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Psychometric Evaluation of the Shared Decision-Making Instrument–Revised

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Abstract

The purpose of this study was to evaluate the psychometric properties of the Shared Decision-Making Inventory–Revised (SDMI-R) to measure four constructs (knowledge, attitudes, self-efficacy, and intent) theoretically defined as vital in discussing the human papillomavirus (HPV) disease and vaccine with clients. The SDMI-R was distributed to a sample (N = 1,525) of school nurses. Correlational matrixes denoted moderate to strong correlations, indicating adequate internal reliability. Reliability for the total instrument was satisfactory (α = .874) along with Attitude, Self-Efficacy and Intent subscales .828, .917, .891, respectively. Exploratory factor analysis revealed five components that explained 75.96% of the variance.

Keywords

instrument development, methods, immune, clinical focus, shared decision-making, community, location of care, school nurses, pediatrics, population focus

Almost 75% of human papillomavirus (HPV) infections occur within the 15- to 24-year-old population. Although the majority of HPV infections (90%) resolve spontaneously (Centers for Disease Control and Prevention [CDC],

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2007; Moscicki, 2005; Trottier & Franco, 2006; Weinstock, Berman, & Cates, 2004), some HPV infections persist and can result in cervical, vaginal, vulvar, and/or anal cancer later in life (CDC, 2010a). There is no cure for the HPV disease (CDC, 2009). However, if females between 16 and 23 years old receive the HPV vaccine prior to the onset of sexual activity, a higher anti-HPV type-specific immune response would result compared with the natural immune response (Block et al., 2006). The vaccine antibodies have been proven to protect against specific HPV types for 6.4 years or longer (Romanowski et al., 2009). Since 2006, HPV vaccines have been available to females between 9 and 24 years of age and recommendations are that the vaccine is initiated in the 11- to 12-year-old female (CDC, 2007; United States [U.S.] Food and Drug Administration [FDA], 2010). The HPV vaccine prevents cervical, vaginal, vulvar, and anal cancer in later life (CDC, 2007; U.S. FDA, 2010). Although it has been 6 years since the HPV vaccine has been recommended, receipt remains suboptimal (Wong, Wai Lee, & Saraiya, 2010) with less than 50% of 13- to 15-years old adolescent females having initiated the HPV vaccine series and less than 25% of this group has completed the series (CDC, 2010b).

Kathleen Sebelius (2010), Secretary of Health and Human Services, identified school nurses' as the only consistent source of health care services for the uninsured child. There were more than 66,000 practicing school nurses (National Association of School Nurses [NASN] & American Nurses Association [ANA], 2011) among an estimated 3 million nurses in the United States (Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing at the Institute of Medicine [IOM], Robert Wood Johnson Foundation, & IOM United States, 2011). School nurses are in an optimal role to promote HPV vaccination among 11- and 12-year-old females and their parents; however, little research has been conducted on the role of school nurses and their influence on HPV vaccinations. There is a lack of published literature measuring how school nurses are affecting the receipt of the HPV vaccine by entering into a shared decision-making counseling session with the parents and 11- to 12-year-old females. 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. The purpose of this research project was to develop and determine the psychometric properties of the Shared Decision-Making Inventory (SDMI) instrument to develop effective interventions programs, with school nurses, to promote shared decision-making and increasing the receipt of the HPV vaccine.

School Nurses Shared Decision-Making Role in HPV Counseling

In a review of the literature regarding the receipt of the HPV vaccine, study participants have primarily been 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 who do, not all consistently recommend the vaccine to parents (Bartlett & Peterson, 2011). This is concerning, as the United States continues to experience a rise in cervical and anal cancer diagnoses and deaths, even with the development of the Pap test and anal cancer screening, respectively (American Cancer Society, 2011). The Pap test and the anal cancer screening are diagnostics used to determine whether the individual has the disease, whereas, the HPV vaccine is a public health primary prevention intervention to decrease the risk of becoming infected with the disease.

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. Second, parents must make an informed health care decision with the assent of his or her 11- to 12-year-old daughter to seek and comply with administration of the vaccine.

Recognizing that individuals should play an active role in the management of their own health, organizations have suggested that clinicians use informed and shared decision-making (ISDM) discussions with clients when relating health care options (Centers for Medicare and Medicaid Services, 2008; Institute for Healthcare Improvement, 2011; IOM U.S. Committee on Quality of Health Care in America, 2001; The Joint Commission, 2008). The Task Force on Community Preventive Services developed the ISDM framework (see Figure 1) to promote cancer prevention interventions at the community and individual levels. As the name implies, the framework defines two decision-making aspects, informed decision-making (IDM) and shared decision-making.

IDM is a range of community or health care 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, Whelan, & Gafni, 1999). IDM

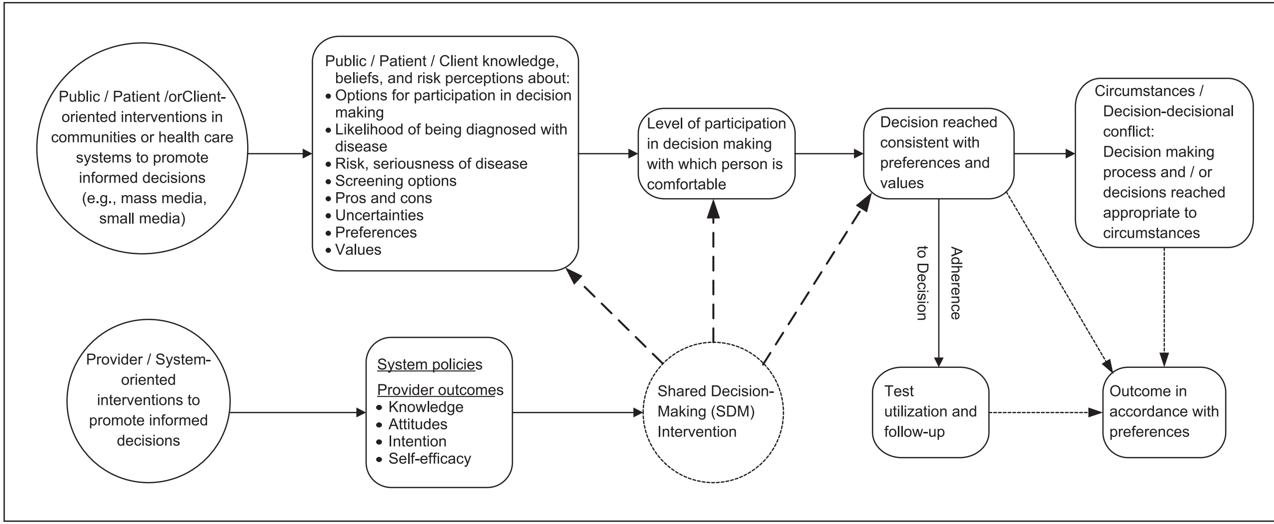

Figure 1. Informed and Shared Decision-Making framework (Briss et al., 2004)

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). IDM provides enough information for individuals to make an informed choice or they may see a health care provider to discuss their health concerns and gain the necessary information and guidance to make an informed health care decision (Briss et al., 2004; Charles et al., 1999).

Shared decision-making is a mechanism in which the provider collaborates with the client, shares health information, and guides the client in making a knowledgeable and informed health care 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). Shared decision-making interventions occur only if the health care 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). The health care provider entering into a shared decision-making discussion 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. It is important to quantify school nurses' knowledge, attitudes, self-efficacy, and intent to promote the HPV vaccine with parents and 11- to 12-year-old females to mitigate the cancerous effects caused by the HPV disease.

Purpose

The purpose of this study was to develop a valid and reliable instrument, the SDMI, to measure school nurses' ability to counsel parents and females between 11 and 12 years of age about the HPV disease and vaccine. The primary research questions for this study were as follows:

Research Question 1 (RQ1): To what extent did the Shared Decision-Making Inventory–Revised (SDMI-R) demonstrate internal consistency and reliability?

Research Question 2 (RQ2): 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)?

Research Question 3 (RQ3): To what extent did the resulting factors demonstrate reliability as independent factors?

Table 1. Constructs, Item, and Item Origin

Construct	Number of Items	Origin
Disease knowledge	10	Beatty, O'Connell, Ashikaga, & Cooper, 2003; Daley et al., 2010
Vaccine knowledge	10	Kahn et al., 2009
Attitude	6	Gerend, Weibley, & Bland, 2009; Kahn et al., 2009
Health counseling self-efficacy	10	Borrelli, Lee, & Novak, 2008; Buckelew, Adams, Irwin, Gee, & Ozer, 2008; Ozer et al., 2004; Perkins, Pierre-Joseph, Marquez, Iloka, & Clark, 2010
Intent	3	Chabot, Godin, & Gagnon, 2010; Feemster Winters, Fiks, Kinsman, & Kahn, 2008; Jones & Cook, 2008

Development and testing of the SDMI was a three-phase process: the instrument development phase, the preliminary study phase, and the psychometric testing phase. Approval to conduct the second and third phases of this study was obtained from the appropriate institutional review board.

Phase 1: Instrument 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 cannot be directly measured, therefore researchers must employ other surrogate measures, such as an instrument that contains attributes, or items, that study participants identify as a construct attribute and rate accordingly (Pett, Lackey, & Sullivan, 2003). The instrument items were theoretically and deductively developed and purposefully did not include inductive, intuitive, or biased items.

Item development. With the conceptual dimensions guiding instrument development, several of the instrument items were adapted from or modeled after sample questions identified in the HPV literature (see Table 1). For the items obtained from the literature review, authors' consent was acquired. For the preliminary study, there were a total of 39 items (see Table 1).

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 Likert-type scaled items measured the variables of attitude, self-efficacy, and intent. The 5-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 variable. The anchors for the attitudes and intent items were *strongly agree* to *strongly disagree*. For the self-efficacy variable, the responses were in a step-down pattern with the anchors being *extremely confident* and *not at all confident* while the neutral position was titled *confident*. Nine items were reverse scored to mitigate response set bias (Idaszak & Drasgow, 1987).

Face validity. Prior to testing the instrument, the primary investigator (PI) sought expert review of the SDMI to validate the content. The NASN researcher group, as well as local infectious disease and adolescent health experts, provided face validation of the instrument. For this critique, these experts evaluated how well the SDMI measured the variables of knowledge, attitudes, self-efficacy, and intent related to the HPV disease and vaccine. Minor revisions occurred to the instrument based on this review.

Phase 2: Preliminary Study Phase

The preliminary study phase was designed to identify potential flaws in the SDMI.

Setting and sample. There were 202 attendees at a regional immunization conference in June 2011. In all, 162 attendees received the SDMI packet that included a solicitation letter and the SDMI survey with 138 attendees providing study data. This response rate reflects an 85% response rate.

Analysis. Analysis of the close-ended and scaled items occurred separately. The close-ended knowledge item responses (N = 5,520) identified 150 (2.7%) missing data points. For the Likert-type scaled items, responses indicated that 12 participants had greater than two (10%) missing responses, resulting in 126 participants in the sample. For participants with less than two missing responses, a calculated mean was inserted for the missing data points (Tabachnick & Fidell, 2007). The high response rate and the low rate of missing responses indicated that the participants had no difficulties completing the SDMI.

Interitem correlation tables were developed for the closed-ended and Likert-type scaled items. This analysis revealed that each item correlated at least once with other items with the number of interitem correlations ranging from 1 to 10. As the participants were not all school nurses, it seemed prudent to retain all items for the dissertation study.

The Likert-type scaled items were analyzed through principal components factor analysis. Results of the principal components factor analyses identified four factors (see Table 2). While these factors accounted for 68.8% of the variance, the intent items loaded within the self-efficacy items (see Table 2).

Table 2. Preliminary Study Pattern Matrix

	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			

Note: A = attitudes; SE = self-efficacy; I = intent. Four components extracted. Extraction method: principal components analysis.

This item loading indicated that the self-efficacy and intent items measured the same construct. In further analysis of 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.

Instrument revisions. In revising the intent questions for the instrument, Ajzen and Fishbein (2005) recommended that researchers prepare items that have the participant look backward in time to identify whether a behavior is already part of their work. In addition, the participant is asked to project into the future to determine whether she or he plans to incorporate the behavior into his or her work (Ajzen & Fishbein, 2005). The following two items were added to the SDMI-R: Item I1, “In the next 60 days, I intend to regularly encourage the parents of 11- to 12-year-old females to get their daughters vaccinated against HPV,” and Item I2, “In the last 60 days, I regularly encouraged the parents of 11- to 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). The anchors for the revised intent items Likert-type scales remained the same as the SDMI, *strongly agree* to *strongly disagree*.

A social desirability (SD) item from the Marlowe–Crown Desirability Scale was added (Crowne & Marlowe, 1964). The item SD1, "No matter who I am talking with, I am always a good listener," was positioned after the intent questions. The Likert-type scale for this item was the same item used for the revised intent items.

Phase 3: Psychometric Testing Phase

The SDMI-R consisted of 39 items. The knowledge, attitudes, and self-efficacy items remain unchanged from the original instrument. The maximum scores for knowledge, attitudes, self-efficacy, intent, and social desirability were 100, 30, 50, 10, and 5, respectively. The minimum scores for the five constructs were 0, 6, 10, 2, and 1.

The range of sample sizes found in the literature is between 10 and 15 participants per item (Pett et al., 2003), to more than 1,500 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 2,084 would exceed the largest sample size identified for instrument development.

Sample. Potential participants for this study were selected from the NASN database of members who provided their e-mail address to the association. Inclusion criteria consisted of school nurses living in the United States who self-identified to work in an elementary or middle school environment with students who 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.

Data collection. The sample of school nurses were solicited by an e-mail and the survey was administered via SurveyMonkey™. The potential 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 and subsequent e-mails sent to the potential participant and the informed consent screen of SurveyMonkey™.

Of the 10,416 surveys originally mailed, 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 that she or he did not want to participate in the study. Two school districts requested removal of 29 e-mail addresses from the mailing list. After the removal of these potential participants, reminder e-mails were 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 and 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 therefore were removed from statistical analyses resulting in 1,525 study participants (Pett et al., 2003). Of the 1,525 respondents, 49 participants did not complete the demographic portion of the survey though 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 survey.

Measures. In addition to the 39-item SDMI-R, the survey collected demographic information, including gender, age, educational level, number of years as a nurse and as a school nurse, and school description. Data were gathered using a dichotomous response option for gender and categorical responses for age group, education level, number of years as a nurse and school nurse, and school description. These data were analyzed to portray the study participants.

Analysis. All data from the SDMI-R were exported from Survey Monkey™ into the Statistical Package for the Social Sciences (SPSS), Windows Version 19.0 (SPSS, Chicago, IL, United States) for analyses. Prior to performing any statistical analyses, the negatively worded items of the SDMI-R were recoded. There were not any missing responses in the data set. The data were examined to determine the normality of distribution of scores on each of the variables and no outliers were identified. The data for all participants were examined and then the data were aggregated by variable. The aggregate variable data are presented in Table 3 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.

Results. As is typical of the nursing profession, the participants were primarily female (n = 1,464; 96%). A majority (n = 1,009; 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.

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

Table 3. Means, Standard Deviations, Skewness, and Kurtosis for Assessed Variables (N = 1,525)

Variable	*M*	*SD*	Skewness	Kurtosis
Knowledge	75.03[a]	12.03	−1.488	4.23
Attitude	9.56[b]	3.17	1.857	5.143
Self-efficacy	32.95[c]	9.35	−.327	−.438
Intent	5.47[d]	2.41	−.181	−.907

Note: Higher scores denote greater levels of the variable.
a. Maximum score = 100.
b. Maximum score = 30.
c. Maximum score = 50.
d. Maximum score = 10.

from this study are compared with Bergren and Monsalve's (2012) demographics in Table 4.

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

RQ1. The SDMI-R demonstrated internal consistency and reliability. Internal consistency, determined by the results of a correlational matrix, revealed that knowledge items had modest interitem correlations whereas the three remaining Likert-type scaled constructs had moderate to strong interitem correlations. The interitem analysis revealed that each item correlated with at least 12 of the other items.

Reliability of the social desirability item and the three Likert-type scaled constructs was analyzed by reviewing the overall Cronbach's alpha (α = .871) to the Cronbach's alpha (α = .874) if the social desirability item was deleted. Removing this item from the SDMI-R did not alter the overall Cronbach's alpha negatively, thus the responses in this study reflect the personal norms of the participants and removing the social desirability item from further analysis was acceptable. The Cronbach's alpha of .874 for attitude, self-efficacy, and intent is considered very good by established acceptable criteria (Nunnally, 1978). The three theoretically derived subscales also achieved adequate reliability. The Attitude subscale attained a reliability coefficient of .828, while the Self-Efficacy subscale realized a .917 reliability coefficient, and the Intent subscale achieved a .891 reliability coefficient.

Table 4. Participant Demographics

	SDMI-R	NASN Membership Survey[a]
	n (%)	*n* (%)
Gender		
Male	12 (1)	14 (1)
Female	1,464 (96)	3,124 (99)
Missing	49 (3)	
Birth year range		
1964-1909 (47-102 years old)	1,027 (67)	1,977 (63)[b]
1979-1965 (32-46 years old)	387 (25)	815 (26)[b]
1990-1980 (21-31 years old)	57 (4)	314 (10)[b]
After 1991 (less than 20 years old)	5 (1)	63 (2)[b]
Missing	49 (3)	
Education		
Licensed practical nurse	27 (2)	408 (13)
Associate degree in nursing/diploma	207 (14)	1,632 (52)
Bachelor (BS, BA, BSN)	806 (53)	973 (31)
Advanced degree (nurse practitioner, masters, clinical nurse special, doctorate)	410 (26)	
Other	26 (2)	126 (4)
Missing	49 (3)	
Years		
0-10		
As a nurse	160 (10)[c]	251 (8)
As a school nurse	793 (52)[c]	1,475 (47)
11-20		
As a nurse	296 (19)[c]	722 (23)
As a school nurse	506 (33)[c]	1,192 (38)
21-30		
As a nurse	392 (26)[c]	1,004 (32)
As a school nurse	149 (10)[c]	408 (13)
31+ years		
As a nurse	628 (41)[c]	1,161 (37)
As a school nurse	23 (2)[c]	1,161 (37)
Missing		
As a nurse	49 (3)[c]	5 (<1)
As a school nurse	54 (4)[c]	101 (3.2)
School description		
Department of Defense	3 (1)[c]	
Charter, parochial, private	138 (8)[c]	188 (6)
Public	1,327 (87)[c]	2,532 (81)
Other	8 (1)[c]	
Missing	49 (3)[c]	408 (13)

Note: SDMIR-R = Shared Decision-Making Inventory–Revised; NASN = National Association of School Nurses.
a. Bergren and Monsalve (2012).
b. Due to percentage rounding participants do not equal 3,138.
c. Due to rounding percentages do not equal 100%.

RQ2. The results of the EFA supported the Shared Decision-Making theoretical framework. EFA is a stepwise evaluation process beginning with the analysis of the correlation matrix that identified strong and very strong correlations signifying item redundancy. As this is the first group testing the SDMI-R, this researcher elected not to delete any items. Prior to EFA, the data were examined through Bartlett's test of sphericity to ascertain if there were a significant number of correlations to proceed to factor analysis. Bartlett's test was significant, $\chi^2(153) = 21{,}720.689$; $p < .0001$. Pedhazur and Schmelkin (1991) cautioned 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. The Kaiser–Meyer–Olkin test range is between 0 and 1 with higher values (>.60) indicating factor analysis is appropriate (Tabachnick & Fidell, 2007). The Kaiser–Meyer–Olkin for the SDMI-R was .813 and therefore appropriate to proceed to factor analysis.

The principal components analysis with varimax and direct oblimin rotation were used to identify the underlying factors of the SDMI-R (Pett et al., 2003; Thompson, 2004). Using these tests allowed for comparison between uncorrelated and correlated solutions (Nunnally, 1978). Data from the principal components analysis with varimax rotation were uninterpretable. In examining the data from the principal components analysis with direct oblimin rotation, five distinct factors were identified and together these factors explained 75.96% of the variance. Each of the five factors had an eigenvalue >1.0 with each of the factors explaining >5% of the variance. The scree plot validated five factors. The 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 (see Table 5). The five factors support the Shared Decision-Making framework though the self-efficacy and attitude items further subdivided into four contextually different factors related to counseling, acquisition of decision aids, and positive and negative HPV attitudes. The 18 Likert-type scaled items produced a Cronbach's alpha of .874, which reflects very good reliability (DeVellis, 1991).

RQ3. 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 ($\alpha = .966$). As these factors are statistically robust and grounded in theory, it is reasonable to assume that they can describe

Table 5. Pattern Matrix

	Component				
	1	2	3	4	5
A1. Vaccinations are an important part of preteen's health care.		.861			
A2. The FDA approved the HPV vaccines, they are safe to administer.		.432		−.581	
A3. If preteens receive the HPV vaccine, they are more likely to have sex at an earlier age.		.857			
A4. It is important to keep preteens up-to-date on their vaccinations.		.792			
A5. Vaccinating a preteen against HPV will prevent them from acquiring HPV.				−.987	
A6. If preteen do not ever receive the HPV vaccine, it is likely that they will acquire the HPV infection someday.				−.970	
SE1. I can complete a HPV vaccine assessment at each preteen encounter.	.787				
SE2. I can teach the preteen and her parents/guardians about behavioral messages and skills that will reduce their risk for HPV.	.680				
SE3. I can discuss with the parents/guardians how the two vaccines are interchangeable.	.759				
SE4. I can access written materials (i.e., brochure) on how to prevent the HPV disease for parents and preteens to review.					.912
SE5. I can access written materials (i.e., brochure) about the HPV vaccine for parents and preteens to review.					.924
SE6. I can provide parents one-on-one education about their preteen's risk of HPV.	.712				
SE7. I can provide parents one-on-one education about their preteen's risk of HPV aided by computer-generated decision aids (i.e., video or program).	.759				
SE8. I can provide parent group education about preteens' risk of HPV.	.855				
SE9. I can provide parent group education about preteens' risk of HPV aided by computer-generated decision aids (i.e., video or program).	.841				
SE10. I can provide a HPV vaccine report to the preteen's primary care provider.	.559				
I1. In the last 60 days, I did regularly encourage the parents of 11- to 12-year-old females to get their daughters vaccinated against HPV.			.922		
I2. In the next 60 days, I intend to regularly encourage the parents of 11- to 12-year-old females to get their daughters vaccinated against HPV.			.918		

Note: A = attitudes; FDA = Food and Drug Administration; HPV = human papillomavirus; SE = self-efficacy; I = intent. Rotation converged in eight iterations. Extraction method: principal components analysis. Rotation method: Oblimin with Kaiser normalization.

shared decision-making behavior. Subsequent testing of the SDMI-R will provide statistical confirmation of this assumption.

Discussion

The validity and reliability of the SDMI-R was based on the principles and procedures suggested by Nunnally (1978) and Pett et al. (2003). The initial

SDMI used in the preliminary testing phase was revised for the psychometric testing phase and renamed to be the SDMI-R. The resulting instrument had a total of 39 items.

Face validity of the SDMI-R was supported through item evaluation by a panel of content experts and results of the preliminary testing phase. The SDMI-R demonstrated high internal consistency reliability, with modest interitem correlations of the knowledge items. The individual Likert-type scaled constructs interitem correlations and the associated Cronbach's alphas indicated potential item redundancy in the self-efficacy construct. The redundancy concern diminished when the 19 items were combined and the Cronbach's alpha decreased and was interpreted to be very good by established acceptable criteria (Nunnally, 1978). Redundancy can be alleviated by removal of items from the instrument (Pett et al., 2003). Further testing of the instrument in diverse populations is needed prior to further instrument refinement.

Principal components analysis with direct oblimin rotation of the three Likert-type scaled items resulted in five factors instead of the predicted three factors found in the theoretical model. Each of the five factors demonstrated high reliability with alphas ranging from .794 to .966. These five factors explained a substantial amount of the variance (Nunnally, 1978).

Construct validity was demonstrated in two ways. First, the review of the literature analyzed the essence of the constructs measured in the instrument (Bartlett & Peterson, 2011). Second, EFA examined the construct relationships within the tool and also between the items within each Likert-type scaled construct. These findings are consistent with other studies that examine practitioner's adoption of shared decision-making and parental vaccine acceptance (Austvoll-Dahlgren & Helseth, 2010; Jackson et al., 2011; LeBlanc, Kenny, O'Connor, & Légaré, 2009; Legare et al., 2010).

Prior to the development of the SDMI-R, researchers were unable to evaluate the shared decision-making constructs in this context. This current study provides initial evidence of internal reliability, construct validity, and the multidimensionality of the SDMI-R. The development of a valid and reliable measurement of shared decision-making is important to identify nurses who are not likely to enter into a HPV shared decision-making counseling session with parents and 11- to 12-year-old females. The lack of shared decision-making could lead to the delay in the receipt of the life-saving HPV vaccine. This instrument will assist school nurses in testing interventions for establishing evidence-based shared decision-making standards.

Recognizing the societal and public health ramifications related to females' exposure to HPV, school nurses should 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. In addition, 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 the shared decision-making process when discussing health options with health care providers. This study sets the foundation for school nurses to practice at the optimum level of their competencies as suggested by the Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing at the IOM, Robert Wood Johnson Foundation, & IOM United States (2011).

This study had several limitations, which have been identified. First, the study began in the middle of November and was open until late December. Realizing that school nurses have a heightened awareness about immunizations at the beginning of the school year, the 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. Second, even though the school nurses provided their e-mail address as a contact point to the NASN, there were five different limitations with using e-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.

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 78% of the population electing not to complete the survey might be different from the group completing the survey. Having identified similar demographics in the study sample and in the NASN survey suggests that the study sample and participants in the NASN survey were the same group of school nurses. The NASN members represent 25% of the school nurse population in the United States. These limitations may have restricted the range of scores in this study.

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 could promote receipt of the HPV vaccine and ultimately, reduce the risk of cervical cancer in future generations.

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