

Measuring perceptions of innovation adoption: the diffusion of a federal drug prevention policy

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Abstract

The purpose of this paper is to describe the testing of a new scale to assess the perceived attributes of a federal drug prevention policy. The 17-item scale was administered to 107 Safe and Drug Free Schools (SDFS) coordinators in 12 states as a part of a larger investigation examining the diffusion of a federal drug prevention policy. In developing this scale, the authors drew from theory, previously validated measures, expert review and pre-testing with SDFS coordinators. Factor analysis revealed three underlying constructs representing relative advantage/compatibility, complexity and observability. The constructs found were internally consistent with a Cronbach's α ranging from a high of 0.89 for relative advantage/compatibility to a low of 0.71 for observability. Each of these constructs was correlated with a district's adoption of the policy in predictable ways. The construct of relative advantage/compatibility appears to be especially useful in assessing policy adoption. This scale was developed to assess a specific innovation; however, we believe that it can be easily adapted to understand the adoption of other health education interventions.

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Introduction

As health education research has advanced it has become increasingly clear that there is a gap between what is known through research and what is done in practice (Parcel *et al.*, 1989; Johnson *et al.*, 1996; Nutbeam, 1996a,b; Brownson and Simoes, 1999; Arthur and Blitz, 2000; Learmonth, 2000). For example, within the realm of substance use prevention, several curricula have demonstrated the ability to produce behavioral outcomes, yet most of the substance use prevention curricula available and used in schools have either been proven ineffective or have not been evaluated (Hansen, 1992; Dusenbury *et al.*, 1997; Silvia *et al.*, 1997). If we are to diminish this gap, it is important to know not only why and how interventions work, but also how to encourage the adoption of effective interventions in practice.

Diffusion of innovation theory provides a useful framework for studying the adoption process. Diffusion studies have found that the way targeted adopters perceive the attributes of an innovation is critical and that these perceptions account for 49–87% of the variance in whether or not they adopt (Rogers, 1995). Perceived attributes of an innovation include:

- *Relative advantage*—the degree to which an innovation is perceived as better than the idea it supersedes (p. 250). The higher the perceived relative advantage, the more likely the innovation will be adopted.
- *Compatibility*—the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential

adopters (p. 250). If the innovation is perceived as an extreme change, then it will not be compatible with past experiences and is less likely to be adopted.

- *Complexity*—the degree to which an innovation is perceived as relatively difficult to understand and use (p. 250). Innovations that are perceived as complex are less likely to be adopted.
- *Observability*—the degree to which the results of an innovation are visible to others (p. 251). If the observed effects are perceived to be small or non-existent, then the likelihood of adoption is reduced.
- *Trialability*—the degree to which an innovation may be experimented with on a limited basis (p. 251). This may include trying out parts of a program or having the opportunity to watch others using a new program. Trialability is positively related to the likelihood of adoption.

This paper describes the testing of a new scale to assess the perceived attributes of a particular innovation, the Principles of Effectiveness. The Principles comprise a new federal policy which requires school districts, and other recipients of Safe and Drug Free Schools (SDFS) funds, to: (1) conduct a thorough assessment of the nature and extent of youth drug use and violence problems; (2) establish a set of measurable goals and objectives; (3) design and implement their programs for youth based on research or evaluation that provides evidence that the programs used prevent or reduce drug use, violence or disruptive behavior; and (4) evaluate their programs to refine, improve and strengthen them (Department of Education, 1998a). The Principles of Effectiveness were promulgated by the US Department of Education on 1 July 1998 and are designed to ensure that limited resources are used in the most effective way possible. Currently, the SDFS program provides funds for prevention and education to nearly every school district in the nation (Hantman and Crosse, 2000); however, school districts risk losing funding if they do not adopt the Principles of Effectiveness.

Despite the importance of innovation perception in adoption decision making, we found few meas-

urement instruments in the public health research literature. This is not surprising since less than 1% of articles from 12 leading public health and health promotion journals were categorized as diffusion research (Oldenburg *et al.*, 1999). Even among those studies classified as diffusion research, many have not addressed the perceived attributes of an innovation. Even fewer have assessed the diffusion of policy. We developed the current scale with items largely adapted from the diffusion research conducted by Brink *et al.* (Brink *et al.*, 1995), Steckler *et al.* (Steckler *et al.*, 1992), and Moore and Benbasat (Moore and Benbasat, 1991). Brink and Steckler's work focused on the diffusion of tobacco prevention curricula, while Moore and Benbasat focused on the adoption of information technology. Our goal was to develop a scale for measuring SDFS coordinator's perceptions about the Principles of Effectiveness, but we also believe that this scale can be adapted to measure the perceived attributes of other health education interventions.

There are at least two important uses for this type of scale. The first use is to determine the perceived attributes of a program before it is developed. With this information, a program developer could modify a program being developed so that it would be more likely to diffuse into practice. The second use is to determine the perceived attributes after the program is developed. With this information, those marketing the program could determine the most effective dissemination strategies. In doing this, they may choose to highlight attributes people perceive positively or to develop messages to improve perceptions that were negative. This can advance the field of health education by (1) developing new programs that are more easily diffused into widespread practice and (2) developing marketing strategies to diffuse effective programs based upon known predictors of program adoption.

Method

Data were collected as a part of a multi-year study examining the diffusion of a new federal SDFS

policy that requires school districts, and other recipients of SDFS funds, to adopt the Principles of Effectiveness. The overall study uses diffusion of innovation theory to evaluate the adoption of the Principles of Effectiveness. It includes two waves of district-level SDFS coordinator survey data.

The first survey was conducted in the fall of 1999 and focused on variables that have been found to affect the rate of adoption, including perceived attributes of the innovation, the type of innovation decision, the nature of the communication channels, extent of the change agents' promotion efforts and the nature of the social system. It also measured practices that related to the Principles of Effectiveness (e.g. programs implemented, evaluation activities completed), as well as indicators that sites are actively planning to adopt the Principles of Effectiveness.

The second survey contains items used to score the school district on the degree and quality of their adoption of the Principles of the Effectiveness. The present analysis uses data from these surveys to test whether the perception items are conceptually and internally consistent and whether they can predict adoption as would be expected theoretically.

Sample selection

SDFS coordinators were selected from two samples. In both cases, the district was selected and the SDFS coordinator was identified as the district respondent. The first was a convenience sample of SDFS coordinators from 104 school districts. These school districts were chosen because they resided in one of 60 communities designated as a Fighting Back (Saxe *et al.*, 1997), Community Partnership (Kaftarian and Hansen, 1994) or national evaluation comparison site (for either project) in 12 states across the US. School districts had been previously contacted for archived school survey data for a meta-analysis to assess the effects of school- and community-based prevention, but few had actually participated in the community intervention beyond a peripheral role. Of these, 81 (78%) completed wave I, and 67 (64%) completed both wave I and wave II. The

second sample includes a saturation sample of all 117 public school districts in North Carolina. Of these, 101 (86%) completed wave I, and 86 (74%) completed both wave I and wave II. Seven school districts were a part of both samples; therefore, there were 214 school districts total. One hundred seventy-five (82%) SDFS coordinators completed wave I, and 146 (68%) completed both wave I and wave II. The combined study sample had a higher proportion of large districts and urban districts than found in the nation overall (Department of Education, 1997–1998, 1999); however, school districts responding to the survey did not differ from non-respondents on either district size or urbanicity. Twenty-three percent of school districts completing both wave I and wave II were small (less than 2500 students), 40% were midsize (2500–10 000 students) and 38% were large (more than 10 000 students). In terms of urbanicity, 44% of responding school districts were rural, 30% were suburban and 26% were urban.

Each SDFS coordinator completing the wave I survey was asked whether they had received written or verbal information about the Principles of Effectiveness. Coordinators that had received information about the Principles at wave I completed additional questions regarding their perceptions of this policy. This paper reports data from the 107 SDFS coordinators who completed both surveys and reported receiving information about the Principles at wave I. The proportion of respondents who had received information about the Principles was similar for each of the two samples. Overall, larger districts and more urbanized districts were more likely to report that they had received information about the Principles. Eighteen percent of districts that reported receiving information about the Principles were small (less than 2500 students), 37% were midsize (2500–10 000 students) and 45% were large (more than 10 000 students). In terms of urbanicity, 38% of districts reporting receipt of information about the Principles were rural, 29% were suburban and 33% were urban.

Data collection procedures

All data were collected via a self-administered, mail questionnaire. SDFS coordinators were sent

a pre-notification letter informing them of the study and requesting their participation. Approximately 10 days later, SDFS coordinators were mailed the questionnaire. The questionnaire mailing included a cover letter and pre-addressed, postage-paid envelope for returning the questionnaire. As an incentive, the national sample received a US\$20 check with the questionnaire mailing and the North Carolina sample received a letter from the state SDFS director encouraging their participation. Two weeks after the first questionnaire mailing, SDFS coordinators were sent a postcard that both requested the participation of respondents that had not returned their questionnaire and thanked respondents that had returned the questionnaire. As a final attempt to reach non-respondents, we telephoned non-respondents to request that they complete the survey. When necessary, an additional questionnaire was mailed to the SDFS coordinator. All mailings were addressed to the SDFS coordinator by name, had a handwritten signature and used first class postage. The premise behind this methodology was that multiple contacts and personalization of contacts significantly increases mail survey response rates (Dillman, 2000). Similar data collection methods were used for wave I and wave II.

Measurement

Perceived attributes of the Principles of Effectiveness

The items for this scale were derived from previous diffusion research. Before writing items, instruments were collected from Steckler (Steckler, 1992), Brink (Brink, 1995), and Moore and Benbasat (Moore and Benbasat, 1991) as they contained examples of how the five perceived attributes (i.e. relative advantage, compatibility, complexity, observability and trialability) of an innovation could be operationalized. They were written using a Likert scale that ranged from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree' and were intended to include at least two items for each attribute. Experts in diffusion research and substance use prevention then reviewed items. Those with expertise in diffusion research were

asked to assess the degree to which individual items measured the intended attributes. Those with expertise in substance use prevention were familiar with both the respondents and the policy being assessed, and were asked to review items for accuracy in depicting the policy and relevancy to respondents. Based upon these reviews, the primary change made was to restate items so that they included both positive and negative direction. The survey was then pilot tested by using cognitive response interviews with SDFS coordinators outside of the study sample. Meeting one-on-one with a respondent, cognitive response interviews use a variety of techniques to ensure that questions are being interpreted and answered as intended (Sudman *et al.*, 1996). After the cognitive response interviews were completed, eight items were dropped from the scale and minor changes were made to make them more conceptually relevant to SDFS coordinators. For example, the item 'Using the Principles of Effectiveness will ensure that I continue to receive SDFS funding', was changed to 'My school district will lose SDFS funding if we do not use the Principles of Effectiveness' after finding out SDFS coordinators were not able to answer the question as it was originally framed. The items used to form the perceived attributes scale used in this investigation are shown in Table I. For the analyses, all items were coded so that a score of five favored adoption. The perceived attributes of an innovation were measured at wave I.

Adoption of the Principles of Effectiveness

Eight items were used to measure adoption of the Principles of Effectiveness. They were derived from requirements set forth in *Nonregulatory Guidance for Implementing the SDFS Principles of Effectiveness* (Department of Education, 1998b). Respondents were asked, 'which, if any of the following changes have been made to your substance use prevention program because of the Principles of Effectiveness?'. Items included:

- (1) Conducted a needs assessment.
- (2) Collected objective data for our needs assessment.

Table I. Items for the perceived attributes of the Principles of Effectiveness^a

A.	Using the Principles of Effectiveness is compatible with the substance use coordination activities in my school district
B.	I think that using the Principles of Effectiveness fits well with the way I like to work
C.	I believe that using the Principles of Effectiveness would require my school district to make substantial changes to our present substance use prevention program ^b
D.	It will be difficult to train teachers and staff to implement the Principles of Effectiveness ^b
E.	Overall, I believe that it will be complicated to implement the Principles of Effectiveness ^b
F.	I believe that each of the activities described in the Principles of Effectiveness needs to be implemented this school year ^b
G.	I believe that it is okay for me to try out a new substance use prevention program on a limited basis before fully implementing
H.	Parents will not be able to see any changes in student behavior if the Principles of Effectiveness are implemented ^b
I.	Teachers will like the changes if the Principles of Effectiveness are implemented
J.	Using the Principles of Effectiveness will enhance my effectiveness on the job
K.	My school district will lose SDFS funding if we do not use the Principles of Effectiveness
L.	Using the Principles of Effectiveness will increase my ability to get non-SDFS substance use prevention funds for my school district
M.	Using the Principles of Effectiveness will increase the quality of substance use prevention programs in my district
N.	Using the Principles of Effectiveness will have no effect on student substance use rates ^b
O.	The Principles of Effectiveness require more work than can be done with current SDFS funding ^b
P.	Even if SDFS did not encourage the use of these Principles, I would like to implement them in my school district
Q.	Overall, I find using the Principles of Effectiveness to be advantageous for my school district

^bItem was reverse coded in the analysis.

^aRange: 1–5 (5 is most favorable for adoption).

- (3) Set goals and objectives so that we could measure progress towards achieving them.
- (4) Chose our goals and objectives based upon needs assessment data.
- (5) Looked at research when deciding upon new strategies for substance use prevention.
- (6) Adopted new strategies because they were research-based.
- (7) Dropped programs that did not have research evidence of their effectiveness.
- (8) Conducted an evaluation of our program.

Response options included 'Did before Principles enacted', 'Changed because of the Principles' and 'Have not done'. For the analyses, these items were dummy coded with the first two response options indicating adoption of the Principles and the third option indicating non-adoption. Items were then summed to create an overall score for adoption of the Principles of Effectiveness. Adoption of the Principles of Effectiveness was measured at Wave II.

Analyses

Perceived attributes

First, inter-item correlations, means and standard deviations were calculated for each item. Second, the perceived attributes items were factor analyzed to determine if the items clustered as expected by diffusion of innovation theory, thereby assessing factorial validity. For this factor analysis, the principal components method was used with two types of rotations. The first, a varimax rotation, is the most commonly used rotation in factor analyses. Second, a promax rotation was used to confirm the earlier findings. A promax rotation is designed to take into account the intercorrelated nature of many scales. Scree plots and eigenvalues were examined to ensure that resulting constructs were more explanatory than a single item. From the factor analysis results, three constructs were identified and a Cronbach's α was computed for each of the resulting constructs. This is a form of reliability assessment in that it determines if the

items were measuring the same thing (Singleton *et al.*, 1993).

Adoption of the Principles of Effectiveness

Measures of the perceived attributes of the Principles of Effectiveness were analyzed in relationship to adoption of the Principles. Analyses were conducted using the Pearson correlation coefficient, which allowed us to see the association between perceptions about the Principles and adoption of the Principles. This was done to assess construct validity: the stronger the correlation, the greater the validity of the scale being tested (Singleton *et al.*, 1993).

All analyses were conducted using SAS 6.12.

Results

Correlations and means of perceived attributes items

Correlations between the 17 items designed to assess the perceived attributes of the Principles of Effectiveness were computed (see Table II). In general, items from within each construct had higher inter-item correlations than correlations between items from different constructs. For ease in comparisons, correlations are arranged by the constructs identified in the factor analysis described below.

Overall, perceptions regarding the Principles of Effectiveness were favorable towards adoption of the policy. Of the 17 items presented, all but two mean scores were either favorable or neutral towards adoption of the Principles of Effectiveness (see Table II). The highest mean scores were found for items assessing relative advantage/compatibility. Moderate mean scores were found for the items assessing complexity and observability.

Factor analysis of perceived attributes items

The 17 items designed to assess the perceived attributes of the Principles of Effectiveness were subjected to a principle component factor analysis with a varimax rotation and a promax rotation. Results were similar for both rotations; therefore,

only the varimax results are presented. Overall, items loaded within the intended constructs; however, there were three exceptions. First, three items (F, G and K) were eliminated from the factor analyses. Item F was eliminated because it loaded on the first factor, but did not belong conceptually with other items in that factor. After item F was removed, a four-factor solution resulted. The fourth factor (items G and K) had a poor internal inconsistency ($\alpha = .31$) and its items were eliminated. Removal of these items resulted in a three-factor solution (see Table III). Second, the items created to assess relative advantage and compatibility loaded on the same factor, rather than as two distinct factors. Third, an item designed to assess compatibility (item C) and an item designed to assess relative advantage (item O) loaded on the same factor as the items designed to assess complexity.

The resulting factors appeared to be conceptually meaningful with the first factor encompassing items designed to assess relative advantage and compatibility (eight items), the second complexity (four items) and the third observability (two items). Cronbach's α s for the first and second factors were high (0.89 and 0.81, respectively), and for the third factor was moderate (0.71).

Correlations between perceived attributes and adoption of the Principles of Effectiveness

Table IV shows the correlations between the perceived attributes of the Principles of Effectiveness and adoption of the Principles. All correlations were in the expected direction and were significant at the $P < 0.05$ level. The strongest relationship with adoption of the Principles of Effectiveness was with relative advantage/compatibility ($r = 0.312$), followed by complexity ($r = 0.248$) and then observability ($r = 0.239$). Thus when coordinators perceived greater relative advantage/compatibility, less complexity or more observability, they were also likely to more fully adopt the Principles of Effectiveness. Adoption scores ranged from 0 to 8, with a mean of 6.8. Cronbach's α for this measure was 0.85.

Table II. Correlation matrix for the perceived attributes of the Principles of Effectiveness (n = 107)

Item	Relative advantage/compatibility										Complexity					Observability				
	A	B	J	L	M	N	P	Q	C	D	E	O	H	I	F	G	K	M (SD)		
A																		3.9 (0.8)		
B	0.654***																	3.9 (0.8)		
J	0.477***	0.590***																3.6 (0.8)		
L	0.294**	0.379***	0.410***															3.5 (0.8)		
M	0.330***	0.510***	0.565***	0.408***														3.8 (0.8)		
N	0.431***	0.425***	0.380***	0.268***	0.488***													3.4 (0.9)		
P	0.488***	0.662***	0.646***	0.529***	0.648***	0.560***												3.6 (0.8)		
Q	0.492***	0.644***	0.595***	0.510***	0.653***	0.453***	0.806***											3.7 (0.7)		
C	0.342***	0.152	0.146	0.070	-0.036	0.115	0.152	0.149										3.1 (1.1)		
D	0.183	0.343	0.297***	0.204*	0.212*	0.192*	0.429***	0.357***	0.411***									3.1 (1.1)		
E	0.321***	0.402***	0.322***	0.216*	0.291**	0.343***	0.456***	0.349***	0.463***	0.759***								3.2 (1.1)		
O	0.278**	0.300**	0.267***	0.270**	0.244*	0.260**	0.321***	0.287**	0.417***	0.491***	0.559***							2.3 (1.1)		
H	0.160	0.346***	0.396***	0.242*	0.409***	0.402***	0.377***	0.365***	0.155	0.347***	0.400***	0.271**						3.5 (0.9)		
I	0.221*	0.399***	0.450***	0.411***	0.395***	0.291**	0.553***	0.421***	0.216*	0.405***	0.429***	0.394***	0.560***					3.2 (0.7)		
F	-0.249**	-0.356***	-0.315***	-0.309***	-0.409***	-0.249**	-0.490***	-0.460***	-0.087	-0.253**	-0.208**	-0.162	-0.111	-0.186*				2.9 (1.0)		
G	0.224*	0.128	0.107	0.124	0.101	0.265**	0.125	0.118	-0.046	-0.031	-0.012	-0.005	0.064	-0.030	-0.216*			4.0 (0.6)		
K	0.184	0.063	0.292**	0.250**	0.131	0.157	0.218*	0.145	0.105	-0.012	0.019	-0.073	0.108	0.216*	-0.331***	-0.197*		3.8 (0.8)		

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table III. Factor analysis (varimax rotation) of the perceived attributes items (n = 107)

Item	Factor 1: relative advantage/compatibility	Factor 2: complexity	Factor 3: observability
A	0.74	0.34	-0.39
B	0.80	0.25	0.01
J	0.72	0.15	0.23
L	0.55	0.05	0.30
M	0.71	-0.06	0.41
N	0.59	0.15	0.17
P	0.80	0.21	0.32
Q	0.81	0.15	0.23
C	0.06	0.80	-0.19
D	0.12	0.75	0.38
E	0.23	0.79	0.30
O	0.20	0.69	0.21
H	0.30	0.22	0.68
I	0.36	0.31	0.64
Mean (SD)	3.7 (0.6)	2.9 (0.9)	3.4 (0.7)
Cronbach's α	0.89	0.81	0.71

Note: Items F, G and K were eliminated from the factor analysis.

Table IV. Correlations between perceived attributes of the Principles of Effectiveness and adoption of the Principles of Effectiveness (n = 107)

Perceived attributes	Adoption of the Principles of Effectiveness
Relative advantage/compatibility	0.312***
Complexity	0.248**
Observability	0.239*

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Discussion

This paper describes a new scale to assess the perceived attributes of an innovation. Our findings suggest that the scale had several desirable properties: (1) it generally supports the idea of distinct constructs within innovation perceptions, (2) findings confirm the expected association between innovation perception and innovation adoption, and (3) it demonstrates that the perceived attributes

of an innovation are potentially useful in studying policy adoption, as well as other types of innovation adoption.

Factor analysis revealed three, rather than the expected five, underlying constructs. Within this factor structure, the intended constructs of relative advantage and compatibility clustered into one factor, indicating that two distinct constructs were not found in this study. This finding is consistent with the work of Halloway who found no clear distinction between relative advantage and compatibility in his work with school principals (Halloway, 1977). Moreover, Rogers has noted that each construct is 'somewhat empirically interrelated with the other four' (Rogers, 1995). At least one prior study combined all of the perceived attributes items into one index of *favorability* towards adoption since all the perceptions items were found to be moderately inter-related (Scheirer, 1990). In contrast, Goldman (Goldman, 1994) found that not only were each of the five constructs distinct, but that compatibility actually factored into two constructs: compatibility with organizational experience and compatibility with organizational needs. Because relatively few studies have used factor analytic methods to assess the perceived attributes, additional research is recommended to determine if these are five distinct constructs and, if so, to more precisely define the measurement of each.

The construct of relative advantage/compatibility appears to be especially strong in this study. Relative advantage, which addresses both the costs and benefits of adoption, has proven to be one of the best predictors of innovation adoption (Rogers, 1995). Within health education, relative advantage has been a significant predictor of adoption for a variety of interventions including a pediatric asthma management protocol (Mesters and Meertens, 1999), a tobacco curricula, (Brink *et al.*, 1995; Parcel *et al.*, 1995) and a nationwide campaign to improve prenatal care (Goldman, 1994). In each of these cases, the adopter is an organization, and organizations are likely to be motivated by perceived advantages such as improved job performance, increased quality of programs and

increased likelihood of securing additional funds. For reasons such as these, relative advantage is likely to continue to be strongly associated with innovation adoption at the organizational level. The items used to assess relative advantage/compatibility in this study were positively associated with adoption, internally consistent and could easily be adapted to examine the adoption of other health education interventions.

An important issue to consider in this study is that the innovation being studied is a policy with financial incentives for the targeted adopters. This is likely to be a strong incentive for policy adoption and, in fact, most districts had at least partially adopted the Principles of Effectiveness. Nonetheless, it is important to monitor not just the adoption of the Principles, but also the quality of adoption. Previous research has shown that incentives encourage adoption by those who normally would not adopt and can decrease the quality of adoption (Rogers, 1995). We believe that relative advantage is likely to be an even better predictor of adoption for innovations that do not have financial incentives.

As stated previously, the perceived attributes of compatibility and relative advantage appear to be one construct in this study. There are several potential reasons for this. First, it is possible that when thinking about the Principles, prevention coordinators first think about the changes they have to make and then think about the advantages for making those changes within their district. In this case, the two attributes are intertwined and prevention coordinators do not think about compatibility without also thinking about relative advantage. Second, it is possible that prevention coordinators believe that they will not have to make major changes in their prevention program in order to comply with the Principles. This may be accurate based upon communications with the state education agency or it may be inaccurate due to a simplistic view of the challenges involved in adopting the Principles. Third, prevention coordinators may not fully understand the requirements of the Principles of Effectiveness. For example, many coordinators have a limited understanding

of what constitutes a research-based program and do not define research-based program in a way that is consistent with the Principles of Effectiveness (Hantman and Crosse, 2000). Furthermore, many curricula marketers promote a curriculum as research-based, even when there is no credible evidence of its effectiveness (Hallfors and Sporer, 2001). In this case, coordinators may believe that what they are doing is research-based, thereby creating the perception that the policy is compatible with current practices. Fourth, if all three items intended to assess compatibility loaded on the same construct, compatibility and relative advantage might have appeared as two distinct constructs; however, one compatibility item loaded with complexity items and two loaded with relative advantage items. When looking at the way the compatibility items split, it was clear that items assessing preferred working styles (i.e. items A and B) factored with relative advantage and that the item assessing the magnitude of changes required (i.e. item C) factored with complexity items. Although, compatibility was not a distinct construct in this study, this concept was important in understanding the adoption of the Principles. After determining that two of compatibility items factored with the relative advantage items, we conducted a sensitivity test to determine if these items (i.e. A and B) were predictive as a separate construct. In each case, when the items intended to assess compatibility were examined in relationship to adoption of the Principles, the relationship was significant.

Complexity also appears to be an important predictor of adoption in this study. Districts that perceived greater complexity were less likely to indicate that they had fully adopted the Principles of Effectiveness. This has been true for other health education studies as well. For example, Goldman (Goldman, 1994) found that, not only was complexity a significant predictor of adoption, but that it was the greatest predictor of adoption in her study of a nationwide campaign to improve prenatal care. It has also been found that perceived complexity was the greatest deterrent to adopting patient information sheets among pharmacists (Ascione

et al., 1987). The items used to assess complexity in this study were associated with adoption, internally consistent and could easily be adapted to examine the adoption of other health education interventions.

The construct of observability was also an important predictor of adoption in this study. When coordinators perceived that teachers and parents would notice changes upon implementing the Principles of Effectiveness, they were more likely to fully adopt the Principles. Observability has not always been significantly associated with adoption in health education. In fact, the only other health education study found in which observability was an important predictor of adoption was Goldman's study of a nationwide campaign to improve prenatal care (Goldman, 1994). In that case, respondents were asked about the observability of prenatal care in relationship to birth outcomes, which, similar to policy, may be more readily observable than many prevention outcomes. We believe that construct of observability will be an important predictor for programs that provide very tangible outcomes. The items used to assess observability in this study were associated with adoption, moderately internally consistent and could be easily adapted to other health education interventions.

The innovation studied, the Principles of Effectiveness, is a somewhat more complicated innovation than those typically studied in diffusion research. The Principles are a cluster of inter-related innovations designed to be adopted sequentially. This is a new process for most school districts and it is one that requires a great deal of skill. The Principles are also being enacted at a time when most school districts are receiving fewer federal SDFS dollars than in previous years, thereby making it even more complicated (and less attractive) for districts to fully adopt the policy. Despite these challenges, the perceived attributes of relative advantage/compatibility, complexity and observability appear to be useful in determining adoption of the Principles of Effectiveness. This is important because it shows that the perceived attributes can be used to explain not only the adoption of simple, one-time innovations, but also

the adoption of multi-component, long-term innovations.

The items intended to assess trialability were weak and did not produce a useable construct in this study. Trialability is rarely mentioned in the results of public health research. This may be because trialability variables are not often significant in health education research or that it is a difficult construct to measure, particularly when assessing a process. We believe that trialability might be more useful construct when examining more concrete interventions. In the case of the Principles of Effectiveness, coordinators were asked about four discrete activities (i.e. needs assessment, setting goals and objectives, implementing programs that have been proven effective, and evaluation) as if they were one innovation; however, coordinators may perceive them differently. In many cases, coordinators follow the requirements of the state SDFS application process and may not even think about whether or not they can try out the Principles. In this case, coordinators are simply following the steps necessary to get funding and the SDFS application is typically the way states monitor compliance with policy. It is recommended that further exploratory work be done to assess items measuring trialability.

Although we believe our findings support earlier theoretical work showing the importance of perceptions in adoption decisions, there are a few limitations that should be considered. First, although the scale was effective in the present study, researchers will need to adapt items for their particular study. As with most other diffusion research, this scale was specific to the innovation studied. Because this was a school-based innovation, it will probably be easiest for those interested in school-based research to adapt these measures. Additional exploratory research will need to be done to develop appropriate items for trialability. Second, this sample is not nationally representative and one state is over-represented. State education agencies serve as the primary change agent for the diffusion of the Principles of Effectiveness and there is substantial variation in the dissemination strategies used by each state (Hallfors, 2001). This is not

surprising, given that others have also found wide variation in how states interpret and disseminate information to the local level (McCormick and Tompkins, 1998). Despite this limitation, both samples had a similar proportion of coordinators who had received information about the policy, and the association between the perceived attributes and adoption remained when the over-represented state was removed from the analysis. Additionally, neither size nor urbanicity was significantly associated with adoption among coordinators who had received information about the Principles. Third, we relied on a relatively simple measure of adoption, in that coordinators indicated whether they had completed each of eight activities. We were concerned that this measure overestimated adoption of the Principles of Effectiveness; therefore, we examined correlations between the perceived attributes and a more complex measure of adoption. In each case, the perceived attributes were significantly associated with the more complex measure of adoption.

Despite these limitations, this study has important implications for health education practice. Consistent with earlier findings, we found that there is an association between perceptions and adoption. We believe that this scale could be modified to help others assess the perceived attributes of an innovation, and then to use that information to develop programs with the potential for widespread dissemination and to determine social marketing strategies for programs that have already been proven efficacious. For example, these results reveal that compatibility and relative advantage are strongly associated with adoption. Program developers may want to ask potential users what type of program they are currently using or what could be done to research-based programs to increase the advantages associated with using them. Social marketers may then choose to demonstrate the ways in which a new program is similar to those currently being used or to highlight the advantages of the new program. In either case, knowing about and assessing the perceived attributes of an innovation can be used to help close

the gap between what is known by research and what is done in practice.

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