Adolescent Sexual Abstinence: A Test of an Integrative Theoretical Framework

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Abstract

The purpose of this study was to test an integrative theoretical framework in explaining adolescents' sexual abstinence and intentions to remain abstinent and refine the framework to reflect which elements contribute more powerfully to the explanation of abstinence and intentions. We administered an anonymous, theory-based questionnaire to two nonrandom samples of seventh- and eighth-graders ($n = 451$ and 447, respectively). Measurement modeling provided sufficient evidence for establishing construct validity. A refined structural equation model demonstrated good fit. Pro-abstinence standards predicted stronger beliefs toward staying abstinent, stronger perceptions that others endorse pro-abstinence norms, and a greater self-efficacy to remain sexually abstinent until marriage. In turn, beliefs, norms, and self-efficacy were predictive of intentions, which predicted sexual abstinence at a later time point. Similar findings emerged in a replication using a second set of sample data. Results suggest that this integrative theoretical framework is useful in explaining adolescents' intention and their subsequent sexual abstinence.

Keywords

sexual abstinence, adolescents, theory, structural equation models

Identifying antecedents of adolescents' first sex has been a topic of special interest for many scholars over the past two decades. One in five teens in the United States report having had sex before the age of 15 (Albert, Brown, & Flanigan, 2003), and early initiation is related to two well-identified and critical public health problems: unintended pregnancy and sexually transmitted infections (STIs), including HIV (Klein & the Committee on Adolescence, 2005). About 30% of U.S. females become pregnant before the age of 20 (National Campaign to Prevent Teen and Unplanned Pregnancy, 2010). Between 74% and 95% of teenage pregnancies in the United States are unintended (Advocates for Youth, 2004), and teen pregnancy rates remain among the highest of the industrialized nations. According to Hoffman (2006), teen childbearing cost (federal, state, and local) taxpayers at least $9.1 billion in 2004. Compared with younger adults, adolescents are at a higher risk for acquiring STIs such as chlamydia and gonorrhea (Kaestle, Halpern, Miller, & Ford, 2005) and, despite representing only 25% of the sexually active population, adolescents acquire almost half of all new STIs annually (Weinstock, Berman, & Cates, 2004).

Although there has been substantial research interest in predictors of adolescent sexual behavior, few investigations have assessed predictors or correlates of sexual *abstinence*. Such research is vital because, despite President Obama's initiative to cease funding for abstinence-only programs (Office of Management and Budget, 2009), the authorization of the recent health care reform bill reinstates substantial funding for these programs (Patient Protection and Affordable Care Act,

2010). There also remain hundreds of other initiatives, including teen pregnancy prevention and comprehensive sexuality education programs, which have as their primary goal the promotion of sexual abstinence among participants. As a result of the limited attention to sexual abstinence, little is known about *why* youth remain abstinent. According to Abbott and Dalla (2008), "such information could provide valuable direction and guidance for parents, educators, and practitioners in their efforts to mitigate health risks associated with early sexual activity" (p. 631).

The few studies that have focused on sexual abstinence suffer from three notable limitations. First, many studies—as well as programmatic efforts—lack theoretical cogency or consistency, or completely lack a theoretical grounding, failing to use a theoretical framework to guide the development of hypotheses or research questions. In a review of 10 studies we located, examining predictors or correlates of sexual abstinence, we found that half *did not* explicitly note the use of a theoretical framework or conceptual model to direct inquiry. Even more disconcerting,

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in evaluating abstinence-only education programming in Texas, investigators found that only 2 of the 32 funded programs explicitly stated in their proposals that they would be based on prevalent scientific theories of behavior change (Goodson, Pruitt, Suther, Wilson, & Buhi, 2006).

Second, when researchers do use a theoretical framework to guide their study, there are numerous health behavior or social science theories from which they choose, and no one comprehensive, multidimensional theoretical model dominates. For example, the information–motivation–behavioral skills model (Bazargan & West, 2006), theory of planned behavior/reasoned action (Childs, Moneyham, & Felton, 2008; Masters, Beadnell, Morrison, Hoppe, & Gillmore, 2008), ecological risk/protective model of resilience (Maguen & Armistead, 2006), and ecological systems theory (Abbott & Dalla, 2008) have all been applied to empirically examine adolescent sexual abstinence. Although theoretical variety may signal a vibrant, innovative literature on one hand, it can also suggest a fragmented, disjointed theoretical landscape, lacking in comprehensive, robust frameworks to explain adolescents' sexual abstinence.

Third, most researchers would acknowledge that the reasons adolescents remain sexually abstinent are complex and multifaceted (Moore, Miller, Glei, & Morrison, 1995). However, although much of the research examining sexual behavior may use multivariate analytic techniques, all of the research we found examining predictors of sexual abstinence did not adopt analytic techniques that incorporate multiple dependent or mediating variables, using instead univariate/bivariate methods that examine one outcome variable at a time. These methods include chi-square analyses (Blinn-Pike, Berger, Hewett, & Oleson, 2004; Paradise, Cote, Minsky, Lourenco, & Howland, 2001), *t* tests (Abbott & Dalla, 2008; Paradise et al., 2001), ANOVA (Bazargan & West, 2006), regression (Bazargan & West, 2006; Blinn-Pike et al., 2004; Childs et al., 2008; Loewenson, Ireland, & Resnick, 2004; Maguen & Armistead, 2006), and survival analysis (Lammers, Ireland, Resnick, & Blum, 2000), rather than multivariate methods that allow researchers to consider multiple outcome variables simultaneously (e.g., multivariate analysis of variance, structural equation modeling [SEM]). According to Goodson, Evans, and Edmundson (1997), "The development of high-quality research which attempts to address teenage . . . behavior as a complex, multifactorial phenomenon will require more sophisticated tools for data collection, analyses, and interpretation" (p. 155) than what has characterized previous adolescent sexual abstinence research.

Further contributing to the need for additional adolescent sexual abstinence research, it is important to note that motivations for and predictors of sexual abstinence (i.e., *why* youth remain abstinent or *why* they postpone intercourse until later ages) may not simply equate to the inverse of the reasons why youth decide to engage in sexual activity. For instance, in a recent study, Goodson, Suther, Pruitt, and Wilson (2003) reported that abstinence education program staff and youth participating in such programs defined sexual abstinence as the

"incorporation of positive attitudes and behavior that contribute to both the sexual and overall well-being of individuals" (p. 96) rather than defining abstinence only by an avoidance of specific sexual behaviors. Masters et al. (2008) also found that adolescents do not consider abstinence and sexual activity as opposing constructs. Thus, in-depth, theoretically grounded research on the predictors of adolescent sexual abstinence is sorely needed.

The purpose of this study is to address some of the gaps in the adolescent sexual abstinence literature. In this study, we use a powerful multivariate analytic technique, SEM, to test an integrative theoretical framework for explaining adolescents' sexual abstinence and intentions to remain sexually abstinent before marriage. For in-depth reviews of the individual factors included in this framework, see Buhi and Goodson (2007).

Theoretical Framework

Fishbein (2000) argued that we do not need new theories of behavior and behavior change; rather, we need to integrate and empirically test existing behavioral theories. Bearinger and Resnick (2003) concurred, noting:

> What is needed, especially for insight into the complex array of influences on sexual behavior, is an integrative theoretical schema that crosses conceptual boundaries and unifies the strengths of the diversity of health behavior theories and models. (p. 345)

This may well be the case, also, with the theories being used in adolescent sexual health research. Given the variety of theories being used to understand adolescent sexual abstinence, perhaps integrating elements from various theories (and testing this integration) may prove useful for better understanding such behavior. As an attempt to foster this integration, the integrative model (Fishbein, 2000; Fishbein et al., 2001) is a useful heuristic and may provide valuable insights.

The theoretical framework used in the current study—the integrative model—was informed by two elements: (a) the National Institute of Mental Health (NIMH)–commissioned theorists' workshop (Fishbein et al., 2001) and (b) the further conceptualization of the workshop elements by Fishbein (2000). In 1991, five leading behavioral theorists—Albert Bandura, Marshall Becker, Martin Fishbein, Frederick Kanfer, and Harry Triandis (all proponents of behavioral theories that enjoy traditional reputations in the field of health promotion)—were invited to the NIMH-commissioned theorists' workshop. Participants were asked to reach a consensus on a set of variables that appear to serve as the primary determinants of any given health-related behavior or behavior change. They settled on eight factors that "appear to account for most of the variance in any given deliberate behavior":

> For a person to perform a given behavior, one or more of the following must be true: The person has formed a strong positive *intention* (or made a commitment) to
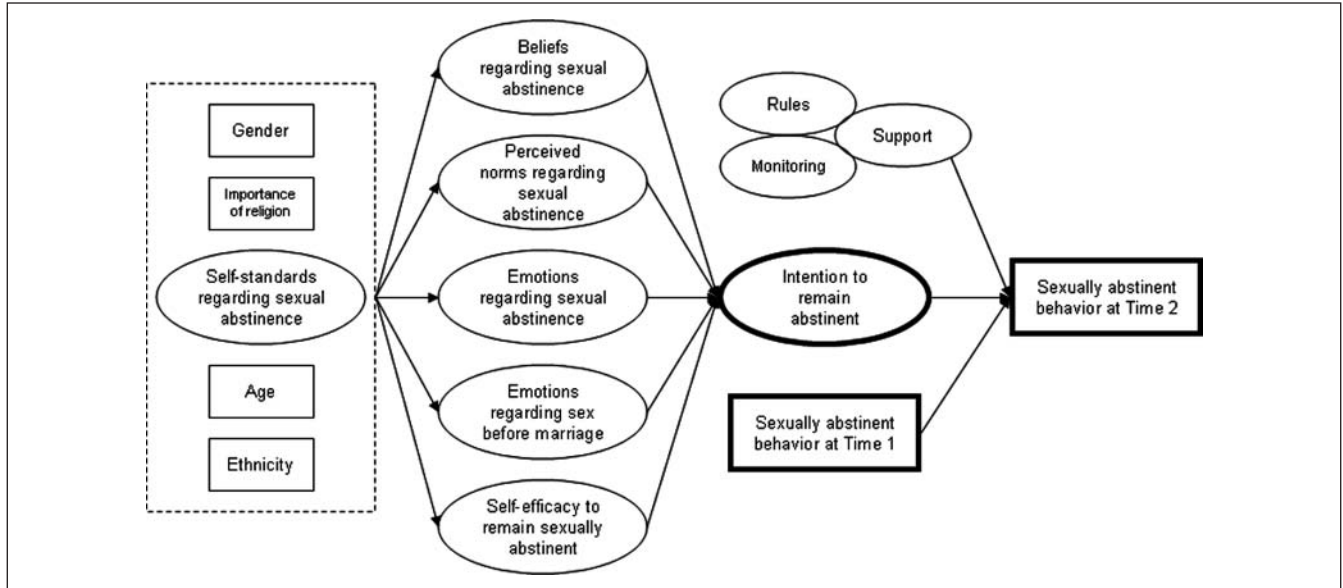
Figure 1. The Mapping of the Integrative Model to Factors Associated with Sexually Abstinent Behavior and Intentions to Remain Abstinent

perform the behavior; There are no *environmental constraints* that make it impossible for the behavior to occur; The person has the *skills* necessary to perform the behavior; The person has a positive *attitude* toward performing the behavior; The person perceives more social (*normative*) pressure to perform the behavior than to not perform the behavior; The person perceives that performance of the behavior is more consistent than inconsistent with his or her self-image, or that its performance does not violate *personal standards* that activate negative self-sanctions; The person's *emotional reaction* to performing the behavior is more positive than negative; and the person perceives that he or she has the capability to perform the behavior under a number of different circumstances; in other words, the person has perceived *self-efficacy* to execute the behavior in question. (Fishbein et al., 2001, p. 5, italics added)

At the time, the five theorists did not achieve consensus, however, regarding how these eight elements are interrelated, or conceptually organized. Later, Fishbein (2000) conceptualized these relationships, and termed this framework an integrative model.

When applied to adolescents' sexual abstinence, one assumption underlying this integrative model is that various intrapersonal psychological factors (both affective and cognitive) influence youth's intentions (or "motivation") to remain sexually abstinent. Changes in these various intrapersonal factors (e.g., self-standards, perceived norms) may lead to the development of intentions that favor abstinence-until-marriage. Youth's intentions, in turn, may be the strongest predictor of sexual abstinence (Montano & Kasprzyk, 2002), although some

scholars question this presupposition (Baron & Kenny, 1986; Mathur, 1998). Figure 1 represents the mapping of the integrative model to factors associated with adolescents' sexual abstinence and intentions to remain abstinent, as identified by Buhi and Goodson (2007) in a systematic review of the adolescent sexual health literature.

Methodological Rationale

To test these factors, and the explanatory ability of the integrative model, a sophisticated multivariate technique—structural equation modeling—is warranted. SEM maintains several advantages over simpler analytic techniques such as regression. First, SEM was created to test and refine theoretical models attempting to explain or predict social or behavioral phenomena (Bentler, 1988) and, thus, is the method most appropriate for use in this study. Second, unlike older techniques that assume zero measurement error in sample data (which is never the case), SEM is unique in its ability to isolate measurement error variance during analyses. Third, SEM helps control for inflation of experimentwise (or Type I) error and, lastly, SEM "best honors the [complex] reality to which the researcher is purportedly trying to generalize" (Thompson, 1994, p. 12). In health and sexual behavior research, most outcomes (i.e., behaviors) have multiple causes (i.e., predictors) and most causes have multiple outcomes, all interacting dynamically. Researchers in these fields investigate multivariate, not univariate, or isolated, phenomena with only one or two determinants (Buhi, Goodson, & Neilands, 2007). It is impossible to assess how multiple variables behave in each other's company when a researcher limits an analysis to a univariate/bivariate examination. Instead, SEM allows all

Table 1. Demographic Characteristics of the Sample: Wave 2

Characteristic	Percent ($n = 448$)	Percent by recruitment site		
		MS1 ($n = 103$)	MS2 ($n = 170$)	MS3 ($n = 175$)
Gender				
Girls	59.3	58.3	60.6	58.6
Grade				
Seventh	58.8	98.1	22.4	71.3
Eighth	41.2	1.9	77.6	28.7
Ethnicity				
American Indian/Alaska Native	6.5	11.7	2.9	6.9
Asian	3.8	1.0	1.8	7.5
Black or African American	4.3	–	8.2	2.9
Hispanic or Latino	29.8	23.3	11.8	51.1
Native Hawaiian or Other Pacific Islander	1.6	4.9	–	1.1
White	70.9	79.6	86.5	50.6
Age, M (SD)	13.19 (0.745)	12.66 (0.635)	13.59 (0.630)	13.11 (0.687)

Note: MS1 = Middle School 1, MS2 = Middle School 2, etc. Columns for ethnicity may not total 100% because youth were allowed to mark all that apply.

variables—multiple independent and dependent variables—to be examined simultaneously.

Our purpose in this study was to use SEM analyses to (a) test the "fit" of this integrative model with middle school youth sample data and to (b) refine the model to reflect which elements contribute more powerfully to the explanation of adolescents' sexual abstinence and intentions. The specific research questions were:

1. Is this integrative model adequate for explaining middle-schoolers' intentions to remain sexually abstinent and their subsequent sexual abstinence?
2. If this integrative model is not adequate, what is the adequacy of a refined model in explaining middle-schoolers' intentions and their subsequent sexual abstinence?
3. Does a model with adequate fit replicate (or, does it "hold") when tested against a second set of youth sample data? In other words, how robust is this model?
4. Which variables in this integrative model are the best predictors of students' intentions to remain sexually abstinent and, thus, the best candidates for intervention/programming foci?

Method

Participants

Participants in this study were Texas middle school youth, taking part in a broader statewide evaluation study of Title V–funded abstinence-only-until-marriage education programs. The larger evaluation involved data collected from youth in two waves. During the 2003-2004 school year (Wave 1), participating youth were recruited from four abstinence programs operating in one rural ($n = 14$) and one urban ($n = 169$) southeastern county, and numerous rural counties in central ($n = 256$) and west Texas ($n = 12$). During the 2004-2005 school year (Wave 2), youth were recruited from three abstinence programs operating in a rural southeast coastal community ($n = 175$), an urban central Texas area ($n = 103$), and various rural counties in west Texas ($n = 170$). In each wave, data were collected immediately before (T1) and after (T2) participation in abstinence-only education programming. The time between T1 and T2 varied and intervals ranged from approximately 10 days to several months (but less than one academic year). Some youth participated in both Wave 1 and Wave 2 data collection. There was no random selection or comparison group (i.e., youth not receiving an intervention) in this sample.

Included in the current study are 451 seventh- and eighth-grade students responding during Wave 1, and 448 seventh- and eighth-graders responding during Wave 2. These respondents returned both T1 and T2 surveys in their respective data collection waves. The sample size was chosen to be comparable to that of other studies that investigated complex relationships among social and behavioral factors precipitating the onset of teen sexual behavior (Gray et al., 2008; Oman, Vesely, Kegler, McElroy, & Aspy, 2003). The sample was predominantly female (Wave 1 = 63.1%, Wave 2 = 59.3%) and White (Wave 1 = 67.6%, Wave 2 = 70.9%) or Hispanic/Latino(a) (Wave 1 = 30.6%, Wave 2 = 29.8%). Ninety-one percent of Wave 2 respondents reported being sexually abstinent at T1 and 87.9% reported being abstinent at T2. Demographic characteristics were largely homogenous across recruitment sites; Table 1 presents demographic characteristics for Wave 2 youth by site (Wave 1 sample characteristics were similar). See Goodson and colleagues (Goodson et al., 2004; Goodson et al., 2005) for detailed information regarding sampling procedures and response rates.

Procedure

The procedures for data collection were reviewed and approved by two institutional review boards. Signed parental consent forms were required for participation at each of the two time points (in both Waves 1 and 2), as were signed youth assent forms. Written surveys were administered by both educators and evaluation team members. To ensure a standardized process, written instructions (including scripts to be read to the youth) were provided to each survey administrator. After completion, youth were directed to place their anonymous surveys in envelopes provided, seal the envelopes, and submit them to the survey administrator. Survey administrators were responsible for collecting all sealed packets and copies of the assent/informed consent forms before mailing materials directly to the evaluation team. Members of the evaluation team coordinated the data entry, cleaning (i.e., matching youths' T1 and T2 surveys based on a unique identification code), and analysis processes.

Measures

The theory-based paper-and-pencil questionnaire was developed by the evaluation team, reviewed by experts in sexuality education, measurement, and evaluation, and pilot tested with a nonrandom sample of middle school youth (Goodson et al., 2002). The instrument was based, in part, on the theoretical framework conceptualized by Fishbein et al. (2001) and Fishbein (2000). However, the only variable in the framework not captured on the questionnaire was skills, as skillfulness can only be assessed with adequate reliability through direct observation. Copies of the instrument are available from the corresponding author.

Sexual abstinence and intentions. Sexual abstinence was assessed with a single item taken from the CDC Youth Risk Behavior Survey (CDC, 2005): "Have you ever had sexual intercourse?" (*Yes* = 0, *No* = 1). Information concerning the validity of Youth Risk Behavior Survey data is reported elsewhere (Brener, Collins, Kann, Warren, & Williams, 1995). Six questions were used to assess intentions to remain abstinent. Youth were asked to respond to questions (e.g., I will or will not "have vaginal sex before marriage") using a 5-point response format, from *definitely will not* to *definitely will*. A reliability analysis for Wave 1 data on these six items resulted in a Cronbach's α of .93.

Environmental constraints. Three variables were used to assess youths' perceptions of environmental constraints: (a) perception of support (Support), (b) rules/boundaries (Rules), and (c) parental monitoring/supervision (Monitoring). Support was measured by three items, using a 5-point response format, from *strongly agree* to *strongly disagree* (e.g., "My parents give me help and support when I need it"). Rules was measured by three items, using a trichotomous response format (e.g., Fill in the circle that best describes the rules in your home about . . ."Dating:"

"Strict rules – No rules"). A reliability analysis for Wave 1 data on support and rules resulted in Cronbach's αs of .90 and .71, respectively. Monitoring was measured by four items using varying response formats. Sample items included "About how many days a week are you home for more than an hour without an adult (like a parent or guardian) being present?" (days home alone) and "How often do you 'hang out' with friends of the opposite sex without an adult (like a parent or guardian) around?" (time alone with opposite sex).

Beliefs. Beliefs regarding sexual abstinence were assessed using seven items, scaled on a 5-point response format, from *strongly agree* to *strongly disagree*. Sample items included "Sexual relationships before marriage create more problems than they're worth" and "Sexual relationships before marriage are a fulfilling part of life." A reliability analysis for Wave 1 data resulted in a Cronbach's α of .87.

Norms. Two variables were used to assess youths' subjective norms regarding sexual abstinence: (a) Norms A (others' beliefs about abstinence in general) and (b) Norms B (others' beliefs about abstinence for me . . .). Norms A was measured by four items, using a 5-point response format, from *strongly agree* to *strongly disagree* (e.g., "Most of my friends intend to wait to have sex until they get married"). Norms B was measured with three items, using a dichotomous response format (e.g., "My best friend thinks 'I should/I should not' abstain from sex until marriage"). A reliability analysis for Wave 1 data resulted in Cronbach's αs of .78 and .81 for norms A and norms B, respectively.

Self-standards. Self-standards regarding sexual abstinence were assessed using seven items, scaled on a 5-point response format, from *strongly agree* to *strongly disagree*. Sample items included "Having sex before marriage goes against my religious or moral beliefs" and "I'm a responsible person if I don't have sex until marriage." A reliability analysis for Wave 1 data resulted in a Cronbach's α of .88.

Emotions. Two variables were used to assess youths' emotions: (a) Emotions regarding sexual abstinence and (b) Emotions regarding sex before marriage. Youth were asked to respond to questions, for both variables, using a 5-point response format (*strongly agree* to *strongly disagree*). Emotions regarding sexual abstinence was measured with four items (e.g., "Being sexually abstinent makes me feel happy"). Emotions regarding sex before marriage was measured using three items (e.g., "Having sex before marriage makes me feel guilty"). Cronbach's α for scaled data from Wave 1 (on each of the two scales) was .90.

Self-efficacy and other variables. Self-efficacy, or confidence to remain abstinent, was assessed using two items ("I can remain abstinent until marriage" and "If I am pressured to have sex, I can resist"), scaled on a 4-point response format, from *not confident at all* to *extremely confident*. A reliability analysis for Wave 1 data resulted in a Cronbach's α of .71. Additional information requested from youth included gender, grade, age, ethnicity, and importance of religion.

Analytic Approach

Modeling. We estimated structural equation models using M*plus* 5 (L. K. Muthén & Muthén, 2007) to test the integrative model presented in Figure 1. M*plus* is an advanced and flexible software package capable of analyzing dichotomous/binary dependent variables (e.g., ever had sex = yes/no) and offers FIML (full information maximum likelihood) to handle missing values. Our modeling involved a two-step process, originally described by Anderson and Gerbing (1988). First, we developed and tested a measurement model, using Wave 1 sample data. In this step, using a confirmatory factor analytic approach, we specified the number of factors (i.e., intentions, emotions, etc.) and the survey items intended to measure the construct and then fitted the model to Wave 1 data to assess its convergent and discriminant validity (which together provide evidence for construct validity). In measurement model testing, we used the M*plus* MLR estimator. This statistical estimator computes standard errors based on White's (1980) sandwich formulation and, with further work by Yuan and Bentler (2000), allows for FIML handling of missing values and produces maximum likelihood estimates and a chi-square test statistic that are robust to conditions of nonnormality (L. K. Muthén & Muthén, 2007). To improve model fit, we deleted survey items with questionable item-to-factor correlations. After we obtained acceptable item-to-factor correlations and model fit, we next cross-validated the measurement model using a second but similar set of data (from Wave 2).

Item-to-factor correlations, variable means, standard deviations, and factor intercorrelations from the measurement models in Waves 1 and 2 are presented in Tables 2 and 3, respectively. Because of poor factor loadings—that is, item-to-factor correlations lower than .40 (Raubenheimer, 2004)—items attempting to infer the latent variable Norms B were excluded from further modeling analyses. In addition, the two items we specified to capture self-efficacy did not yield adequate factor loadings, and thus we retained a single observed item (The question "I can remain abstinent until marriage") to represent this variable.

After developing and testing the measurement model, we estimated the structural models as the second step, using Wave 2 sample data. In a structural model, the goal is to examine the underlying relationship, or structure, among variables proposed by the theory. We used the M*plus* WLSMV estimator for the structural model because categorical outcomes were introduced into the analysis (e.g., sexually abstinent = no/yes). To determine the fit between the hypothesized theoretical model and the observed data, we examined the following fit indexes: the χ^2 statistic, Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and the new index, weighted root mean square residual (WRMR) (Yu, 2002). There are various recommendations from experts regarding ideal cut-off points (or ranges) for goodness-of-fit indexes (Browne & Cudeck, 1993; Hu & Bentler, 1999; Yu, 2002). Little consensus exists, however, for these cutoff values as being "golden

rules of fit" (see Marsh, Hau, & Wen, 2004). In short, values close to the recommended cutoff points suggest that the model might be useful, whereas those further away indicate potential inconsistency between the model and sample data (Buhi et al., 2007). Consequently, where possible, we strove to obtain final models where two of the three Hu and Bentler (1999) cutoff criteria—values of ≤0.06 for RMSEA, ≥0.95 for TLI, and ≤1.0 for WRMR—were indicative of optimal model fit to the data. Models that exhibited fit statistics close to but not meeting or exceeding these thresholds were deemed to have approximate or close fit to the data.

Missing data. Missing data for variables in Wave 1 and Wave 2 data sets ranged from 0% to 7.76% and 0% to 9.6%, respectively. To use all available data in the current study, we invoked FIML (Arbuckle, 1996) during measurement model testing. FIML has been documented to perform optimally over ad hoc methods such as deletion or mean substitution (Allison, 1987; Buhi, Goodson, & Neilands, 2008; B. Muthén, Kaplan, & Hollis, 1987; Peugh & Enders, 2004; Schafer & Graham, 2002). During the structural model testing, however, FIML could not be used because the major dependent variable of interest was binary ("Have you ever had sexual intercourse?" *Yes* = 0, *No* = 1). Thus, we conducted a sensitivity analysis (Molenberghs, Kenward, & Goetghebeur, 2001) to determine whether missing data could have been responsible for altering model results substantially. In this analysis, we first coded all missing values for this question as zero and compared the subsequent model estimates to results from a model in which we simply ignored the missing data. Next, we coded all missing values as one and repeated the analysis. In both cases, we found that substituting extreme values (a zero or one) for missing values did not change the results substantively. Thus, we concluded that the impact of data missingness was negligible in our analyses.

Results

Research Question 1: Is this integrative model adequate for explaining middle-schoolers' intentions to remain sexually abstinent and their subsequent sexual abstinence?

Initial model fit testing of the integrative model indicated close fit of the model to the data, with a χ^2 statistic of 366.61 (*df* = 113, *p* < .0001), TLI value of .93, and RMSEA and WRMR values of .07 and .97, respectively. The largest parameter estimates were for self-standards→beliefs (*B* = 1.04; 95% CI = 0.86, 1.22; β = 0.80), self-standards→self-efficacy (*B* = –0.88; 95% CI = –1.04, –0.71; β = –0.76), self-standards→norms (*B* = 0.83; 95% CI = 0.65, 1.00; β = 0.72), intentions→T1 abstinence (*B* = 0.67; 95% CI = 0.53, 0.82; $β^1$ = 0.68), self-standards→emotions regarding sex before marriage (*B* = –1.01; 95% CI = –1.19, –0.82; β = –0.64), self-efficacy→intentions (*B* = –0.74; 95% CI = –0.99, –0.48; β = –0.57), self-standards→emotions regarding abstinence (*B* = 0.81; 95%

Table 2. Measurement Model Fit and Standardized Item-to-Factor Correlations for Wave 1 (*n* = 451) and 2 (*n* = 447) Data

Latent factor—What a higher score indicates (theoretical range)	Wave 1	Wave 2
Intentions: Stronger intentions to remain abstinent until marriage (1 to 5)		
E1. Have oral sex before marriage.	.85 (4.0/1.21)	.88 (4.1/1.19)
E2. Have vaginal sex during next year.	.81 (4.6/0.81)	.76 (4.6/0.83)
E3. Touch someone else's sexual organs during next year.	.81 (4.3/1.06)	.82 (4.4/1.01)
E4. Have oral sex during next year.	.82 (4.5/0.95)	.79 (4.5/0.89)
E5. Have vaginal sex before marriage.	.86 (4.1/1.17)	.85 (4.2/1.18)
E6. Touch someone else's sexual organs before marriage.	.84 (3.9/1.29)	.86 (4.0/1.32)
Beliefs: Stronger belief in abstinence until marriage (1 to 5)		
L5. Sexual relationships before marriage create more problems than they're worth.	.73 (4.0/1.04)	.73 (4.0/1.19)
L6. It is all right for two people to have sex before marriage if they are in love.[a]	.73 (3.2/1.27)	.80 (3.5/1.35)
L7. People should have sex only if they are married.	.81 (3.6/1.24)	.81 (3.7/1.29)
L8. Sexual relationships before marriage make life too difficult.	.72 (3.6/1.14)	.65 (3.4/1.30)
L10. A sexual relationship before marriage can be very enjoyable.[a]	.67 (3.4/1.13)	.77 (3.5/1.19)
L11. Sexual relationships before marriage only bring trouble to people.	.77 (3.5/1.11)	.70 (3.5/1.24)
L12. Sexual relationships before marriage are a fulfilling part of life.[a]	.64 (3.5/1.06)	.73 (3.6/1.19)
Norms: Stronger perception that others endorse proabstinence norms (1 to 5)		
N1. Most people my age think they should wait until marriage to have sex.	.69 (3.4/1.08)	.73 (3.4/1.13)
N4. My friends think that abstinence until marriage is the best choice.	.61 (3.4/1.10)	.78 (3.5/1.16)
N5. Most of my friends intend to wait to have sex until they get married.	.95 (3.6/1.14)	.82 (3.6/1.22)
Self-standards: Greater endorsement of abstinence-related standards (1 to 5)		
P1. A relationship at this time in my life that includes sex would probably interfere with my future goals and plans.	.69 (4.2/1.07)	.70 (4.2/1.12)
P2. I'm the kind of person who abstains from sex until marriage.	.85 (3.9/1.17)	.87 (3.9/1.19)
P6. I'm a responsible person if I don't have sex until marriage.	.70 (3.9/1.12)	.74 (4.0/1.11)
P7. If I have sex before marriage I'm not being very careful with my life.	.73 (3.8/1.15)	.78 (3.9/1.19)
Emotions A: More positive emotions regarding abstinence (1 to 5)		
R1. Being sexually abstinent makes me feel happy.	.97 (3.7/1.15)	.98 (3.7/1.23)
R2. Being sexually abstinent makes me feel good.	.96 (3.7/1.17)	.96 (3.7/1.23)
R4. Being sexually abstinent makes me feel like I'm doing the right thing.	.80 (3.7/1.24)	.89 (3.8/1.27)
Emotions B: More negative emotions regarding sex before marriage (1 to 5)		
R6. Having sex before marriage makes me feel afraid.	.83 (3.0/1.21)	.91 (3.5/1.23)
R7. Having sex before marriage makes me feel worried.	.96 (3.0/1.21)	.97 (3.5/1.22)
R8. Having sex before marriage makes me feel guilty.	.75 (3.0/1.28)	.85 (3.6/1.26)
Support: More support (1 to 5)		
I1. I get along well with my parents.	.89 (4.1/0.91)	.66 (4.1/0.93)
I2. My parents give me help and support when I need it.	.68 (4.5/0.79)	.86 (4.5/0.83)
Rules: More rules in the home (1 to 3)		
G4. About dating.	.72 (2.0/0.71)	.67 (1.8/0.69)
G5. Going to parties.	.66 (1.9/0.65)	.77 (1.8/0.65)
Fit indexes		
χ^2 test of model fit	1064.03 (*df* = 377)	980.34 (*df* = 377)
TLI	.89	.91
RMSEA	.06	.06
SRMR	.05	.04

Note: Values are Item-to-Factor Correlation (Mean/SD). TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.
a. These items were reverse coded.

CI = 0.63, 0.99; β = 0.46), and T1 abstinence→T2 abstinence (*B* = 0.41; 95% CI = 0.28, 0.53; β = .42).

The smallest parameter estimates (and also nonstatistically significant) were for emotions regarding abstinence→intentions (*B* = –0.003; 95% CI = –0.06, 0.05; β = –0.003); support→T2 abstinence (*B* = 0.007; 95% CI = –0.30, 0.32; β = 0.005); rules→T2 abstinence (*B* = –0.16; 95% CI = –0.35, 0.68; β = 0.07); time alone with the opposite sex→T2 abstinence (*B* = –0.07; 95% CI = –0.06, 0.21; β = 0.10); gender→emotions regarding abstinence (*B* = 0.10; 95% CI = –0.13, 0.32; β = 0.04);

Table 3. Estimated Correlation Matrix for Latent Factors: Wave 1 (Below the Diagonal, *n* = 451) and Wave 2 (Above the Diagonal, *n* = 447)

	F1	F2	F3	F4	F5	F6	F7	F8
F1. Intentions	–	.80	.76	.84	.44	.54	.44	–.48
F2. Beliefs	.71	–	.77	.93	.50	.66	.47	–.51
F3. Norms	.63	.61	–	.80	.48	.60	.42	–.50
F4. Standards	.83	.91	.72	–	.54	.70	.51	–.48
F5. Emotions A	.32	.36	.30	.48	–	.47	.34	–.26
F6. Emotions B	.19	.20	.16	.33	.13	–	.34	–.26
F7. Rules	.32	.27	.40	.39	.24	.01	–	–.25
F8. Support	–.51	–.45	–.39	–.52	–.26	–.14	–.25	–

all five paths with age; all five paths with being black or African American; four paths with being White: beliefs, norms, emotions regarding sex before marriage, and self-efficacy; and Hispanic→emotions regarding abstinence and Hispanic→emotions regarding sex before marriage. These nonstatistically significant relationships were deleted for further rounds of model testing.

> Research Question 2: If this integrative model is not adequate, what is the adequacy of a refined model in explaining middle-schoolers' intentions and their subsequent sexual abstinence?

As noted above, the initial model's fit was close but not ideal, so we deleted nonstatistically significant variable relationships, and consulted M*plus* modification indexes before rerunning the modeling analyses. Modification indexes point to variable relationships that could potentially improve model fit. This step-by-step (systematic) process of deleting weak variable relationships and establishing new potentially useful variable relationships (e.g., Hispanic→self-standards and importance of religion→self-standards) resulted in nine additional rounds of model testing. The tenth and final model yielded a χ^2 statistic of 171.74 (*df* = 54, *p* < .0001), TLI value of .95, and RMSEA and WRMR values of .07 and .87, respectively. These values, considered altogether, are indicative of optimal model–data fit. That is, we are confident the model is useful in explaining adolescents' sexually abstinent intentions and their subsequent abstinence. The final model results, in graphical form, are presented in Figure 2.

We assessed the composite, or total, indirect effects of several explanatory variables on sexual abstinence at Time 2 (Table 4). We also assessed the specific indirect effects of the endogenous explanatory variables beliefs regarding sexual abstinence, perceived norms regarding sexual abstinence, self-efficacy to remain sexually abstinent, and self-standards regarding sexual abstinence on sexual behavior at Time 2. Below we report the specific indirect effects for these variables, which are potentially modifiable through intervention efforts.

Beliefs. For beliefs regarding sexual abstinence, the indirect effect through intention to remain abstinent was statistically significant at the .05 level (*B* = 0.08; 95% CI = 0.02, 0.20; β = 0.07). The indirect effect through intention to remain abstinent and abstinence at T1 was also significant at the .05 level (*B* = 0.10; 95% CI = 0.04, 0.18; β = 0.09).

Perceived norms. For perceived norms regarding sexual abstinence, the indirect effect through intention was significant at the .05 level (*B* = 0.08; 95% CI = 0.02, 0.20; β = 0.06). The indirect effect through intention and abstinence at T1 was also significant at the .05 level (*B* = 0.11; 95% CI = 0.04, 0.21; β = 0.08).

Self-efficacy. For self-efficacy to remain sexually abstinent, the indirect effect through intention was significant at the .05 level (*B* = 0.10; 95% CI = 0.02, 0.22; β = 0.09). The indirect effect through intention and abstinence at T1 was also significant at the .05 level (*B* = 0.13; 95% CI = 0.07, 0.22; β = 0.11).

Self-standards. For self-standards regarding sexual abstinence, the indirect effects through self-efficacy and intention was significant at the .05 level (*B* = 0.09; 95% CI = 0.02, 0.20; β = 0.07), as were the indirect effects through beliefs and intention (*B* = 0.09; 95% CI = 0.02, 0.21; β = 0.07) and norms (*B* = 0.07; 95% CI = 0.01, 0.16; β = 0.05). The indirect effect through self-efficacy, intention, and abstinence at T1 was significant at the .05 level (*B* = 0.11; 95% CI = 0.06, 0.20; β = 0.08). The indirect effect through beliefs, intention, and abstinence at T1 was also significant at the .05 level (*B* = 0.11; 95% CI = 0.04, 0.21; β = 0.08), as was the indirect effect through norms, intention, and abstinence at T1 (*B* = 0.09; 95% CI = 0.03, 0.18; β = 0.06).

> Research Question 3: Does a model with adequate fit replicate (or, does it "hold") when tested against a second set of youth sample data? In other words, how robust is this model?

To assess model and parameter reliability (i.e., replicability), we tested the final model using a second but similar set of sample data (from Wave 1). The replication resulted in a nearly identical reproduction of Wave 2 model fit findings, χ^2 = 241.47 (*df* = 64, *p* < .0001). Although model fit was quite close to the recommended Hu and Bentler (1999) cutoffs, two of the three fit statistics failed to meet the desired cutoffs: TLI = .93, RMSEA = .08, WRMR = .97. In the replication, gender→self-efficacy was nonstatistically significant. Removal of this nonsignificant path did not change the global model fit results or individual parameter estimates and inferences in any meaningful way. Modification indices did not suggest any theoretically consistent modifications.

> Research Question 4: Which variables in this integrative model are the best predictors of students' intentions to remain sexually abstinent and, thus, the best candidates for intervention/programming foci?
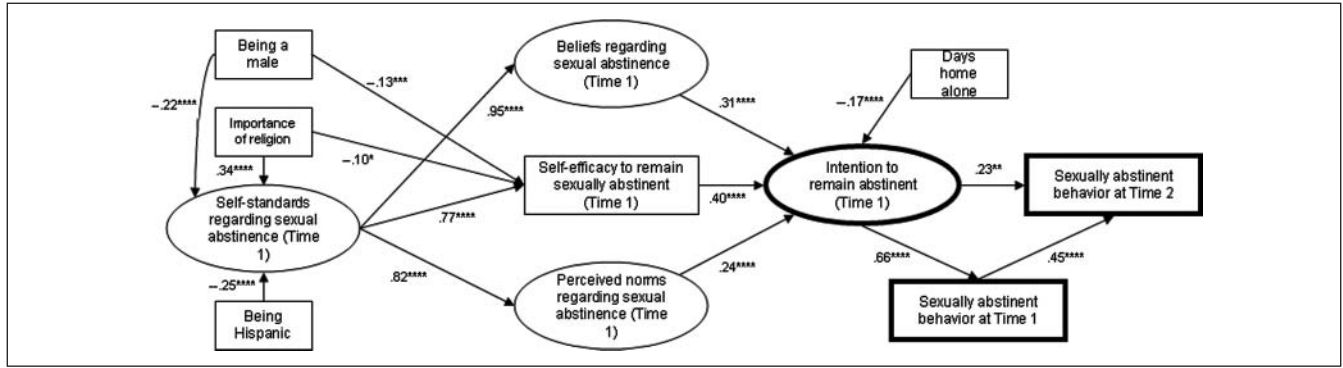
Figure 2. Testing the integrative theoretical framework: Final structural model of adolescent sexually abstinent behavior and intensions to remain abstinent, Wave 2 data (*N* = 439)

Note: Parameter estimates are standardized regression (β) weights, with the exception of those to behavior at Times 1 and 2. These estimates are probit regression coefficients. A probit regression coefficient with a positive sign means the probability of the categorical dependent variable (e.g. being sexually abstinent) is increased when the predictor value increases. A greater magnitude means this probability increases faster. Model Fit Statistics: $\chi^2(df)$ = 171.74 (54), TLI = .95, RMSEA = .07, WRMR = .87. $^*p \le .05$. $^{**}p \le .01$. $^{***}p \le .005$. $^{****}p \le .001$.

Table 4. Composite Indirect Effects of Explanatory and Intermediary Variables on Time 2 Abstinence and Intentions, Wave 2 (*n* = 447)

Outcome variable	Explanatory variable	*B*	95% CI	β
Time 2 abstinence	Beliefs	0.18	0.06, 0.33	0.16
	Norms	0.19	0.07, 0.36	0.14
	Self-efficacy	0.23	0.12, 0.39	0.20
	Days home alone	−0.08	−0.14, −0.04	−0.08
	Self-standards	0.55	0.37, 0.72	0.41
	Being male	−0.25	−0.38, −0.14	−0.12
	Importance of religion	0.21	0.12, 0.31	0.12
	Being Hispanic	−0.24	−0.36, −0.13	−0.10
Intention	Standards	1.07	0.92, 1.25	0.79
	Being male	−0.49	−0.66, −0.30	−0.23
	Importance of religion	0.40	0.25, 0.55	0.23
	Being Hispanic	−0.46	−0.62, −0.29	−0.20

Note: Any 95% confidence interval that does not include zero is statistically significant at *p* <.05.

In the final Wave 2 model, self-efficacy was the largest predictor of intention (*B* = 0.48; 95% CI = 0.33, 0.62; β = 0.40). However, beliefs (*B* = 0.36; 95% CI = 0.20, 0.52; β = 0.31), perceived norms (*B* = 0.33; 95% CI = 0.16, 0.50; β = 0.24), and days home alone (*B* = –0.17; 95% CI = –0.25, –0.08; β = –0.17) were also predictive of intention. See Table 5 for a complete list of direct effect results.

The use of the squared multiple correlation (R^2)—the percentage of variance explained by one or more predictor variables on a dependent variable—in SEM is an ongoing area of research and debate at the present time (Bentler & Raykov, 2000; Hayduk, 2000, February 20). Consequently, we report R^2 here simply as a descriptive statistic of interest. According to the final model, the percentage of variance explained for T1 and T2 abstinence was 43.1% and 47.1%, respectively. The largest percentage of variance explained was for beliefs (89.4%), followed by intention (75.6%), norms (66.9%), self-efficacy (59.8%), and self-standards (25.3%). For illustrative purposes, we report parameter estimates from a "reduced form" model in Table 6.

Discussion

Results from the current analyses indicate that the integrative model examined here is useful in explaining adolescents' intention to remain sexually abstinent and their sexual abstinence. This study contributes to the adolescent sexual health literature in three ways. First, despite the utility of past research into the predictors of intention, sexual abstinence, and sexual behavior, to our knowledge no research efforts have followed the integrative model as a guide. Rather than focusing on a narrow range of explanatory factors, this theoretically driven study examined the simultaneous impact of multiple elements, including intrapersonal, interpersonal, and perceived environmental factors, on adolescents' intention and their abstinence from sex.

Second, most studies examining adolescent sexual abstinence use simple analytic techniques that examine single outcomes. Our use of SEM strengthens this research because the method is ideal for testing and refining theoretical models (which was our central purpose). It also strengthens our research

Table 5. Direct Effects of Explanatory and Intermediary Variables on Intermediary Variables and Time 2 Abstinence, Wave 2 (*n* = 439)

Outcome variable	Explanatory variable	B	95% CI	β
Time 2 abstinence	Intention	0.23	0.06, 0.39	0.23
	Time 1 abstinence	0.45	0.32, 0.57	0.45
Time 1 abstinence	Intention	0.65	0.52, 0.78	0.66
Intention	Beliefs	0.36	0.20, 0.52	0.31
	Self-efficacy	0.48	0.33, 0.62	0.40
	Norms	0.33	0.16, 0.50	0.24
	Days home alone	−0.17	−0.25, −0.08	−0.17
Beliefs	Self-standards	1.10	0.91, 1.28	0.95
Self-efficacy	Self-standards	0.86	0.70, 1.02	0.77
	Being male	−0.23	−0.37, −0.09	−0.13
	Importance of religion	−0.15	−0.28, −0.03	−0.10
Norms	Self-standards	0.82	0.65, 0.99	0.82
Self-standards	Being male	−0.34	−0.49, −0.20	−0.22
	Importance of religion	0.44	0.32, 0.57	0.34
	Being Hispanic	−0.43	−0.59, −0.27	−0.25

Note: Any 95% confidence interval that does not include zero is statistically significant at *p* <.05.

Table 6. Reduced Form Model: Regression of Time 2 Abstinence Onto All Integrative Model Explanatory Variables and Demographic Factors, Wave 2 (*n* = 420)

Outcome variable	Explanatory variable	B	95% CI	β
Time 2 abstinence	Intention	0.40	0.08, 0.73	0.18
	Beliefs	−0.13	−0.92, 0.66	−0.07
	Norms	−0.36	−0.83, 0.11	−0.14
	Self-standards	−0.01	−0.91, 0.89	0.00
	Emotions regarding sexual abstinence	0.27	0.09, 0.44	0.21
	Emotions regarding sex before marriage	0.00	−0.29, 0.30	0.00
	Perception of support	0.01	−0.24, 0.25	0.00
	Rules/boundaries	−0.27	−0.90, 0.36	−0.10
	Gender (0 = *male*, 1 = *female*)	−0.15	−0.59, 0.28	−0.06
	Age	−0.07	−0.36, 0.23	−0.04
	Being Black or African American	−1.19	−2.22, −0.17	−0.16
	Being Hispanic	−0.48	−1.15, 0.19	−0.17
	Being White	−0.25	−0.97, 0.47	−0.09
	Importance of religion	0.13	−0.28, 0.53	0.06
	Time 1 abstinence	1.32	0.75, 1.89	0.29
	Days home alone	−0.24	−0.45, −0.03	−0.19
	Time alone with opposite sex	−0.05	−0.26, 0.16	−0.05
	Self-efficacy	0.47	0.17, 0.76	0.32

Note: Any 95% confidence interval that does not include zero is statistically significant at *p* <.05.

by isolating measurement error variance during analyses, controlling for inflation of experimentwise error, and honoring the complex reality to which we are attempting to generalize via decomposing total effects into direct and indirect subcomponents (Thompson, 1994).

Third, unlike most adolescent sexual behavior research, the current analyses used data collected at two time points and replication to assess the utility of the integrative model. Studies that go beyond cross-sectional data collection are more appropriate for documenting evidence for cause-and-effect relationships because of the control of the temporal priority of variables (i.e., the cause must *precede* the effect). Because of the age of

youth in this sample, a true test of the integrative model would require outcome data obtained several years in the future (i.e., in high school). In our study, controlling for abstinence at Time 1, we assessed the impact of the integrative model factors on abstinence at Time 2, which ranged from approximately 10 days to several months later. Furthermore, we validated these variable relationships using a second sample of data mostly composed of different participants from the first sample. This replication serves to ensure against making a decision based on a single, possibly unusual, outcome or result. Instead, we obtained nearly identical results using data from two mostly separate groups of youth respondents.

Nevertheless, this study suffers from seven particular limitations. First, although we note above that our findings are strengthened by our obtaining nearly identical results through replication, we should also note that this replication did not result in the desired Hu and Bentler (1999) "two-out-of-three" fit statistic cutoffs. Instead, the replicated model met the WRMR criterion (.97; recommended cutoff: ≤1.0) and was quite close to the recommended cutoff values for the RMSEA (.08; recommended cutoff: ≤.06) and the TLI (.93; recommended cutoff: ≥.95). Yuan (2005) noted that a fit index is not just a measure of model fit but also of other uncontrollable factors, such as sample size and model complexity, two important considerations in the current research. Marsh et al. (2004) cautioned that reliance on the more stringent cutoff values proposed by Hu and Bentler (1999) may lead to incorrectly rejecting an acceptable model. For instance, in additional empirical work studying the finite sample properties of the RMSEA model fit statistic, Chen, Curran, Bollen, Kirby, and Paxton (2008) observed that "there is little empirical support for the use of .05 or any other value as *universal* cutoff values to determine adequate model fit" (p. 462; italics added). In light of the growing body of statistical literature that calls into question the use of exact cutoffs for SEM fit statistics, we view these fit statistics as approximate measures of model fit and, accordingly, believe that the replicated model demonstrated close but still useful fit to the data. We acknowledge that this level of fit is not perfect, but in our view it is still sufficiently strong to yield valuable results that attest to the robustness of the integrative model. Future research projects using the integrative model may benefit from refinements of the existing measurement instruments used in this study combined with the inclusion of new measurement instruments that tap additional facets of the latent constructs studied here. Such efforts may result in replications of the integrative structural equation model that exhibit even better global model fit.

Second, the scope of the investigation was limited to examining the components of Fishbein's integrative model. One critique of this model may be that it is overly individualistic. For instance, following the model with fidelity, we were unable to include environmental influences such as exposure to pro-sex media messages, advertising, family, peer and community culture that may, in turn, influence standards, beliefs, norms, and intentions at the individual level.

Third, our modeling excluded a key element in that integrative model: skills. Although important, skills were not measured in the larger evaluation study because skillfulness must be measured through direct observation in naturalistic settings (Goodson & Buhi, 2007). Thus, no measure of ability of any sort (nor youth self-reporting of ability) was included in the current analyses. Although we did include a measure of self-efficacy, which has been used as a proxy measure for skills, this measure was assessed through only one item—"I can remain abstinent until marriage." Whether this item truly captures the concept of self-efficacy is questionable and is deserving of some additional study.

Fourth, although the integrative model posits that environmental constraints as well as individual-focused factors affect behavior, we examined youths' perceptions of environmental constraints. Such perceptions included the perception of support for remaining sexually abstinent, rules/boundaries in the home, and parental monitoring/supervision. Because of the complexity of youth data collection in school settings, better measures, including parents' actual monitoring/supervision, were not available in this study.

Fifth, the sample selection procedure in the broader evaluation study may have lent itself to bias. For instance, student recruitment was based on convenience, not on probabilistic sampling procedures. The sample included students participating in five abstinence-only education programs, which *volunteered* to partner with the evaluation team. Furthermore, these programs were operating in select middle schools, and not a representative sample of middle schools in Texas. Therefore, findings from this research may not be generalizable to all middle-schoolers in Texas, nor may they be applied to all youth participating in abstinence-only programs in Texas. According to Huck (2004), these findings may only be generalized to an abstract (hypothetical) population of adolescents participating in abstinence programs in Texas.

Ideally, testing of this integrative framework would have been most fruitful among a sample of youth not participating in an abstinence promotion intervention. Recognizing threats to internal validity is important in this case because, theoretically, abstinence-only programs may have had an effect on either the outcome of interest (sexual abstinence) or any one of the mediating variables included in the model. However, pre- and postintervention analyses, reported elsewhere (Goodson et al., 2004; Goodson et al., 2005), revealed that dosage—as measured by time and intensity of program activities to which each middle-schooler was exposed—had no effect on sexual abstinence. Furthermore, with the exception of perceived norms, dosage was not related to changes in any of the mediating variables in the model from pre- to postintervention. Therefore, although acknowledging that the exclusion of dosage in the model is a potential limitation of this study, in reflecting on the findings of the larger abstinence education evaluation study, we believe the effect of the intervention on the fit of the integrative model with data obtained from this sample of youth is likely to be negligible. Moreover, an advantage of testing the model under conditions of intervention enhances the external validity of our findings.

Sixth, although we found minor variation in terms of sample characteristics between recruitment sites (i.e., for Wave 2: greater numbers of American Indians from Site 1, African Americans from Site 2, and Hispanics/Latinos from Site 3; see Table 1), the youth sample included in this analysis was largely White. We were unable to examine individual recruitment site effects because breaking the sample up into smaller groups would have rendered subsequent SEM analyses unstable and, therefore, less useful. However, on the whole, having more

African American and American Indian youth represented can bolster this study's generalizability to other ethnic groups to some degree. Although recruiting schools to participate in the overarching study was a challenge, our work could be strengthened if future research replicated findings with a more diverse sample of students from a more representative sample of middle schools.

Lastly, we caution readers on the limitations inherent in structural equation modeling. For instance, it is wise to be aware of the potential for alternative explanations for research findings. In addition, although SEM is often referred to as causal modeling, the findings in this study denote correlational relationships. Inferring causation requires more than simply using SEM as a method; instead, an *association* must exist between the variables postulated to have the cause-and-effect relationship and *directionality* of the causal relationship must be established. In the current study, we partially met these two criteria. For instance, all of the variables included in the final model exhibited strong statistical relationships in the hypothesized manner. With the longitudinal nature of the broader evaluation study, we were able to test the effects of multiple variables (e.g., beliefs) at one time point on youth remaining sexually abstinent, while statistically controlling for previous sexual behavior. The final condition for inferring causation is that variables of interest must be *isolated* from all other influences, which would require the highest level of control: an experimental vacuum (Bullock, Harlow, & Mulaik, 1994). Unfortunately, this level of control is impossible in sexuality research, so sex behavior research that uses SEM will only provide a clue that a causal relationship may exist.

In light of these limitations, based on our results, adolescents' intention to remain sexually abstinent is a strong predictor of staying abstinent, even at a second time point. This finding is well supported by many studies of adolescent sexuality (Gillmore et al., 2002; Masters et al., 2008; Stanton, Li, Black, & Ricardo, 1996). However, to understand this impact, the relationships among the other variables must be examined. First, we found that greater endorsement of abstinence-related standards predicted (a) stronger beliefs regarding staying abstinent until marriage, (b) a stronger perception that others endorse proabstinence norms, and (c) greater confidence (self-efficacy) to remain abstinent until marriage. In turn, stronger beliefs regarding staying abstinent until marriage, a stronger perception that others endorse proabstinence norms, and greater confidence to remain abstinent predicted adolescents' intentions to remain abstinent.

There appears to be support in the literature for these findings. For instance, in their study of 14- to 25-year-old urban girls, Paradise et al. (2001) found that many of the virginal girls held abstinence as a personal value. Similarly, Blinn-Pike et al. (2004) found adolescents' conservative values concerning sex before marriage predicted who remained abstinent over an 18-month period. In addition to endorsements of abstinence-related standards, when youth in our study perceived sexual

abstinence to be the norm among same-aged peers, they more often reported greater intentions to remain abstinent and, in turn, be sexually abstinent. Gillmore and colleagues (2002), similarly, found that youth who had not had sexual intercourse perceived those around them to favor sexual abstinence at that age. Other studies support the strong relationship between perceived peer norms and youth sexual behaviors or abstinence (Alexander & Hickner, 1997; DiClemente et al., 2001; Kinsman, Romer, Furstenberg, & Schwartz, 1998; Kirby, 2007; Kotchick, Shaffer, Forehand, & Miller, 2001; Santelli et al., 2004; Stanton et al., 1996). However, as noted above, directionality is an important question in this literature. Could it be that choosing sexual abstinence leads teens to immerse themselves in proabstinent environments? Or, is it the influence of proabstinent environments that support teens' sexual abstinence. More research is needed examining actual peer influences on abstinence.

Both emotions factors failed to predict intentions, "washing out" of the analyses in early rounds of model testing. It may be that emotions surrounding abstinence or sexual activity do not play a critical role in maintaining sexual abstinence among youth at this age because of their lack of experience with sexual activity and romantic relationships. Although the data on emotions were valid, for our sample, they may have lacked the necessary variability to behave as an adequate predictor in our model. It might prove fruitful to examine the role of emotions within a model for high-schoolers, as emotions may play a more prominent role for adolescents confronting the reality of sexual relationships, on a more frequent basis. Studies of Puerto Rican high school youth (Collazo, 2004) and early adolescent African Americans (Stanton et al., 1996) revealed that negative emotions regarding sex (or positive emotions toward abstinence) were associated with intention to remain abstinent and subsequent sexual abstinence, respectively. A third study (Blinn-Pike et al., 2004) measured emotions among high-schoolers in a much different manner than we did in this study. These researchers' emotions factor (emotionality and confusion) was represented by fears surrounding pain with sexual intercourse, embarrassment over sex, lack of money for birth control or condoms, and peer or partner disapproval. Nevertheless, one area in need of more focused inquiry relates to the effects of emotions in the integrative model.

Within the integrative model, the environmental constraints element likely represents the most complex predictor, as a diversity of factors fall under this category. Environmental factors examined most frequently in sexual behavior and/or sexual abstinence research include parental involvement and closeness, parental relationship quality, rules and boundaries, parental support, and parental monitoring and supervision (Buhi & Goodson, 2007). In our study, we assessed youth's perception of parental support rules and boundaries, and parental monitoring and supervision. However, for both models, only days home alone (inversely) predicted adolescents' intentions to remain abstinent. This finding mirrors other studies indicating that time home alone is strongly related to teens remaining

abstinent or postponing sexual intercourse (Kotchick et al., 2001; Miller, 2002). The other perceived environmental variables—rules, support, and time alone with opposite sex—all had statistically nonsignificant relationships with sexual abstinence. It is unclear why these factors failed to play a substantial role in predicting behavior in this study, as measurement model testing yielded adequate factor loadings on the rules and support indicators. Furthermore, the scaled rules and support scores appeared to be adequately reliable (α = .71 and .90, respectively). The integrative model may be improved through further focused empirical study of parental monitoring and supervision and youth sexual behavior and intention outcomes. Buhi and Goodson (2007), in their systematic review, found that increased parental monitoring exhibited a largely protective effect on sexual activity initiation as reported by several studies. However, many reports noted no statistically significant effects. This—as well as other "mixed findings" Buhi and Goodson detected—may well be a product of investigators' use of different instruments or scales to measure parental monitoring (and other variables).

Several findings emerged regarding the demographic and individual difference variables. For example, gender was inversely related to standards and self-efficacy, meaning that males in this study exhibited weaker endorsements of abstinence-related standards and less confidence that they would remain abstinent until marriage. This finding is not surprising given that males statistically differed from females, in the Wave 2 sample, in terms of reporting ever having had sexual intercourse (Fisher's exact test, $p \leq 0.04$). It is possible that in this sample, the normative expectations regarding remaining sexually abstinent, and the appropriate age and circumstances of first sex, vary by gender (Pleck, Sonenstein, & Ku, 1993). Certainly, research has demonstrated that different sexual standards are held, both explicitly and implicitly, for young males compared with young females (Oliver & Hyde, 1993). Given that much of the research using national surveys has been conducted with young adult females, more research needs to be conducted with adolescents, especially adolescent boys. In fact, Tolman, Striepe, and Harmon (2002) noted that gender is largely absent from most adolescent sexual health models and called for in-depth exploration on how gender may promote or undermine adolescent sexual health.

In the current study, sexual abstinence and importance of religion were indirectly related via stronger abstinence-related standards. Sexually inactive youth may be internalizing pro-abstinence values, and this may serve as a protective factor. Findings from our study also indicated that importance of religion was inversely related to being more confident to remain abstinent. We have found no research explaining this finding, however. Although religiosity is, in general, associated with later sexual initiation and less frequent intercourse (Whitehead, Wilcox, Rostosky, Randall, & Wright, 2001), perhaps religion serves primarily as a social control mechanism against early sexual activity, through adult monitoring or supervision

(Rasberry, 2006). In terms of self-efficacy to remain sexually abstinent, religiosity may not play a substantial role in allowing youth to develop the confidence to reject peer pressure, or communicate about sex and sexuality.

Finally, being Hispanic or Latino in this study's sample predicted weaker endorsements of abstinence-related standards. What exactly this finding means needs to be examined further, as being Hispanic did not significantly predict beliefs, self-efficacy, or perception of norms. In an exploratory step, we partitioned the sample and tested the integrative model among Hispanic youth only. Although data are not reported here, in model testing, poor fit statistics indicated a potential inconsistency between the model and sample data. In addition, the relationship between intentions→T2 abstinence was not statistically significant. The small sample size may have been a factor in these findings, as data for only 131 Hispanics were available for modeling. Nevertheless, these results raise additional questions, which should be answered in future research, regarding the adequacy of this model for certain priority populations.

Implications for Practice

Our study has implications for health and sexuality education practice and research. First, this model lends itself to application in practice, as educational programs and curricula can easily supplement the provision of information by focusing on self-standards, self-efficacy, and beliefs regarding sexual abstinence to affect sexual health. Self-efficacy, for example, was the largest predictor of intention to remain abstinent. Educational programs could focus on boosting adolescents' confidence by developing activities related to refusing sex, handling pressure from boyfriends or girlfriends, communicating sexual limits, and negotiating difficult sexual situations (Laflin, Wang, & Barry, 2008). Furthermore, programs may choose to reinforce the perceived norms about refraining from sex. In the larger evaluation study, for example, it was found that adolescents' perception of norms related to abstinence actually improved from pre- to posttest (Goodson et al., 2005). This finding indicates that perceived norms may be rather easily influenced, among middle-schoolers, through educational programming.

Second, although most programmatic efforts aimed at pregnancy and STI prevention focus on girls, educators may wish to shift their attention to male-targeted programming. As noted above, boys in this study exhibited weaker endorsements of abstinence-related standards and less confidence that they could remain abstinent until marriage. Programs may be able to reinforce the perceived norms among young males (the normative expectations about remaining abstinent, the appropriate age and circumstances of first sex, etc.).

Third, results from our investigation support other studies indicating that time home alone is strongly related to intentions to remain abstinent or postponing sexual intercourse (Miller, 2002). Both abstinence-only and comprehensive sexuality education programs may be able to influence adolescent risk

by involving youth during after-school hours (Manlove, Franzetta, McKinney, Papillo, & Terry-Humen, 2004) or by developing a parental component (designed to increase parent–child closeness or improve monitoring and supervision) to accompany sex education programming for youth. However, to do this, increased funding support mechanisms must be in place, and public policy changes may be warranted. For example, perhaps local education policies supporting year-round schooling (eliminating long summer periods with increased time home alone) or revising school-time hours (beginning class later in the morning and ending later in the afternoon) may decrease adolescents' time home alone and, thus, their sex behavior risk.

Implications for Research

Several implications for future study should be noted. First, this study tested the integrative model using a sample of middle school students. Does the explanatory power of this model and of individual factors (e.g., self-standards, intentions), however, change with age or when older (high school) students are examined? Perhaps variables such as perceived norms regarding abstinence are not strong correlates of older adolescents' sexual involvement.

Second, in part because of potential selection bias, youth in the current samples were predominantly White, female, and had high educational aspirations. Most respondents also lived with both biological parents, and the majority did not spend much time alone at home unsupervised. Studies are needed to examine the impact of the integrative model among adolescents in more diverse communities, among groups where educational aspirations are lower, and in settings where youth live in single-parent households with little supervision.

Third, this study assessed the influence of the perception of peer norms on intentions. Little is known, however, about actual peer and social network influences on abstinence and sex behaviors. As noted above, these influences must be examined further.

Fourth, other than in the current study, to our knowledge this integrative model has only been applied to a small number of health behaviors in limited settings (Rhodes, Stein, Fishbein, Goldstein, & Rotheram-Borus, 2007; Sumartojo et al., 2008; Zhao et al., 2006). More empirical testing is needed to assess its application to other preventive and health-risk behaviors among youth and adolescents. Lastly, given the implications detailed above for health and sexuality education practice, if school-based programs are developed based on the integrative model, more research and evaluation studies are warranted to explore these programs' effects. It is of utmost importance that researchers follow cohorts of participants in such programs, through high school and beyond, to gain a true understanding of program impact (or lack thereof) as well as to inform theoretical development.

Note

1. The M*plus* estimates for paths connecting predictors to an observed categorical dependent variable (in this case, sexually abstinent behavior) are probit regression coefficients. A coefficient with a positive sign means the probability of the categorical dependent variable (e.g. being sexually abstinent) is increased when the predictor value increases.

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