942	.595	.860
SE5	59.58	110.284	.587	.860
SE6	60.38	105.168	.748	.852
SE7	60.60	106.800	.676	.856
SE8	60.69	105.016	.762	.852
SE9	60.73	106.694	.699	.855
SE10	60.75	107.565	.572	.861
I1	60.66	111.495	.464	.865
I2	60.29	112.350	.470	.865
SD	58.96	123.650	.127	.874

**Internal consistency.** The inter-item correlation matrix measures internal consistency by evaluating correlations between items measuring the same construct as different items should give consistent results (Pett et al., 2003). The range for inter-item correlations is between -1.0 to +1.0. The Pearson  $r$  has a range of weak (0.00-0.08), low (0.09-0.24), moderate (0.25-0.48), strong (0.49-0.80), and very strong ( $> 0.81$ ) (Pett et al., 2003).

The correlation matrix (see Table 12) examines correlation by calculating the Pearson product moment correlation, or the Pearson  $r$ , between each item in the SDMI-R. The Pearson  $r$  ranges between -1.00 and +1.00 with the stronger relationships occur when the

correlation moves closer to -1.00 and +1.00 and correlations weaken as the interrelationships move closer to zero (Nunnally, 1978). As noted, correlation relationships can be either negative or positive. A positive relationship is defined as when one score increases, or decreases, the other score moves in the same direction (Nunnally, 1978). Whereas negative correlations reflect opposite movement in scores, meaning as one score increases the other score decreases (Nunnally, 1978).

When analyzed, the SDMI-R inter-item correlation matrix had two correlations at the 0.05 significance level falling within the weak correlation range A1 with SE 4, and A1 with SE5. The remaining discussion will report correlation items at the 0.01 significance level. Attitude items correlated with Attitude items at low, moderate, strong, and very strong levels. Self-efficacy items correlated with Self-efficacy items at moderate, strong, and very strong levels. Intent items correlated with all the self-efficacy items at low and moderate levels while having a very strong relationship (Pearson  $r = .805$ ) to each other. Four other correlations, within the SDMI-R, fell within the very strong category also (a) item A1 with A4 (Pearson  $r = .863$ ), (b) A5 with A6 (Pearson  $r = .931$ ), (c) SE4 with SE5 (Pearson  $r = .934$ ), and (d) SE7 with SE9 (Pearson  $r = .832$ ). In summing the correlations, there was one low correlation, eight moderate correlations, and 33 strong correlations. Since each item within each subscale correlated at a low, moderate, strong, or very strong levels, it seems reasonable to state that these items have internal consistency.

Table 12

*Correlations of Attitude, Self-Efficacy and Intent Items*

Item	A1	A2	A3	A4	A5	A6	SE1	SE2	SE3	SE4	SE5	SE6	SE7	SE8	SE9	SE10	I1	I2
A1	1	.644**	.559**	.863**	.458**	.420**	.019	-.009	.014	-.053*	-.057*	-.024	.027	.008	.036	-.023	.011	.022
A2		1	.399**	.565**	.650**	.618**	.020	-.012	.006	-.003	.003	-.002	.018	.024	.034	.005	.002	.010
A3			1	.443**	.160**	.220**	.021	.000	.002	-.015	-.019	-.005	-.011	-.023	-.023	-.021	-.016	.003
A4				1	.452**	.414**	.023	.003	.012	-.034	-.040	-.022	.029	.022	.041	-.018	.022	.037
A5					1	.931**	.034	.024	.043	-.006	-.006	.013	.022	.026	.045	.004	.005	.016
A6						1	.030	.020	.032	-.028	-.033	-.004	.003	.006	.029	-.003	-.001	.013
SE1							1	.595**	.525**	.320**	.318**	.552**	.445**	.563**	.466**	.493**	.371**	.377**
SE2								1	.483**	.490**	.477**	.718**	.488**	.671**	.522**	.448**	.367**	.370**
SE3									1	.326**	.310**	.508**	.412**	.516**	.458**	.390**	.320**	.296**
SE4										1	.934**	.565**	.522**	.514**	.496**	.409**	.242**	.217**
SE5											1	.561**	.505**	.499**	.478**	.409**	.254**	.227**
SE6												1	.630**	.782**	.598**	.495**	.372**	.368**
SE7													1	.669**	.832**	.492**	.267**	.271**
SE8														1	.778**	.507**	.351**	.355**
SE9															1	.484**	.271**	.276**
SE10																1	.328**	.346**
I1																	1	.805**
I2																		1

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

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

**Cronbach alpha.** To determine if a subscale, or an item, is reliable, the Cronbach Alpha is measured (Pett et al., 2003). The Cronbach Alpha measurement can range from zero to one, higher values, usually greater than 0.70, indicate greater reliability (Nunnally, 1978). Reliability of the SDMI-R was determined to be .874. The reliability of the SDMI-R was then determined after removing each theoretically-derived subscale. This was done to determine the contribution of each subscale to the instrument as a whole. These results are displayed in Table 13.

Table 13  
*Reliability Statistics for the SDMI-R Constructs*

	Cronbach's Alpha	Cronbach's Alpha if Subscale Deleted	Contribution to the SDMI-R
SDMI-R	.874		18
Attitude		.691	6
Self-efficacy		.921	10
Intent		.867	2

Tables 14 through 16 provide the Cronbach Alpha for the SDMI-R as a whole, and the reliability statistics for each subscale. Based on these data findings the SDMI-R was able to undergo exploratory factor analysis.

Table 14

*Reliability Statistics for the SDMI-R without Social Desirability Item*

Cronbach's Alpha	N of Items
.874	18

*Item-Total Statistics*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	54.09	121.884	.170	.876
A2	54.39	120.382	.190	.876
A3	54.18	122.282	.080	.878
A4	54.06	122.354	.179	.876
A5	55.23	118.474	.191	.878
A6	55.40	118.835	.171	.878
SE1	56.84	106.832	.616	.862
SE2	56.14	105.241	.684	.859
SE3	56.93	108.657	.552	.865
SE4	55.39	107.719	.593	.863
SE5	55.34	108.060	.585	.863
SE6	56.14	102.955	.748	.856
SE7	56.36	104.612	.674	.859
SE8	56.45	102.785	.762	.855
SE9	56.49	104.474	.698	.858
SE10	56.51	105.337	.572	.864
I1	56.42	109.130	.467	.869
I2	56.05	109.995	.473	.868

Table 15

*Reliability Statistics for the Attitude Subscale*

Cronbach's Alpha	N of Items
.828	6

*Item-Total Statistics*

Item Number	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
A1	21.57	8.227	.665	.806
A2	21.87	6.926	.743	.772
A3	21.66	8.494	.352	.843
A4	21.54	8.783	.634	.822
A5	22.71	5.381	.780	.764
A6	22.87	5.366	.770	.768

Table 16  
*Reliability Statistics for the Self-efficacy Subscale*

Cronbach's Alpha	N of Items
.917	10

*Item-Total Statistics*

Item Number	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SE1	24.93	73.179	.621	.912
SE2	24.23	71.382	.716	.907
SE3	25.02	74.525	.565	.915
SE4	23.48	72.713	.663	.910
SE5	23.43	73.092	.650	.911
SE6	24.22	69.091	.801	.902
SE7	24.45	70.270	.735	.906
SE8	24.54	68.934	.818	.901
SE9	24.58	70.268	.755	.905
SE10	24.60	71.463	.596	.915

Table 17  
*Reliability Statistic for the Intent Subscale*

Cronbach's Alpha	N of Items
.891	2

*Item-Total Statistics*

Item Number	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I1	2.92	1.503	.805	.00
I2	2.55	1.719	.805	.00

### Exploratory Factor Analysis

Factor analysis is not one statistical test, but is a compilation of tests used to discover interrelationships among a set of items and then to reduce the items into factors having common relationships (Pett et al., 2003). Factor analysis assesses construct validity when administered to a specific population. Exploratory factor analysis (EFA) is the most common form of factor analysis used in healthcare research when the researcher is uncertain how

many factors explain the interrelationships among a set of items. The tests within this section will include the evaluation of the correlation matrix, Bartlett's Test of Sphericity, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy, and the EFA.

### **Correlation Matrix**

Prior to performing an EFA, the data must be analyzed to determine if the items correlate with one another (Pett et al., 2003). If the items do not correlate with other items it will be impossible to obtain a parsimonious set of factors that characterize the instrument items. The correlation matrix (see Table 11) was described earlier in the chapter.

Pett et al. (2003) assert that the correlation matrix provides the researcher with a beginning picture of which items would cluster to form a factor. Given each of the items within each subscale correlated at a moderate, strong, or very strong level indicates that the three theoretically based subscales will provide three separate factors indicating a sound instrument. When factor analysis occurs it will become important to remove the very strong category items, one at a time, and determine the effect the item removal has on the overall study data.

### **Bartlett's Test of Sphericity**

Bartlett's test of sphericity examines data to ascertain if there are a significant number of correlations within the data to proceed to a factor analysis (Pett et al., 2003). If there were no correlations within the data, Bartlett's test would be nonsignificant, rendering the correlation matrix to an identity matrix (Pett et al., 2003). If the correlation matrix were an identity matrix the item would be correlated to itself but have no other correlations meaning there would be a factor for each item in the attitude, self-efficacy, and intent subscales and it would be futile to continue with factor analysis. Bartlett's test was significant,  $\chi^2(153) =$

21720.689,  $p < .0001$ . Pedhazur and Schmelkin (1991) caution researchers to use Bartlett's test as a minimum standard of assessing the correlation matrix as the test is influenced by large sample sizes. With a sample of size of 1,525, the Kaiser-Meyer-Olkin test was also used to verify the correlation matrix.

### **Kaiser-Meyer-Olkin Test**

The Kaiser-Meyer-Olkin test (KMO) measures the sampling adequacy by comparing the calculated correlation coefficients to the partial correlation coefficients to determine if EFA is appropriate for the sample data (Pett et al., 2003). The KMO test range is between 0 and 1 with higher values ( $> .60$ ) indicating factor analysis is appropriate (Tabachnick & Fidell, 2007). The KMO for the SDMI-R was .813 and therefore appropriate for factor analysis.

### **Principal Component Analysis**

In instrument development one challenge is to reduce the number of items in the subscales without diminishing the statistical power of the instrument (Pett et al, 2003). In using principal component analysis (PCA), Nunnally (1978) stated this process of data refinement occurs in two steps, first defining the data and second rotating the factors to determine if the factor interpretation improves. PCA accounts for total variance (common, specific, and error) (Pett et al., 2003). Common variance represents the variance shared between a set of items resulting in common factor summarizing the interrelationships between the items (Pett et al., 2003). Specific variance is specific to an item but shared with items excluded from the analysis (Pett et al., 2003). Error variance is measurement error and evaluated by the items' reliability (Pett et al., 2003). In PCA the three variance components, which in the SDMI-R variance equals 18, plays an important role in identifying the



underlying factors. The aim of PCA is to duplicate the correlation matrix by way of a set of factors that are fewer in number than the original set of items (Pett et al., 2003).

Once the factors have been obtained, the first factor accounts for the largest amount of variance, the second factor analyzes the residual variance and accounts for the largest amount of this variance and it continues until all the variance is explained (Pett et al., 2003). With the creation of each factor comes an associated eigenvalue (Pett et al., 2003). Based on the correlation matrix, the eigenvalue for the SDMI-R could range from zero to 18.

The PCA was computed using the attitude, self-efficacy, and intent items with the percent of variance extracted for the eigenvalues set greater than one. The analysis of this PCA produced a five-factor model explaining 75.96% of the variance in the model. Three of the five factors in this solution were associated with the three variables of attitude, self-efficacy, and intent. The two remaining factors were difficult to interpret due to strong loadings from multiple variables.

Varimax and direct oblimin rotations were also employed to identify if a more meaningful factor solution was possible. Varimax rotation is an orthogonal rotation and it assumes the factors are independent, or uncorrelated, to each other (Pett et al., 2003). Direct oblimin rotation is an oblique rotation which assumes there are inter-item correlations and, therefore, there are correlations between two or more of the factors (Pett et al., 2003). In SPSS 19.0, when direct oblimin rotation is used the Kaiser Normalization procedure is the default option. This procedure allows equal weight to be given to all items when rotation occurs (Pett et al., 2003).

In oblique rotation solutions, all of the items should load greater than .40 in the factor structure matrix and the factor pattern matrix (Pett et al., 2003). Comrey and Lee (1992)

indicate that the higher the factor loadings the higher the overlapping variance is between the item and the factor and the greater number of items with substantial factor loading the easier it is to identify what the factor represents. The difference between the structure and pattern matrices is that the structure matrix presents the correlations between factors and variables which could be confounded by correlations between the factors, while the pattern matrix presents uncontaminated correlations between variables and factors (Ho, 2006). The pattern matrix is usually the matrix used for interpreting factors (Ho; Tabachnick & Fidell, 2007). All factor loadings, in the pattern matrix were greater than or equal to 0.43 and is described as “good” with a majority (14 items) of the loadings being greater than 0.70, which is “very good”.

Five components displayed eigenvalues greater than one (see Table 18), and the results of the scree test (see Figure 3) also suggested that the five components were meaningful. In interpreting the rotated pattern matrix (see Table 19), an item is said to load on a given component if the factor loading was 0.40 or greater (Ho, 2006). Using this criteria, eight items loaded on Factor I called self-efficacy in the HPV health counseling component. Factor II had four items load on it and was subsequently called the positive HPV attitude component. The two intent items loaded on Factor III which was called the the intention to discuss HPV component. Three items had a negative loading on Factor IV called the negative HPV attitude component. Factor V had two very strong items load on it and it was labeled the self-efficacy in accessing HPV decision aids component.

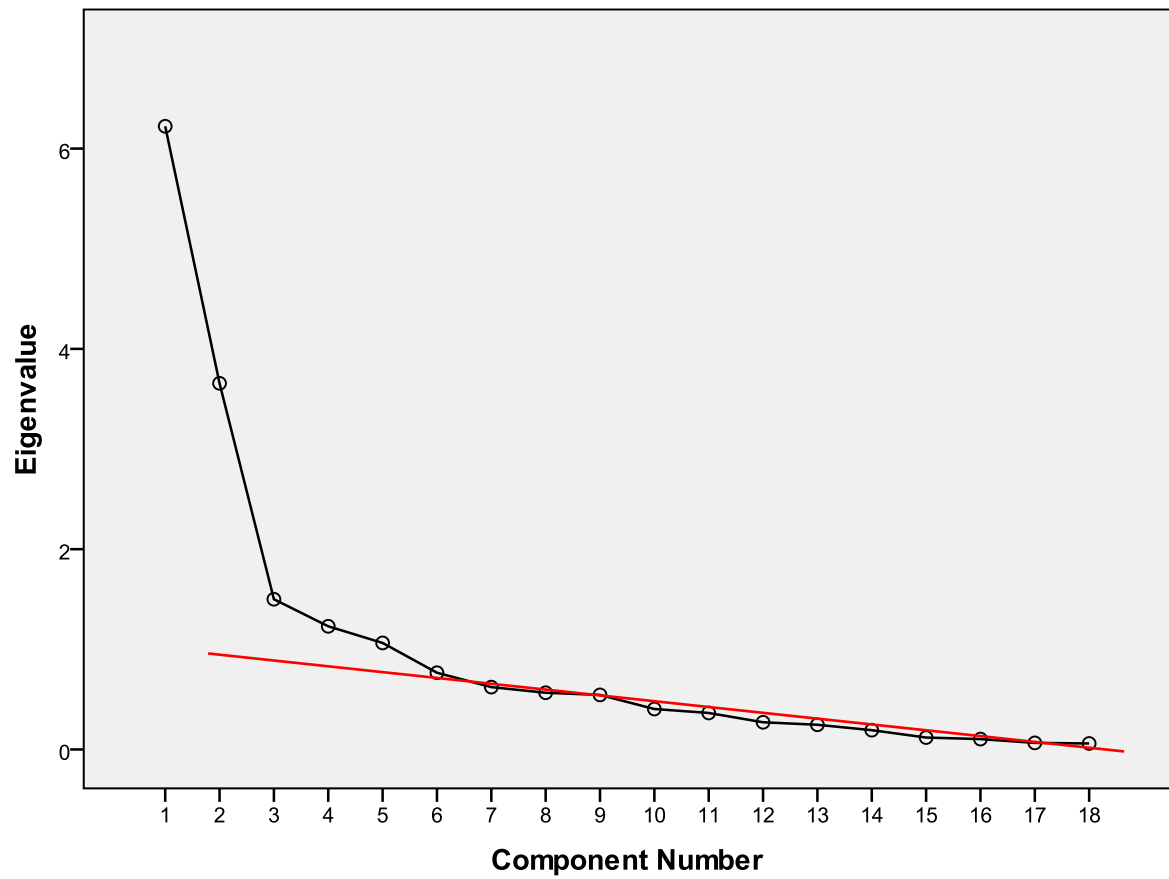
Table 18

*Total Variance Explained*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.223	34.571	34.571	6.223	34.571	34.571	5.779
2	3.656	20.312	54.883	3.656	20.312	54.883	2.891
3	1.500	8.334	63.217	1.500	8.334	63.217	2.719
4	1.230	6.832	70.049	1.230	6.832	70.049	2.934
5	1.064	5.909	75.958	1.064	5.909	75.958	3.344
6	.766	4.257	80.215				
7	.623	3.459	83.674				
8	.566	3.147	86.821				
9	.545	3.026	89.847				
10	.404	2.244	92.091				
11	.365	2.025	94.116				
12	.272	1.509	95.625				
13	.247	1.370	96.995				
14	.193	1.070	98.065				
15	.119	.662	98.727				
16	.104	.576	99.303				
17	.066	.365	99.668				
18	.060	.332	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.



*Figure 3.* Scree test for SDMI-R.

Table 19  
*Pattern Matrix<sup>a</sup>*

	Component				
	1	2	3	4	5
A1		.861			
A2		.432		-.581	
A3		.857			
A4		.792			
A5				-.987	
A6				-.970	
SE1	.787				
SE2	.680				
SE3	.759				
SE4					.912
SE5					.924
SE6	.712				
SE7	.759				
SE8	.855				
SE9	.841				
SE10	.559				
I1			.922		
I2			.918		

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

## Conclusion

The aim of this dissertation study was to develop a reliable and valid tool. After items were measured for normality, the social desirability item was analyzed to determine if the participants' answered the item in accordance with social norms or if it reflected their personal norms. Based on the Cronbach alpha of .874 this indicated the participants in this study responded according to their personal norms. The SDMI-R demonstrates reliability and validity. In order to meet this aim the items were analyzed separately and as a subscale composite.

**Knowledge items.** The Knowledge variable was analyzed separately from the other variables (Attitude, Self-efficacy, and Intent) as the Knowledge items were not Likert scored. Each of the Knowledge items correlated. A majority of the correlations were within the weak or low correlation range. However, moderate correlations were shared between items DK 6 and 7, DK 6 and 10, DK 7 and 10, and DK4 and VK 14. Items VK 19 and 20 shared a strong correlation.

**Attitude, Self-efficacy and Intent items.** Reliability for the Likert scored SDMI-R subscales was tested using the alpha coefficient. The Cronbach alpha for the SDMI-R was .871. These results indicate that this portion of the SDMI-R was internally consistent. There is possible redundancy concerns with item A3 as the alpha would increase to .878 if the item were removed. However, this action should not occur until replication studies validate this finding.

Prior to performing an EFA, the correlation matrix was analyzed for inter-item relationships. This determined that 19 items correlated strongly. It appeared from this correlation analysis that three factors would be identified from the EFA as Attitude items correlated with Attitude items, Self-efficacy items had primarily moderate to strong correlations with Self-efficacy items, and the two Intent items had a very strong correlation with each other but also had low to moderate relationships with Self-efficacy. Upon performing the PCA with direct oblimin rotation five components were identified and named (a) Factor I was labeled self-efficacy in HPV health counseling component, (b) Factor II was called positive HPV attitude component, (c) Factor III which was called intention to discuss HPV component, (d) Factor IV was called negative HPV attitude component, and (e) Factor V was called self-efficacy in accessing decision aids. These five factors explained 75.96% of

the variance. Chapter Six includes further discussion of the results, a discussion of the study limitations, and suggestions for future studies.

## CHAPTER 6

### DISCUSSION

#### **Introduction**

This chapter is divided into three sections. The first section provides a review of the study purpose. The second section discusses the study findings and the study limitations. The concluding section explores the implications for practice and future research.

#### **Study Purpose**

Recognizing that the individual should be the center of decision-making, regulatory and healthcare organizations have charged clinicians to use shared decision-making discussions when presenting healthcare options (Centers for Medicare and Medicaid Services, 2008; Institute of Healthcare Improvement, 2011; Institute of Medicine United States [US] Committee on Quality of Health Care in America, 2001; The Joint Commission, 2008). The Shared Decision-Making framework posits that for a healthcare provider to initiate a shared decision-making intervention, such as a discussion with females between 11 and 12 years of age or her parents regarding the HPV disease and vaccine, this action is determined by the provider's knowledge, attitude, self-efficacy, and intent related to the intervention (Briss et al., 2004).

A Healthy People 2020 (Office of Health Policy, 2010) objective is to have at least 80% of females between the ages of 13 to 15 years complete the human papillomavirus (HPV) vaccine series. Also in 2010 the Center for Disease Prevention and Control (CDC)



reported the HPV vaccine receipt was suboptimal (Wong et al., 2010) with less than 50% of US females aged 13 to 15 years old having initiated the HPV vaccine series and less than 25% of this group having completed the series since 2006 (CDC, 2010b). Early on, the vaccine was promoted to the “catch up” cohort population of females between the ages of 14 and 26 years of age, and little emphasis was placed on the targeted population of females between 11 and 12 years of age (Conroy et al., 2009). To meet the Healthy People 2020 (Office of Health Policy) objective and in light of the data indicating that the majority of the early initiators do not complete the series (CDC), it is essential that the female population between 11 and 12 years of age be targeted to promote HPV receipt. This is especially true when one considers that six months is required to complete the vaccination series. Primarily researchers have focused research efforts on the medical provider and parents (Bartlett & Peterson, 2011) and have excluded other healthcare providers, such as the school nurse, who regularly manages the well-child which includes the females between 11 and 12 years of age (Sebelius, 2010).

Theoretically focused methodological research was used to develop a measurement instrument that evaluates the school nurses’ capacity to enter into a shared decision-making discussion with females between 11 and 12 years of age or their parents about the HPV disease and vaccine is unknown. Therefore, the aim of this research study was to develop a psychometrically sound, theoretically based instrument that was capable of assessing the four shared decision-making constructs (knowledge, attitude, self-efficacy, and intent). Instrument development occurred in two phases. The first phase encompassed reviewing the literature to identify the theoretical underpinnings of shared decision-making to develop the Shared Decision-Making Inventory (SDMI). The initial SDMI was preliminarily tested. These data

were used to revise the SDMI to the SDMI-R, which was then utilized to obtain sufficient data to perform initial psychometric testing. The SDMI and the SDMI-R followed the phases of instrument development delineated by Pett et al. (2003). The research questions answered by this study were: (1) To what extent did the SDMI-R demonstrate internal consistency and reliability prior to establishing factorial validity?; (2) To what extent were the components of the SDMI-R, created from an integrative synthesis of the literature regarding HPV disease, vaccine characteristics and receipt, demonstrated in exploratory factor analysis (EFA)?; and (3) To what extent did the resulting factors demonstrate reliability to stand as independent factors?

The sample for this study were a volunteer group ( $N = 1525$ ) of elementary and middle school nurses who were members of the National Association of School Nurses (NASN). Research approval was secured from the University of Missouri-Kansas City's Social Science Institutional Review Board prior to initiation of the study. Participants who provided the study data were invited via e-mail. All participation occurred on a voluntary basis without coercion. For the dissertation study, a total of 1525 school nurses answered yes to the screening question (are there females between 11 and 12 years of age in the school in which you work) and provided answers to at least 90% of the instrument's items. The study participants' demographics were consistent with the NASN organization member demographics (Bergren & Monsalve, 2012). The dissertation study instrument is located in Appendix L. Proportions, correlation matrixes, Cronbach alpha, and principle component analysis with direct oblimin rotation were the primary methods used in this study to determine if the instrument was psychometrically sound. A discussion of the study results follows.

## Study Findings

**Research Question 1.** To what extent did the SDMI-R demonstrate internal consistency and reliability?

**Summary of results.** The SDMI-R demonstrated internal consistency and reliability. Internal consistency, determined by the results of a correlational matrix, revealed that knowledge items had modest inter-item correlations while the three remaining constructs had moderate to strong inter-item correlations. Reliability of the three remaining constructs, determined by calculating Cronbach's alpha, indicated that the SDMI-R has a reliability of .874. In addition, each theoretically derived subscale achieved adequate reliability. The Attitude subscale achieved a reliability coefficient of .828, while the Self-efficacy subscale attained a .917 reliability coefficient, and the Intent subscale realized a .891 reliability coefficient.

**Discussion.** Based on the recommendations obtained from expert reviewers, items within the SDMI were changed. Internal consistency and reliability for the SDMI-R was tested through correlation matrixes and Cronbach alpha. The correlation matrixes tested for strong inter-item relationships indicate item redundancy (Pett et al., 2003). Based on these relationships, additional exploration of the items should occur through additional use of the SDMI-R.

**Research Question 2.** To what extent were the components of the SDMI-R, created from an integrative synthesis of the literature regarding HPV disease, vaccine characteristics and receipt, demonstrated in exploratory factor analysis (EFA)?

**Summary of results.** The results of the EFA supported the Shared Decision-Making theoretical framework.

**Discussion.** EFA is a stepwise evaluation process beginning with the analysis of the correlation matrix to identify strong and very strong correlations which signify item redundancy. EFA was performed using PCA and then PCA with direct oblimin rotation. PCA is the most frequently used form of EFA (Pett et al., 2003; Thompson, 2004). Through this analysis five factors were named (a) self-efficacy in HPV health counseling component, (b) positive HPV attitude component, (c) intention to discuss HPV component, (d) negative HPV attitude component, and (e) self-efficacy in accessing decision aids component. These five factors explained 75.96% of the variance.

**Research Question 3.** To what extent did the resulting factors demonstrate reliability to stand as independent factors?

**Summary of results.** Items which created the five factors were subjected to reliability testing demonstrating a high reliability for each factor (a) self-efficacy in HPV health counseling component ( $\alpha = .908$ ), (b) positive HPV attitude component ( $\alpha = .794$ ), (c) intention to discuss HPV component ( $\alpha = .891$ ), (d) negative HPV attitude component ( $\alpha = .889$ ), and (e) self-efficacy in accessing decision aids component ( $\alpha = .966$ ). Since these factors are statistically robust and grounded in theory, it is reasonable to assume that they can describe shared decision-making behavior. Subsequent testing of the SDMI-R will provide statistical confirmation of this assumption.

**Discussion.** Using PFA without any rotation produced a five-factor solution that was uninterpretable as the items from the three variables were scattered throughout the factors. PFA with direct oblimin rotation accepts that the items correlate with other items and produced five factors (Ho, 2006; Tabachnick & Fidell, 2007). The five factors had an eigenvalue  $> 1.0$ , with each of them explaining  $> 5\%$  of the variance (together they explained

75.96% of the variance), the scree plot validated five factors, and the five factors support the Shared Decision-Making framework. The 18-item Cronbach alpha was .874 which was judged as having very good reliability (DeVellis, 1991).

### **Conclusion**

The importance of creating a reliable and valid instrument that is theoretically based not only allows shared decision-making to be measured but the exploratory factor analysis provides shared decision-making to be defined. To demonstrate psychometric reliability and validity of the SDMI-R is obligatory for the instrument's future use in shared decision-making research. While confirmatory analysis is still needed, this instrument will provide useful insights about school nurses' shared decision-making perception related to the nurse-client encounter for state and national nursing organizations as well as public policy makers. This instrument has promise for advancing the understanding of shared decision-making, as it is perceived by the school nurse. Furthermore, this instrument will assist the school nurse population to test interventions for establishing evidence-based shared decision-making standards.

### **Study Limitations**

In planning the dissertation study, a procedure was developed and implemented to minimize study limitations. However, the study results should be considered with the context of the limitations. The limitations of the study will be discussed in terms of the study design and response bias.

**Study design.** The study began in the middle of November and was open until late December. Finding the appropriate time to begin and end a study can be problematic. Realizing that school nurses have a heightened awareness about immunizations at the beginning of the school year, the Primary Investigator (PI) wanted to begin measurement in

the fall term. However, data collection occurring over Thanksgiving and the holiday season may have caused nurses to electively choose not to participate in the survey.

Even though the school nurses provided their e-mail address as a contact point to the National Association of School Nurses (NASN), there were five different limitations with using e-mail mail (a) the recipient not recognizing the PI's name or e-mail address, (b) school district provisions, (c) incorrect e-mail addresses, (d) inability of the PI to send more than 1,000 e-mail invitations per day, and (e) the inability of the PI to validate who actually completed the survey. Related to the recipient not recognizing the PI's name or e-mail address the participant could equate the e-mail invitation as a "cold call" or "spam mail" and delete the message without opening it. Two school districts asked the PI to remove e-mail addresses ending in either ops.org or sdhc.k12.fl.us from the distribution lists resulting in loss of 29 potential participants. Due to functionality of the three different e-mails available to the researcher, the largest amount of e-mails was 1,000 per day. This led to the first mailing to take 10 days and included the need to send e-mails over the weekend as well as the weekdays.

**Response bias.** There were three limitations identified related to response bias (a) respondents electing to not complete the survey, (b) the comparative demographic data to a NASN survey, and (c) the population of choice. Three percent of the population ( $n = 307$ ) answered *Yes* to the screening item, Do you have 11 to 12 year old females in the school in which you work?, but it appears as though they left the survey after responding to that question. The responses from the 3% above and the 78% of the population electing not to complete the survey might be different from the group completing the survey. Having comparable sample population demographics to the NASN survey demographics could mean

that the same sub-population of the NASN completed both surveys. The NASN members represent 25% of the school nurse population. These limitations may have resulted in a restriction of the range of scores for the study.

### **Implications for Nursing**

This methodological study's aim was to develop a valid and reliable instrument to measure school nurses shared decision-making related to the human papillomavirus disease and vaccine. Chapter Three discussed development of the instrument and results from the preliminary study. Chapter Four informs how the instrument was revised based on the preliminary study findings and the dissertation study methods. Chapter Five reports the data indicating that the instrument, Shared Decision-Making Inventory-Revised, is a reliable and valid tool that is capable of measuring all the shared decision-making constructs (knowledge, attitude, self-efficacy, and intent). This scale with its four sub-scales can provide momentum for nurses to further develop the concept of shared decision-making.

Using the Shared Decision-Making framework created a way to evaluate school nurses perception of shared decision-making. The psychometric analysis provided evidence the SDMI-R is a valid and reliable instrument that mirrors the framework from which it was drawn. The SDMI-R could become an objective tool to measure shared decision-making and be used to better understand the Informed and Shared Decision-Making framework.

Recognizing the societal and public health ramifications related to females' exposure to HPV allows school nurses to initiate shared decision-making conversations aimed at reducing the risk of cervical cancer. School nurses have the ability to alter the health outcomes for future generations by developing tools and interventions geared to increasing the receipt of the HPV vaccine. Additionally, the use of shared decision-making

conversations in the school environment could act as a model for other nursing specialties' and as a catalyst for consumers to demand this type of conversation with other healthcare providers. This study sets the foundation for school nurses to practice to the level of their degree as set forth by the Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing at the Institute of Medicine, Robert Wood Johnson Foundation, & Institute of Medicine US (2011).

### **Future Research**

The overall goal for future research studies is to increase the receipt of the HPV vaccine in females between 11 and 12 years of age in addition to determining school nurses' capacity for using Shared Decision-Making. In order for the overall goal to be achieved concurrent studies would need to occur, such as, continued SDMI-R validation studies while developing interventional studies aimed at increasing school nurses' capacity to engage parents and/or females between 11 and 12 years of age in a shared decision-making discussion regarding the HPV disease and vaccine.

**Continued SDMI-R validation.** Instrument validation is an ongoing, iterative process (Pett et al., 2003). The psychometric findings from this study should be replicated in other heterogeneous populations, such as with health education instructors and outpatient nurses, to establish concurrent validity of the SDMI-R. Convergent and discriminant validity of the SDMI-R should occur by testing the SDMI-R and other instruments known to measure the same, or close, constructs. As HPV research continues to expand, such as the case with oral HPV carcinomas, additional SDMI-R items will need to be added and tested to reflect this new knowledge. Perhaps the next most logical study to undertake is that of common



factor analysis (CFA). CFA will assist in further validation of the theoretical variables of the SDMI-R (Pett et al., 2003).

**Interventional studies.** In order to determine needed interventions, the next step would be to explore the dissertation study data to identify the variables associated with the study participants who have, and who have not, engaged parents and/or the parents' 11 to 12 year old daughters in a shared decision-making discussion regarding the HPV disease and vaccine. This analysis will define areas in which interventional studies are needed. In addition, theme-based interventions which include all of the necessary information surrounding a particular shared decision-making deficit could be designed and implemented. The current SDMI-R would be used in pretest-posttest interventional studies to determine if significant practice change has occurred within the realm of shared decision-making.

### **Dissertation Conclusion**

The aim of this research study was to develop a psychometrically sound instrument based in theory and on prior research literature to assess four shared decision-making constructs (knowledge, attitude, self-efficacy, and intent). The intent of this study was to contribute to the shared decision-making knowledge regarding school nurses' capacity to engage parents and/or the parents' 11 to 12 year old daughters in discussing the HPV disease and vaccine. The theoretically based instrument was determined to be valid and reliable to measure the constructs of knowledge, attitude, self-efficacy, and intent. The findings of the study provide ideas for future research in the areas surrounding instrument validation and shared decision-making interventional studies in which the SDMI-R is used as a pretest-posttest measurement instrument. Findings from such studies will enable nurses to engage parents and females between 11 and 12 years of age in HPV disease and vaccine shared

decision-making discussions that will lead to the receipt of the HPV vaccine and ultimately reduce the risk of cervical cancer for future generations.

APPENDIX A  
CONSTRUCTS, ITEM AND ITEM ORIGIN FOR  
THE SDMI AND SDMI-R

Constructs, Items and Item Origin for the SDMI and SDMI-R

Construct		Item	Origin
I. Knowledge	DK1	HPV is a sexually transmitted infection (STI). (true)	Daley et al. (2010); Preliminary study (Bartlett)
a. Disease	DK2	HPV is the primary cause of cervical cancer. (true)	Preliminary study (Bartlett)
Knowledge (DK)	DK3	Genital HPV infections tend to be symptomatic. (false)	Preliminary study (Bartlett)
	DK4	The same HPV genotypes that cause cervical cancer cause genital warts. (false)	Preliminary study (Bartlett)
	DK5	HPV is the most common STI among adolescents. (true)	Beatty et al. (2003); Preliminary study (Bartlett)
	DK6	HPV status, determined by testing, should occur before a HPV vaccine is given. (false)	Preliminary study (Bartlett)
	DK7	Pre-teens who have been diagnosed with HPV should not be given the HPV vaccine. (false)	Daley et al. (2010); Preliminary study (Bartlett)
	DK8	Condoms may reduce the risk of HPV infection. (true)	Beatty, et al. (2003); Preliminary study (Bartlett)
	DK9	Risk factors associated with HPV infections include: infection with other STIs, being immunocompromised, and the age at first sexual activity. (true)	Preliminary study (Bartlett)
	DK 10	A pregnancy test should be performed prior to giving HPV vaccine. (false)	Daley et al. (2010); Preliminary study (Bartlett)

(table continues--)

Construct		Item	Origin
b. Vaccine Knowledge (VK)	VK1	The HPV vaccine is recommended for females 11-12 years of age. (true)	Preliminary study (Bartlett)
	VK2	The HPV vaccines protect against cervical cancer. (true)	Kahn et al. (2009); Preliminary study (Bartlett)
	VK3	Both HPV vaccines require a series of three injections to be given over a six-month period. (true)	Preliminary study (Bartlett)
	VK4	Both HPV vaccines protect against genital warts. (false)	Preliminary study (Bartlett)
	VK5	Even though the HPV vaccine was obtained, Pap tests should be obtained every three years if a female has been sexually active for three years or more, or if they are over 21 years old. (true)	Kahn et al. (2009); Preliminary study (Bartlett)
	VK6	HPV vaccines only protect against specific HPV genotypes. (true)	Preliminary study (Bartlett)
	VK7	HPV vaccines are not a HPV treatment. (true)	Preliminary study (Bartlett)
	VK8	HPV vaccines are most effective if completed before any sexual activity. (true)	Preliminary study (Bartlett)
	VK9	HPV vaccines could cause a female to acquire HPV. (false)	Preliminary study (Bartlett)
	VK10	HPV vaccines could cause a female to become sterile. (false)	Preliminary study (Bartlett)

Construct		Item	Origin
II. Attitudes	A1	Vaccinations are an important part of pre-teen's healthcare.	Gerend et al. (2009); Kahn, et al. (2009); Preliminary study (Bartlett)
	A2	The FDA approved the HPV vaccines, they are safe to administer.	Gerend et al. (2009); Preliminary study (Bartlett)
	A3	If a pre-teen receives the HPV vaccine they are more likely to have sex at an earlier age.	Gerend et al. (2009); Kahn et al. (2009); Preliminary study (Bartlett)
	A4	It is important to keep pre-teens up-to-date on their vaccinations.	Gerend et al. (2009); Preliminary study (Bartlett)
	A5	Vaccinating a pre-teen against HPV will prevent them from acquiring HPV.	Kahn et al. (2009); Preliminary study (Bartlett)
	A6	If pre-teen do not ever receive the HPV vaccine, it is likely that they will acquire the HPV infection someday.	Gerend et al. (2009); Preliminary study (Bartlett)

(table continues--)

Construct		Item	Origin
III. Self-efficacy	SE1	I can complete an HPV vaccine assessment at each pre-teen encounter.	Preliminary study (Bartlett)
	SE2	I can teach the pre-teen and her parents/guardians about behavioral messages and skills that will reduce their risk for HPV.	Preliminary study (Bartlett)
	SE3	I can discuss with the parents/guardians how the two vaccines are interchangeable.	Preliminary study (Bartlett)
	SE4	I can access written materials (i.e. brochure) on how to prevent the HPV disease for parents and pre-teens to review.	Preliminary study (Bartlett)
	SE5	I can access written materials (i.e. brochure) about the HPV vaccine for parents and pre-teens to review.	Ozer et al. (2004); Preliminary study (Bartlett)
	SE6	I can provide parents one-on-one education about their pre-teen's risk of HPV.	Preliminary study (Bartlett)
	SE7	I can provide parents one-on-one education about their pre-teen's risk of HPV aided by computer-generated decision aids (i.e. video or program).	Preliminary study (Bartlett)
	SE8	I can provide parent group education about pre-teens' risk of HPV.	Preliminary study (Bartlett)
	SE9	I can provide parent group education about pre-teens' risk of HPV aided by computer-generated decision aids (i.e. video or program).	Preliminary study (Bartlett)
	SE 10	I can provide an HPV vaccine report to the pre-teen's primary care provider.	Preliminary study (Bartlett)

(table continues--)

Construct			Item	Origin
IV.	Intent	I1	I use every encounter with pre-teen females to discuss the HPV vaccine with her parents if she has not begun or completed the series.	Preliminary study (Bartlett)
		I2	I am able to determine if the pre-teen is in need of the HPV vaccine.	Preliminary study (Bartlett)
		I3	I am able to discuss issues of sexuality before administering the HPV vaccine to the pre-teen.	Preliminary study (Bartlett)



APPENDIX B  
UNIVERSITY OF MISSOURI-KANSAS CITY SOCIAL SCIENCES INSTITUTIONAL  
REVIEW BOARD  
APPROVAL FOR  
PRELIMINARY STUDY

**From:** barrethr@umkc.edu [mailto:barrethr@umkc.edu]  
**Sent:** Friday, May 06, 2011 2:36 PM  
**To:** Peterson, Jane  
**Cc:** Barreth, Rebekah; Anderman, Sheila H.  
**Subject:** Study SS11-61: Shared Decision-Making: Understanding the Nursing Role in the Uptake of the Human Papillomavirus (HPV) Vaccine in the Pre-Adolescent Female

May 6, 2011

Jane Peterson, Ph.D.  
UMKC - School of Nursing  
2220 Holmes  
Kansas City, MO 64108

Approval Date: 05/2/2011

Dear Dr. Peterson,

Your research protocol IRB # SS11-61, entitled: "Shared Decision-Making: Understanding the Nursing Role in the Uptake of the Human Papillomavirus (HPV) Vaccine in the Pre-Adolescent Female" was reviewed by the Chair of the UMKC Social Sciences Institutional Review Board and classified as exempt in accordance with exemption criteria #2 in the Federal Guidelines 45 CFR Part 46 as follows: "Research involving the use of educational tests (cognitive, diagnostic, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability or reputation".

It is our understanding no identifiers will be used to link the subjects with data collected.

Reapproval is also required and you are asked to submit a progress report before 05/01/2012 if your project continues beyond this date. If your project is terminated earlier, a final report to the Review Board is required within 90 days.

Thank you,

Rebekah Barreth, CIP  
Compliance Officer  
Social Sciences Institutional Review Board  
University of Missouri - Kansas City  
5319 Rockhill Road  
Kansas City, MO 64110-2499  
Office: 816-235-6150  
Fax: 816-235-5602  
barrethr@umkc.edu

This e-mail is an official notification intended only for the use of the recipient(s). This letter indicates the status of the UMKC Social Sciences IRB review of the referenced research project. When appropriate, a member of the UMKC Social Sciences IRB staff will be contacting the recipient(s) informing them of other IRB documents related to this project that are available to either 1) be picked up at the IRB office - 5319 Rockhill Road or 2) be mailed via campus mail or postal service - i.e.; revisions to consent form, advertisements, etc. If a signed copy of this letter is needed, please contact a member of the IRB staff. If you have received this communication in error, please return it to the sender immediately and delete any copy of it from your computer system.

APPENDIX C  
ENROLLMENT SCRIPT FOR  
MID AMERICA IMMUNIZATION COALITION

There have been many changes with the vaccine schedule over time. This means that nurses' knowledge, attitudes, self-efficacy and intent have also had to change, over time, to assist parents to understand the changes to the schedule along with the risks and benefits to their child receiving the vaccine. In an effort to assess nurses' ability to assist parents with the HPV vaccine, you are being asked to participate in a research study to validate a newly developed survey. For this study, you will be helping me evaluate a survey. The refined survey will be used by me, Jacqueline Bartlett, a PhD nursing student at the University of Missouri—Kansas City, Missouri, School of Nursing, in my dissertation research.

The survey is called the Shared Decision Making Inventory (SDMI) regarding HPV vaccine uptake. You are free to choose to complete the survey and participate in this study or not participate. The survey is printed on both sides and it takes less than 15 minutes to complete. In no way can your responses be linked back to you and your responses will remain anonymous. It is not required, but I encourage you to complete all the items on the SDMI by answering each question with only one answer, with the exception of the demographic area. You may stop at any time. Again, the goal is to refine this tool for future use.

Each of you will receive a survey packet which includes a pen, this enrollment script that has my contact information on it, an envelope, and the survey. Please respond to the questions in relation to how they apply to you; do not discuss the questions on the survey with those around you until the surveys are returned.

You will suffer NO negative consequences if you chose not to take this survey or chose not to complete the survey once you have started it. These data will be reported in group findings and in no way individual responses be revealed. Completing this survey and handing them back to the principal investigator is your agreement (informed consent) to participate in this research study. After I receive the surveys back, everyone's answers will be entered into a computer program and analyzed to see where there is duplicity between the questions. These questions will be removed from the survey. The result will be a refined survey that I will be able to ask a national representative sampling of ambulatory, inpatient and school nurses to complete. This new survey will aid me to identify future intervention areas to better position nurses when discussing the HPV vaccine with parents.

Any discomfort or inconvenience to you will occur only from the amount of time taken to complete the survey. You have the option of not completing the survey. If you elect to not complete the pen and paper survey, I would ask you to sit in the meeting room while the participants electing to finish the survey do so. If any questions make you feel uncomfortable, you may either skip them or elect to not complete the survey. If you need to speak to someone about your discomfort and you are uncertain who you can discuss your concerns with, please speak to the PI and she will help you identify someone to talk to.

I would ask you to place the survey in the envelope found in the packet, seal it, and hand it to one of my assistants as you exit this room. If you have any questions, please contact me by using any of the routes identified on the script. If you have any questions regarding your rights as a research subject, please contact the IRB Administrator of UMKC's Social Sciences Institutional Review Board at 816-235-1764. The script and pen is yours to keep.

Please know that for every returned and completed survey I obtain, one dollar will be donated to the Mid America Immunization Coalition, up to \$300, to be used to offset future immunization educational offerings.

Thank you! I appreciate your time and consideration!

Jacqueline A. Bartlett RN, MSN, MBA/HCM

UMKC School of Nursing PhD Student

816.701.4534 (phone)      [Jab225@mail.umkc.edu](mailto:Jab225@mail.umkc.edu) (email)

APPENDIX D

SHARED DECISION MAKING INVENTORY

FOR HUMAN PAPILLOMAVIRUS (HPV) VACCINATION

## SHARED DECISION MAKING INVENTORY FOR HUMAN PAPILLOMAVIRUS (HPV) VACCINATION

The *purpose* of this survey is to better understand the HPV vaccine discussion with the parents/guardians of the pre-adolescent female (11-12 years of age). (*For this survey, pre-adolescent female equates to pre-teen.*) In order to maintain confidentiality of your responses, please do not write your name on this survey.

*Please mark only ONE answer for each statement.*

### A. The following statements are about the Human Papillomavirus (HPV).

	True	False	Don't know / Not sure
DK1. HPV is a sexually transmitted infection (STI).			
DK2. The primary cause of cervical cancer is HPV.			
DK3. Genital HPV infections tend to be symptomatic.*			
DK4. The same HPV genotypes that cause cervical cancer cause genital warts.*			
DK5. The most common STI among adolescents is HPV.			
DK6. HPV status, determined by testing, should occur before a HPV vaccine is given.*			
DK7. Pre-teens who have been diagnosed with HPV should not be given the HPV vaccine.*			
DK8. Condoms may reduce the risk of HPV infection.			
DK9. Risk factors associated with HPV infections include: infected with other STIs, being immunocompromised, and the age at first sexual activity.			
DK10. A pregnancy test should be performed prior to giving HPV vaccine.*			

### B. The following statements are about both HPV vaccines (Gardasil™ and Cervarix™).

	True	False	Don't know / Not sure
VK1. The HPV vaccine is recommended for females 11-12 years of age.			
VK2. The HPV vaccines protect against cervical cancer.			
VK3. Both HPV vaccines require a series of three injections to be given over a six-month period.			
VK4. Both HPV vaccines protect against genital warts.*			
VK5. Even though the HPV vaccine was obtained, Pap tests should be obtained every three years if a female has been sexually active for three years or more, or they are over 21 years old.			
VK6. HPV vaccines only protect against specific HPV genotypes.			
VK7. HPV vaccines are not a HPV treatment.			
VK8. HPV vaccines are most effective if completed before any sexual activity.			
VK9. HPV vaccines could cause a female to acquire HPV.*			
VK10. HPV vaccines could cause a female to become sterile.*			

\*Denotes reverse scored items



**C. How strongly do you agree or disagree with the following statements regarding the vaccines available?**

	Strongly Agree	Agree	Neutral Not Sure	Disagree	Strongly Disagree
A1. Vaccinations are an important part of pre-teen's healthcare.					
A2. The FDA approved the HPV vaccines, they are safe to administer.					
A3. If a pre-teen receives the HPV vaccine they are more likely to have sex at an earlier age.*					
A4. It is important to keep pre-teens up-to-date on their vaccinations.					
A5. Vaccinating a pre-teen against HPV will prevent them from acquiring HPV.					
A6. If pre-teen do not ever receive the HPV vaccine, it is likely that they will acquire the HPV infection someday.					
I1. I use every encounter with pre-teen females to discuss the HPV vaccine with her parents if she has not begun or completed the series.					
I2. I am able to determine if the pre-teen is in need of the HPV vaccine.					
I3. I am able to discuss issues of sexuality before administering the HPV vaccine to the pre-teen					

\*Denotes reverse scored items

**How confident are you that you can:**

	Extremely confident	Very Confident	Confident	Somewhat confident	Not at all confident
SE1. I can complete a HPV vaccine assessment at each pre-teen encounter.					
SE2. I can teach the pre-teen and her parents/guardians about behavioral messages and skills that will reduce their risk for HPV.					
SE3. I can discuss with the parents/guardians how the two vaccines are interchangeable.					
SE4. I can access written materials (i.e. brochure) on how to prevent the HPV disease for parents and pre-teens to review.					
SE5. I can access written materials (i.e. brochure) about the HPV vaccine for parents and pre-teens to review.					
SE6. I can provide parents one-on-one education about their pre-teen's risk of HPV.					
SE7. I can provide parents one-on-one education about their pre-teen's risk of HPV aided by computer-generated decision aids (i.e. video or program).					

	Extremely confident	Very Confident	Confident	Somewhat confident	Not at all confident
SE8. I can provide parent group education about pre-teens' risk of HPV.					
SE9. I can provide parent group education about pre-teens' risk of HPV aided by computer-generated decision aids (i.e. video or program).					
SE10. I can provide a HPV vaccine report to the pre-teen's primary care provider.					

**D. In your practice, what have been pre-teens' reasons for not wanting the HPV vaccine? (Check all that apply.)**

- ☐ Fear of pain      ☐ Too young      ☐ Inconvenience (multiple visits)  
☐ Does not understand risks/benefits  
☐ Vaccine effectiveness not long enough  
☐ Fear of parents reaction about being sexually active  
☐ Other (please specify): \_\_\_\_\_

**E. Do you provide direct care to pre-teens?**      ☐ Yes      ☐ No

**F. What else would you like to share about this subject?** \_\_\_\_\_

**G. Demographic data:**

**Are you:**    ☐ Male      ☐ Female

**Year born:**      ☐ 1909-1945    ☐ 1946-1964    ☐ 1965-1979    ☐ 1980-1990    ☐ 1991-today

**Have you been diagnosed with an abnormal Pap?**    ☐ Yes      ☐ No

**Have any of your relatives, or friends, been diagnosed with an abnormal Pap?**

☐ Yes      ☐ No      ☐ Don't know

**Employment Status:**    ☐ Full time    ☐ Part time    ☐ Retired

**Please specify the state in which you work:** \_\_\_\_\_

**Please describe your education:**    ☐ LPN    ☐ Registered Nurse (AD, Diploma, BSN)

☐ Advanced Practice Nurse (NP, CNS, etc.)

☐ DNP, PhD      ☐ Other (please specify): \_\_\_\_\_

**Please describe your practice setting:**    ☐ Hospital based    ☐ Ambulatory / Clinic

☐ School based

☐ Other (please specify): \_\_\_\_\_

**Please rank (1 most frequently – 7 least frequently) the population you serve:**

\_\_\_ White      \_\_\_ Black / African American      \_\_\_ Hispanic

\_\_\_ Asian      \_\_\_ American Indian / Alaska Native

\_\_\_ Native Hawaiian / other Pacific Islander    \_\_\_ Other (please specify): \_\_\_\_\_

APPENDIX E

INTENT CONSTRUCT, ITEMS AND ITEM

ORIGIN FOR SDMI-R

SOCIAL DESIRABILITY ITEM

I. Intent	I1	In the next 60 days, I intend to regularly encourage the parents of 11-12 year old females to get their daughters vaccinated against HPV.	Roberto et al. (2011)
	I2	In the last 60 days, I regularly encouraged the parents of 11-12 year old females to get their daughters vaccinated against HPV.	Roberto et al. (2011)
II. Social Desirability	SD1	No matter who I am talking with, I am always a good listener.	Crowne & Marlowe (1964)

APPENDIX F  
UNIVERSITY OF MISSOURI-KANSAS CITY SOCIAL SCIENCES INSTITUTIONAL  
REVIEW BOARD  
APPROVAL FOR  
DISSERTATION STUDY

November 1, 2011

Jane Peterson, Ph.D.  
UMKC - School of Nursing  
2220 Holmes  
Kansas City, MO 64108

Determination Date: 11/1/2011  
Review Type: Exempt, Category 2

RE: SSIRB Protocol #: SS11-158, entitled: "The Development and Psychometric Testing of the Shared Decision-Making Inventory Instrument"

Dear Dr. Peterson,

The above referenced study was reviewed and determined to be exempt in accordance with the Federal Guidelines 45 CFR Part 46 as follows: (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are required to submit a progress report on or before 10/31/2012 to prevent withdrawal of the exempt determination for your study. If your project is completed before the anniversary of the study determination date, a final report is required.

Please contact the administrative office of the SSIRB (email: [umkcssirb@umkc.edu](mailto:umkcssirb@umkc.edu); phone: 816-235-5927) if you have questions.

Thank you,

SSIRB Administrative Office

PLEASE NOTE:

If a signed copy of this letter is needed, please contact a member of the IRB staff.

This e-mail is an official notification intended only for the use of the recipient(s). If you have received this communication in error, please return it to the sender immediately and delete any copy of it from your computer system.

APPENDIX G

CHILDREN'S MERCY HOSPITALS AND CLINICS

PATIENT CARE SERVICES RESEARCH DEPARTMENT

LETTER OF SUPPORT



April 18, 2011

Jacqueline A. Bartlett, MSN, MBA HCM, RN  
School of Nursing  
University of Missouri – Kansas City  
2464 Charlotte Street  
Kansas City, MO 64108

Dear Ms. Bartlett:

I am pleased to extend my commitment, and that of the Children's Mercy Hospitals and Clinics (CMH&C) to your proposed research project: "School Nurses' Intent to Discuss Human Papillomavirus (HPV) Vaccine with the Parents of Pre-Adolescent Females." We realize that the uptake of the HPV vaccine is low; therefore, measuring the intent of the school nurse to discuss the HPV vaccine with parents of 11- to 12- year old females is needed to expand the scientific nursing knowledge.

CMH&C's mission is promoting the health and well-being of children, from birth through adolescence, in the region. Your research project exemplifies the mission of our Organization. This project has the potential to identify the barriers and facilitators school nurses encounter when discussing the HPV vaccine with parents and 11- to 12- year old females. Once the barriers and facilitators are identified, we believe future interventional research projects will be forthcoming from you. As this research project parallels the Organization's mission, we are more than willing to allow you access to SurveyMonkey™, at no charge to you, through Susan Teasley's professional subscription.

We hope that your proposal receives an affirmative review and we look forward to working with you on this project.

Sincerely,

A handwritten signature in black ink, appearing to read "Karen Cox".

Karen S. Cox, RN, PhD  
Executive Vice President  
Co-Chief Operating Officer



## APPENDIX H

### E-MAIL INVITATION TO THE POTENTIAL STUDY PARTICIPANTS

Hello,

I would like to ask you to participate in a research study. Your participation is in the form of completing this survey ([https://www.surveymonkey.com/s/survey\\_HPV](https://www.surveymonkey.com/s/survey_HPV)) on the topic of Human Papillomavirus (HPV). Little is known about how school nurses discuss the HPV disease and vaccine with parents/guardians of 11- to 12-year old females.

I obtained your email from the National Association of School Nurses and I will not contact you for any other reason than to ask you to complete this survey. I will be sending out four email reminders and the link to the survey. Aside from the emails provided in this way, I will not retain the original email list beyond the completion of this study.

Your participation in completing this survey is voluntary and you can choose not to participate or discontinue your participation at any time. This web-based survey takes approximately 20 minutes to complete. There are no right or wrong answers, I am merely asking for your thoughts and perceptions.

There is text on the initial screen of the survey that explains all the details about the survey and your rights as a study participant. Please read this text carefully before you move to the survey. The responses of everyone taking survey will be collected as a group and individual responses will not be obtained. Your completion of the survey and submitting your responses implies your informed consent to participate in this research study. There is no way for me to know who participates, or to match your identifying information to your responses. The survey site will not provide me with any information regarding your IP computer address.

I am not aware of any risks to you in completing this survey. If you experience discomfort from the survey you can stop the survey at any time. If you are uncertain who you can discuss your concerns with regarding this survey, please email me at my email address below. I will help in resolving any issues or refer you to someone to speak with about the problem. Although it is not the University's policy to compensate or provide medical treatment for persons who participate in studies, if you think you have been harmed as a result of participating in this study, please call the IRB Administrator of UMKC's Social Sciences Institutional Review Board at 816.235.5927.

Here is the link [https://www.surveymonkey.com/s/survey\\_HPV](https://www.surveymonkey.com/s/survey_HPV) to the study.

Thank you very much for your participation.

Jacqueline A. Bartlett, PhD(c), RN  
PhD Nursing Student  
University of Missouri—Kansas City  
[jab225@mail.umkc.edu](mailto:jab225@mail.umkc.edu)

APPENDIX I  
REMINDER E-MAIL INVITATION  
TO POTENTIAL STUDY PARTICIPANTS

Hello,

If you have not already participated in this HPV survey, you still can! This is the last call for you to participate by completing this survey

([https://www.surveymonkey.com/s/survey\\_HP](https://www.surveymonkey.com/s/survey_HP)) on the topic of Human Papillomavirus (HPV). Little is known about how school nurses discuss the HPV disease and vaccine with parents/guardians of 11- to 12-year old females. *If you have already participated in this survey, I appreciate your effort and you do not need to do anything more.*

I obtained your email from the National School Nurse Association and I will not contact you for any other reason than to ask you to complete this survey. I will be sending out four email reminders and the link to the survey. Aside from the emails provided in this way, I will not retain the original email list beyond the completion of this study.

Your participation in completing this survey is voluntary and you can choose not to participate or discontinue your participation at any time. This web-based survey takes approximately 20 minutes to complete. There are no right or wrong answers, I am merely asking for your thoughts and perceptions.

There is text on the initial screen of the survey that explains all the details about the survey and your rights as a study participant. Please read this text carefully before you move to the survey. The responses of everyone taking survey will be collected as a group and individual responses will not be obtained. Your completion of the survey and submitting your responses implies your informed consent to participate in this research study. There is no way for me to know who participates, or to match your identifying information to your responses. The survey site will not provide me with any information regarding your IP computer address.

I am not aware of any risks to you in completing this survey. If you experience discomfort from the survey you can stop the survey at any time. If you are uncertain who you can discuss your concerns with regarding this survey, please email me at my email address below. I will help in resolving any issues or refer you to someone to speak with about the problem. Although it is not the University's policy to compensate or provide medical treatment for persons who participate in studies, if you think you have been harmed as a result of participating in this study, please call the IRB Administrator of UMKC's Social Sciences Institutional Review Board at [816-235-5927](tel:816-235-5927).

Here is the link [https://www.surveymonkey.com/s/survey\\_HP](https://www.surveymonkey.com/s/survey_HP) to the study.

Thank you very much for your participation.

Jacqueline A. Bartlett, PhD(c), RN  
PhD Nursing Student  
University of Missouri—Kansas City  
[jab225@mail.umkc.edu](mailto:jab225@mail.umkc.edu)

## APPENDIX J

Letter of Support from the  
National Association of School Nurses

April 29, 2011

Jacqueline A. Bartlett, MSN, MBA HCM, RN  
School of Nursing  
University of Missouri – Kansas City  
2464 Charlotte Street  
Kansas City, MO 64108

Dear Ms. Bartlett:

Please accept my commitment, and that of the National Association of School Nurses (NASN), to your proposed research project. The project, Shared Decision-Making Inventory Instrument: Psychometric Tool Development, is novel and will expand nursing knowledge. This research reflects the mission and immunization position statement of the National Association of School Nurses. The project has the potential to answer key questions regarding the barriers and facilitators nurses encounter when discussing the HPV vaccine with parents and 11- to 12- year old females. Furthermore, findings from your dissertation project will promote future school nurse intervention research projects.

NASN believes school nursing is a specialized practice of professional nursing that advances the well-being, academic success and life-long achievement and health of students. This research project is harmonious with NASN's position statement that immunizations are a key to primary prevention of disease from infancy through adulthood. We see strong potential to build the knowledge and research base with your research project, while also benefiting the constituents of NASN.

We hope that your proposal receives a favorable review and we look forward to working with you on this project.

Sincerely,

A handwritten signature in cursive script, reading "Martha Dewey Bergren".

Martha Dewey Bergren, DNS RN NCSN FNASN FASHA  
Director of Research  
National Association of School Nurses

APPENDIX K  
PARTICIPANT RECRUITMENT PROTOCOL

## Participant Recruitment Protocol

1. The NASN mailing list order form will be completed and sent to NASN.
2. Upon receipt of the mailing list, and in order to minimize mass e-mailing effect, the distribution list was divided into distribution lists containing 100 e-mail aliquots per list.
3. Participants will be e-mailed an enrollment script (Appendix G) via the PI's gmail.com account (the UMKC Outlook Web Access point only allows 5 e-mails containing a distribution list of 100 e-mails each while the gmail.com account allowed 10 e-mails containing a distribution list of 100 e-mails each) which contained a link to the SDMI-R survey administered via SurveyMonkey™. Ten e-mails were sent out daily for the first e-mail solicitation (E-mails were sent at 0800 beginning November 7, 2011, ending November 18, 2011).
4. If a participant elected to not complete the survey and to address the issue of intrusion in subsequent e-mails the PI apologized for the intrusion. If the participant sent an e-mail asking the PI to take them off the distribution list, the PI removed the participant's e-mail address from subsequent mailings.
5. The first reminder e-mails began on November 20, 2011 which included the enrollment script (Appendix J).
6. The second reminder e-mails began on December 5, 2011



7. At the end of completing the survey, participants were thanked for their participation via SurveyMonkey™

APPENDIX L

SHARED DECISION-MAKING INVENTORY-REVISED

**SHARED DECISION MAKING INVENTORY--REVISED  
FOR HUMAN PAPILLOMAVIRUS (HPV) VACCINATION**

*Please mark only ONE answer for each statement.*

**The following statements are about the Human Papillomavirus (HPV).**

	True	False	Don't know / Not sure
DK1. HPV is a sexually transmitted infection (STI).			
DK2. The primary cause of cervical cancer is HPV.			
DK3. Genital HPV infections tend to be symptomatic.*			
DK4. The same HPV genotypes that cause cervical cancer cause genital warts.*			
DK5. The most common STI among adolescents is HPV.			
DK6. HPV status, determined by testing, should occur before a HPV vaccine is given.*			
DK7. Pre-teens who have been diagnosed with HPV should not be given the HPV vaccine.*			
DK8. Condoms may reduce the risk of HPV infection.			
DK9. Risk factors associated with HPV infections include: infected with other STIs, being immunocompromised, and the age at first sexual activity.			
DK10. A pregnancy test should be performed prior to giving HPV vaccine.*			

**The following statements are about both HPV vaccines (Gardasil™ and Cervarix™).**

	True	False	Don't know / Not sure
VK1. The HPV vaccine is recommended for females 11-12 years of age.			
VK2. The HPV vaccines protect against cervical cancer.			
VK3. Both HPV vaccines require a series of three injections to be given over a six-month period.			
VK4. Both HPV vaccines protect against genital warts.*			
VK5. Even though the HPV vaccine was obtained, Pap tests should be obtained every three years if a female has been sexually active for three years or more, or they are over 21 years old.			
VK6. HPV vaccines only protect against specific HPV genotypes.			
VK7. HPV vaccines are not a HPV treatment.			
VK8. HPV vaccines are most effective if completed before any sexual activity.			
VK9. HPV vaccines could cause a female to acquire HPV.*			
VK10. HPV vaccines could cause a female to become sterile.*			

**How strongly do you agree or disagree with the following statements regarding the vaccines available?**

	Strongly Agree	Agree	Neutral Not Sure	Disagree	Strongly Disagree
A1. Vaccinations are an important part of pre-teen's healthcare.					
A2. The FDA approved the HPV vaccines, they are safe to administer.					
A3. If a pre-teen receives the HPV vaccine they are more likely to have sex at an earlier age.*					
A4. It is important to keep pre-teens up-to-date on their vaccinations.					
A5. Vaccinating a pre-teen against HPV will prevent them from acquiring HPV.					
A6. If pre-teen do not ever receive the HPV vaccine, it is likely that they will acquire the HPV infection someday.					

**How confident are you that you can:**

	Extremely confident	Very Confident	Confident	Somewhat confident	Not at all confident
SE1. I can complete a HPV vaccine assessment at each pre-teen encounter.					
SE2. I can teach the pre-teen and her parents/guardians about behavioral messages and skills that will reduce their risk for HPV.					
SE3. I can discuss with the parents/guardians how the two vaccines are interchangeable.					
SE4. I can access written materials (i.e. brochure) on how to prevent the HPV disease for parents and pre-teens to review.					
SE5. I can access written materials (i.e. brochure) about the HPV vaccine for parents and pre-teens to review.					

	Extremely confident	Very Confident	Confident	Somewhat confident	Not at all confident
SE6. I can provide parents one-on-one education about their pre-teen's risk of HPV.					
SE7. I can provide parents one-on-one education about their pre-teen's risk of HPV aided by computer-generated decision aids (i.e. video or program).					
SE8. I can provide parent group education about pre-teens' risk of HPV.					
SE9. I can provide parent group education about pre-teens' risk of HPV aided by computer-generated decision aids (i.e. video or program).					
SE10. I can provide a HPV vaccine report to the pre-teen's primary care provider.					

Thinking about your practice:

	Strongly Agree	Agree	Neutral Not Sure	Disagree	Strongly Disagree
I1. In the last 60 days, I did regularly encourage the parents of 11-12 year old females to get their daughters vaccinated against HPV.					
I2. In the next 60 days, I intend to regularly encourage the parents of 11-12 year old females to get their daughters vaccinated against HPV					
SD1. No matter who I am talking with, I am always a good listener.					

\*Denotes reverse scored items

**In your practice, what have been pre-teens' reasons for not wanting the HPV vaccine?**

(Check all that apply.)

- ☐ Fear of pain
- ☐ Inconvenient (multiple visits)
- ☐ Does not understand risks/benefits
- ☐ Vaccine effectiveness not long enough
- ☐ Too young
- ☐ Fear of parents reaction about being sexually active
- ☐ Other (please specify): \_\_\_\_\_

**Do you provide direct care to pre-teens?** ☐ Yes

☐ No

**Demographic data:**

**Year born:**

☐ 1909-1945

☐ 1946-1964

☐ 1965-1979

☐ 1980-1990

☐ > 1991

**Gender:**

☐ Male

☐ Female

**Have you initiated/completed the HPV vaccine series?**

☐ Yes ☐ No

**Have you been diagnosed with an abnormal Pap?**

☐ Yes ☐ No

**Have any of your relatives, or friends, been diagnosed with an abnormal Pap?**

☐ Yes ☐ No ☐ Don't know

**Employment Status:**

☐ Full time ☐ Part time ☐ Retired

**Please specify the state in which you work:**

**Please describe your education:**

☐ LPN

☐ Registered Nurse (AD, Diploma, BSN)

☐ Advanced Practice Nurse (MS, MSN, PNP, FNP, NNP, CNS, etc.)

☐ DNP, PhD

☐ Other (please specify): \_\_\_\_\_

**Please provide how many years you have been an RN:**

**Please provide how many years you have been a school nurse:**

**Please describe your school location:**

☐ Urban/Suburban

☐ Rural

**Please describe your school district size:**

- ☐ Small (< 999)
- ☐ Medium (1,000-4,000)
- ☐ Very large (> 4,000)

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## VITA

Jacqueline Ann Bartlett was born on August 16, 1957 in LeMars, Iowa. She received her primary and secondary education at Gehlen High School, LeMars, Iowa. She received her Bachelor of Science in Nursing degree at Mount Mercy College, Cedar Rapids, Iowa in 1979. In 2007 she attained a Masters in Nursing and Business Administration from the University of Phoenix, Phoenix, Arizona.

Ms. Bartlett worked at the University of Iowa in the Pediatric Nursing Division for nine years before relocating to Kansas City, Missouri to work at Children's Mercy Hospitals and Clinics. It is through her clinical experiences in working with children that Ms. Bartlett recognized the patient, or client, and family needs to be the center of decision-making. Ms. Bartlett's research interest is shared decision making.

In 2001, Ms. Bartlett assumed the role of Evidence Based Practice Program Manager at Children's Mercy Hospitals and Clinics. Ms. Bartlett has mentored staff nurses and clinical nursing instructors in the design and implementation of interventional studies and instrument development studies. Upon completion of her degree requirements, Ms. Bartlett plans to continue her career in pediatric evidence based practice and build a program of research focused on increasing the use of shared decision-making discussions with children and their families.

Ms. Bartlett is a member of the Midwest Nursing Research Society, the Society of Pediatric Nurses, the National Association of School Nurses and Sigma Theta Tau International. Ms. Bartlett was awarded the Dee Lyons Intramural Research Grant in 2011.