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Predictors of Secondary Abstinence in U.S. College Undergraduates

Catherine N. Rasberry · Patricia Goodson

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Abstract This study examined (1) the percentage of participants who practiced secondary sexual abstinence and (2) factors associated with its practice among a sample of U.S. college students. College undergraduate men and women (n = 1,133) in Texas completed a web-based survey assessing abstinence status and predictors of abstinent behavior. Results revealed that 12.5% of participants practiced secondary abstinence. Of eight variables, five significantly predicted secondary abstinence (following sexual initiation). Predictors were positive attitude toward abstinence, subjective norm supporting abstinence, greater religious ties, and previous negative sexual experiences. The fifth variable, participation in abstinence education, however, was associated with a significantly reduced likelihood of secondary abstinence. Fewer perceived barriers, less environmental manipulation (efforts to make physical and social environments supportive of abstinence), and greater religious ties significantly predicted self-efficacy for secondary abstinence. Findings provide an estimate of the percentage of participants who practiced secondary abstinence and suggest focal points for future research.

Keywords Secondary abstinence · Sexual abstinence · Adolescents · College students

C. N. Rasberry (✉)
Department of Health, Physical Education, and Sport Sciences, Morehead State University, 200F Laughlin Health Building, Morehead, KY 40351, USA
e-mail: cnrasberry@hotmail.com

P. Goodson
Department of Health and Kinesiology, Texas A&M University, College Station, TX, USA

Introduction

In recent years, researchers have focused increased attention on sexual abstinence among adolescents and the effectiveness of educational programs, likely due to increased federal funding in the United States for abstinence-only-until-marriage programs (Bassett et al., 2002; Marx & Hopper, 2005; Rosenberg, 2002; Stewart, Shields, & Hwang, 2003; Thomas, 2000; Wiley & Terlosky, 2000). In theory, abstinence-only education appears a logical choice for reducing adolescents' sexual health risks. By practicing abstinence, young people reduce the number of lifetime partners, the number of non-monogamous partners, and their overall exposure to sexual activities that put them at risk for pregnancy and sexually transmitted infections (STIs).

To date, evidence supporting the effectiveness of abstinence-only programs (of the type currently funded through federal monies in the U.S.) is limited, at best (Buhi & Goodson, 2006; United States Government Accountability Office, 2006; Young & Penhollow, 2006). A recent review of evaluations of abstinence education programs revealed mixed results (Young & Penhollow, 2006). Many of the studies in the review indicated that programs did not lead to reductions in risky sexual behaviors (a finding generally consistent with other research) (Kirby, 2001; Young & Penhollow, 2006), but a few of the studies did report intended behavioral outcomes—some present at certain follow-ups and not others (i.e., after 3 months, but not 6 or 12) or for certain subgroups of participants (i.e., reduced frequency of intercourse and number of partners among sexually-experienced youth) (Young & Penhollow, 2006). Even so, these and similar glimpses of effectiveness are often undermined by the lack of rigor present in many published evaluations (Buhi & Goodson, 2006; United States Government Accountability Office, 2006; Young &

Penhollow, 2006). Furthermore, mixed results have also emerged from studies focusing on the impact of taking virginity pledges, an element often incorporated into many abstinence-only programs. While some researchers have found settings with few pledgers (Bearman & Bruckner, 2001) or pledges made privately (Bersamin, Walker, Waiters, Fisher, & Grube, 2005) were associated with delayed initiation of intercourse, others have reported virginity pledges did not correlate with reduced incidence of STIs (Bruckner & Bearman, 2005).

Given the uncertainty regarding effects of interventions to promote sexual abstinence, it is reasonable to assume that many salient questions remain unanswered. One fundamental question is: What happens when sexually experienced youth—those who have already initiated sexual activity—hear abstinence-promoting messages? If abstinence education programs are getting mixed results when promoting abstinence to younger children, is it even reasonable to promote abstinence for sexually-experienced youth, as many programs claim to do? Although adolescents are likely to continue having intercourse once they have started (Thomas, 2000), these programs often assume that sexually active students can, and will, transition to being sexually inactive (Hancock & Powell, 2001; Worth Waiting For, 2002).

The practice of sexual abstinence following the initiation of intercourse (and often a period of sexual activity) is termed *secondary abstinence* (Loewenson, Ireland, & Resnick, 2004; Thomas, 2000). Rather than studying *secondary* abstinence, much of the adolescent sexuality research focuses on antecedents of initiation of sexual intercourse (Kirby, 1997, 2002; Zimmer-Gembeck, Siebenbruner, & Collins, 2004) and, in rare instances, individuals' reasons for *primary* abstinence (never having had intercourse) (Bassett et al., 2002; Dunsmore, 2005; Lammers, Ireland, Resnick, & Blum, 2000; Loewenson et al., 2004). Available evidence points to a variety of factors that correlate with *primary* abstinent behavior, including higher socioeconomic status (Lammers et al., 2000; Oman, Vesely, Kegler, McLeroy, & Aspy, 2003), having been raised in a dual-parent household (Lammers et al., 2000; Oman et al., 2003) and having parents with higher education levels (Carvajal et al., 1999; Oman et al., 2003), fear of adverse consequences such as pregnancy or STIs (Blinn-Pike, 1999; Dunsmore, 2005; Loewenson et al., 2004), parental expectations and influences (Bassett et al., 2002; Lammers et al., 2000; Paradise, Cote, Minsky, Lourenco, & Howland, 2001), personal values (Blinn-Pike, Berger, Hewett, & Oleson, 2004; Paradise et al., 2001), and religious influences (Bassett et al., 2002; Dunsmore, 2005; Lammers et al., 2000; Oman et al., 2003). A recent qualitative study also found "future orientation," beliefs about "positive outcomes of abstinence," fear of a "physical/sexual relationship," "concerns related to social responsibility," "fear of emotional/moral consequences," and the desire to gain control in, or manipulate aspects of, a relationship cited by a sample of college students as important motivations for primary abstinence (Dunsmore, 2005, pp. 19–21).

Despite the concentrated focus on *primary* abstinence, a review of the literature revealed a sizeable gap in the research dedicated to examining and understanding the practice of *secondary* abstinence (Rasberry, 2006). Although researchers have alluded to the term or the concept in their work (Erulkar, Ettyang, Onoka, Nyagah, & Muyonga, 2004; Haglund, 2003; Norris, Clark, & Magnus, 2003; Paradise et al., 2001; Simbayi, Chauveau, & Shisana, 2004; Thomas, 2000), only one study has examined secondary abstainers' reasons for avoiding intercourse (Loewenson et al., 2004). That study found the reasons were similar to those cited by primary abstainers and included fear of negative consequences and "normative beliefs about the appropriateness of having intercourse" (Loewenson et al., 2004, p. 213). It was cautioned, however, that the response options in that survey were based on researchers' prior knowledge of reasons shaping primary abstinence; in other words, reasons selected by survey participants were provided to them, a priori, and did not emerge from the sample itself.

In addition to identifying reasons for secondary abstinence, Loewenson et al. (2004) also provided data regarding the percentage of participants who practiced among adolescents. It was found that among the "sexually experienced" youth in their study (a sample of Minnesota 9th and 12th grade students), approximately 7.8% (1,944 of 24,921 adolescents) claimed to practice secondary abstinence. To the best of our knowledge, this is one of the only estimates available of the percentage of participants who practiced secondary abstinence among U.S. youth. The purpose of the current study, therefore, was to begin to fill this void in the research about secondary abstinence by providing a better understanding of the practice as well as an estimate of the percentage of participants who practiced secondary abstinence in a sample of U.S. college students.

Theoretical framework

Qualitative data, obtained by the first author when studying college students' experiences with secondary abstinence (Rasberry, 2006), provided the empirical and theoretical bases for the study reported here. These data—analyzed and interpreted in light of behavior change theories—guided the development of a conceptual model hypothesizing relationships among salient variables (Fig. 1).

Among these salient variables, attitude toward behavior, subjective norm, religious ties, previous negative experi-

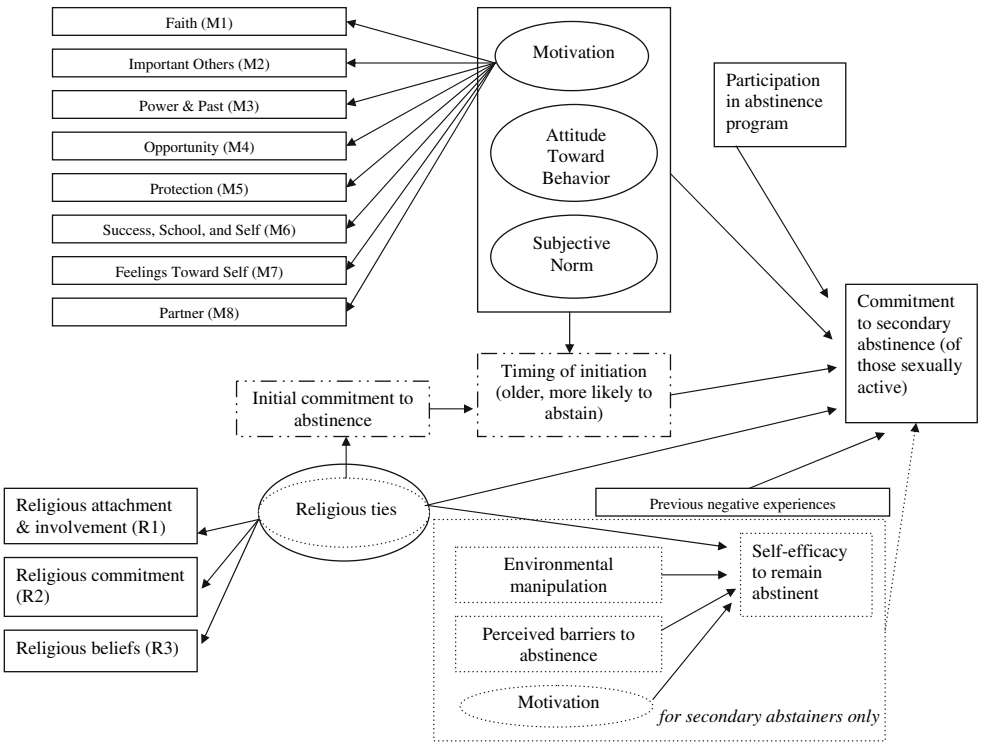

Fig. 1 Model of the hypothesized relationships between predictor variables and secondary abstinence. The model was statistically tested in three separate sections. Variables in each section are identified by different types of lines: Section 1 variables are outlined with solid lines (———), Section 2 variables are outlined with uneven, dotted lines (— - - — - -), and Section 3 variables are outlined with small dotted lines (- - - -)

ences, perceived barriers, environmental manipulation (efforts to make physical and social environments supportive of abstinence), and motivation for abstinence were factors that emerged from the qualitative data. Conceptual validity of these factors was also supported by numerous health behavior theories often deployed in understanding the sexual behavior of adolescents and young adults. Attitude toward behavior and subjective norm are included in the theory of planned behavior (Ajzen, 1991), while religious ties and perceived barriers are constructs in the Social Control Theory (Hirschi, 1969) and Health Belief Model (Rosenstock, 1974), respectively. The environmental manipulation variable includes aspects of the environment construct in Social Cognitive Theory (Bandura, 1986), perceived behavioral control in Theory of Planned Behavior (Ajzen, 1991), and seeking and enacting strategies in the AIDS Risk Reduction Model (Catania, Kegeles, & Coates, 1990). In addition to being grounded in the responses provided by the sample in our qualitative study, the construct of motivation for abstinence was included due to research evidence linking various dimensions of motivation to sexual abstinence in other samples of college students (Dunsmore, 2005). Self-efficacy to remain abstinent was included in the model based on its influence on behavior as explained in Bandura's (1997) Self-efficacy Theory. The participation in abstinence education variable was added to capture any potential relationships among abstinence programming and adolescents' behavior. Demographic variables (e.g., gender, age, and ethnicity) were included based on previous research that has linked each of these factors to abstinence, and for group comparisons (Blinn-Pike et al., 2004; Donnelly et al., 1999; Kirby, 1997; Oman et al., 2003).

Purpose

As few empirical data on the topic of secondary abstinence and its multidimensional facets are currently available, this study represents an attempt to fill this gap. Our purpose in this study, therefore, was twofold: (1) to determine the percentage of participants who practiced secondary abstinence, and (2) to identify factors associated with its practice among a sample of college undergraduates in the U.S.

Method

Participants

In the fall of 2005, complete listings of undergraduate students from three universities (total population $N = 41{,}808$) within a large university system in the state of Texas provided the sampling frame for selecting a random sample of 6,000 students (stratified by university). Students were e-mailed an invitation to participate and a web-link for the online survey. In an effort to avoid bias, the survey was

described as an exploration of aspects of both sexual activity and abstinence. One-week follow up reminders were sent, and data collection ended 2 weeks after the initial contact. As a way to increase response rates, students could enter a drawing for 1 of 4 DVD players (while maintaining anonymity of responses) (Dillman, 2000). Of the 6,000 invitations, 5,659 were deliverable, and 1,133 participants completed surveys (a response rate of 20.0%).

Most participants were female (59.4%) and Caucasian (85.1%). Other ethnicities represented were Hispanic (10.0%), Asian/Pacific Islander (2.7%), African American/Black (1.6%), American Indian (.2%), and Other (.4%). Participants' mean age was 20.52 years (SD = 2.50). Less than half (38.7%) reported drinking alcohol an average of at least once per week (61.3% drank less than once a week) and nearly three-quarters of participants (72.2%) identified themselves as belonging to a faith community. In terms of relationship status, 38.7% were single and not dating, 53.6% were dating, 4.7% were engaged to be married, and 4.0% were married or previously married (Table 1).

Measures

Designed to measure the factors posited in the theoretical model (Fig. 1), initial drafts of the survey instrument were sent to a panel of five experts in the field of health education and/or sexual health/sexuality education to establish content validity of the items. The final version incorporated reviewers' comments and was constructed online; an electronic pilot-test was subsequently conducted with a convenience sample of 143 students from the largest university in the sample.

The instrument contained 45 items, several of which consisted of multiple components (for example, the motivation item contained parts "a" through "y"). The instrument was designed by the first author, and the measures were grounded in both qualitative data from a preceding phase of this research (Rasberry, 2006) and health behavior theories. The final version was placed on a website for electronic distribution and administration; electronic delivery facilitated fast, convenient, and anonymous survey responses (Tse, 1998). Students had to provide consent to move from the introduction web page to the survey, and estimated completion time was 10–15 min. The Institutional Review Board of the local university approved this study.

A total of 10 primary variables were examined in this study. Data for scaled variables were examined for reliability through estimates of Cronbach's alpha. Split-half reliability was estimated because the survey was a single administration of an online instrument and test–retest was not a viable option (Crocker & Algina, 1986).

The dependent variable for most analyses was Abstinence Status. Primary abstainers were those that responded they had (1) never had vaginal sex and (2) made a conscious commitment to abstinence (defined as a "conscious commitment to refrain from sexual activity for an extended period of time"). Secondary abstainers were those who had (1) engaged in vaginal sex and (2) reported being currently committed to abstinence. Non-abstainers were participants who had either (1) never made a commitment to abstinence or (2) reported they were not currently committed to abstinence.

Self-efficacy to remain abstinent was a single-item measure assessed by participants' responses to "How confident are you that you can keep your commitment to abstinence" on a scale of 1 (not at all confident) to 4 (very confident).

In addition, there were eight variables tested as predictor variables for secondary abstinence. The only single-item measure was participation in an abstinence program. It was assessed by yes or no responses to the question "Have you ever participated in an abstinence education program?"

The remaining constructs were measured by combining responses to multiple items into a single score for each scaled predictor variable. Attitude Toward the Behavior was measured by a 26-item scale assessing both behavioral beliefs and expectancies associated with behavioral outcomes. For example, students responded on a scale of 1 (extremely unlikely) to 5 (extremely likely) to items such as "I would be less successful in school if I were sexually active," and then rated the value they placed on the outcome (in this case, "success in school") on a scale of 1 (it would be extremely bad) to 5 (it would be extremely good). Responses were reverse coded as necessary to create a scale in which higher scores indicated more positive, favorable attitudes regarding abstinence. Belief scores were multiplied by corresponding expectancy scores and the products were summed to arrive at a score for the complete scale. The Cronbach's alpha for Attitude Toward the Behavior data was .85, and split-half reliability was .73.

Subjective Norm was a 20-item scale that assessed the degree to which students felt important others approved of abstinence (normative beliefs) and the likelihood that they would want to do what each referent believed was best for them (motivation to comply). When asked to rate the extent to which each referent (e.g., parents, other family members, best friend, etc.) approved of abstinence, participants responded on a scale of 1 (really disapproves) to 5 (really approves). Participants then rated the likelihood they would want to do what each referent wanted them to on a scale of 1 (extremely unlikely) to 5 (extremely likely). Responses were reverse coded as necessary, normative belief scores were multiplied by motivation to comply scores, and the products were summed. Higher scores indicated a subjective

Table 1 Demographic characteristics and sexual experiences for non-abstainers, primary abstainers, and secondary abstainers

Characteristic	Not committed to abstinence (N = 604)		Primary abstainers (N = 386)		Secondary abstainers (N = 142)		One-way ANOVA
Age (in years)	*M*	*SD*	*M*	*SD*	*M*	*SD*	<.001
	20.8	2.7	19.8	1.4	20.9	3.3	
Gender	%		%		%		.017
Women	55.5		63.7		64.1		
Men	44.5		36.3		35.9		
Ethnicity							ns
Caucasian	84.2		88.3		80.3		
Non-Caucasian	15.8		11.7		19.7		
Year in school							.001
Freshman	20.1		28.8		17.6		
Sophomore	19.5		19.7		19.0		
Junior	23.1		24.4		28.2		
Senior	37.3		26.7		35.2		
Alcohol consumption							<.001
Drink average of once/week	52.4		17.8		37.4		
Member of faith community							<.001
Yes	59.8		89.1		78.4		
Relationship status							<.001
Single/not dating (never married)	28.2		56.9		33.1		
Dating	60.6		40.4		52.6		
Engaged to be married	6.2		2.7		4.3		
Married	4.8		.0		7.2		
Previously married	.2		.0		2.9		
Sexual activity experience							
Handholding	96.4		83.7		100.0		<.001
Closed-mouth kissing	95.4		77.4		100.0		<.001
Open-mouth kissing	94.4		71.2		100.0		<.001
Hand-to-breast contact	92.7		54.5		100.0		<.001
Hand-to-genital contact	90.8		43.5		99.3		<.001
Oral sex	85.6		23.2		95.8		<.001
Anal sex	25.5		.8		26.6		<.001
Vaginal sex	77.7		.0		100.0		<.001
Nature of first sexual experience							<.001
Voluntary and wanted	83.0		–		69.8		
Voluntary, but unwanted	14.3		–		25.9		
Involuntary	2.8		–		4.3		
Participated in Abstinence Education Program?							<.001
Yes	30.0		43.0		23.0		

norm more supportive of abstinence. Cronbach's alpha for Subjective Norm data was .91; split-half reliability was .93.

Previous Negative Experiences were measured with an eight-item scale (Cronbach's alpha = .84; split-half reliability = .82). Participants responded on a scale of 1 (strongly disagree) to 5 (strongly agree) to a variety of statements assessing aspects of previous sexual experience such as feelings about the experience, guilt, pressure, continuance with sexual activity despite a desire to stop, effects on relationships, and overall feelings about self when sexually active. Responses were reverse coded as necessary so that higher scores indicated more negative previous experiences with sex.

Perceived Barriers were measured by participants' responses on a scale of 1 (strongly disagree) to 5 (strongly agree) to eight items that assessed the degree to which

students viewed factors such as friends, alcohol, college environments, physical attraction, pressure, privacy from parents, involvement in a serious relationship, and perceptions about the acceptance of sex, as hindering the practice of abstinence. Higher scores indicated perceptions of more barriers. For these data, Cronbach's alpha was .81; split-half reliability was .846.

The Environmental Manipulation scale (Cronbach's alpha = .78; split-half reliability = .84) comprised six items to measure participants' agreement with statements about shaping their settings to support abstinence (through activities such as reducing time spent alone with a partner, limiting alcohol association, or only dating others committed to abstinence). Responses were scaled from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher levels of environmental manipulation.

Two variables—Religious Ties and Motivation for Abstinence—comprised several subscales. The Religious Ties scale included 12 items to measure multiple dimensions of religiosity as proposed by Social Control Theory. Participants responded to statements associated with each dimension on a scale from 1 (strongly disagree) to 5 (strongly agree). For data from the full scale, Cronbach's alpha was .93, and split-half reliability was .91. Confirmatory factor analyses (CFA) supported division into 3 subscales: attachment and involvement, commitment, and beliefs.[1]

Scores for the full Motivation for Abstinence scale (Cronbach's alpha = .85; split-half reliability = .93) were constructed from eight subscales focused on various dimensions of motivation expressed by students in previous qualitative research: faith, important others, power and past, opportunity, protection, feelings toward self, partner, and success, school, and self. Participants responded to statements associated with each dimension on a scale from 1 (strongly disagree) to 5 (strongly agree). These subscales were determined by exploratory factor analyses.

Exploratory factor analyses were initially conducted with pilot test data. Findings from these analyses led to splitting the motivation and religious ties scales into subscales. The subscales were then re-examined through confirmatory factor analyses (CFA) in the final data set. CFA results supported the validity of all the Religious Ties subscales and four of the Motivation subscales. The two motivation subscales remaining from the pilot test CFAs were each further divided into two scales resulting in the following four subscales: Faith, Important Others, Power and Past, and Opportunity.

[1] Information on the factor analysis, including factor scores, percent of variance explained, and Cronbach's alpha reliability measures, is available from the corresponding author upon request.

Results

Sexual and abstinent behavior

Regarding sexual behaviors, participants reported involvement in hand-holding (92.5%), closed-mouth kissing (89.8%), open-mouth kissing (87.2%), petting above the waist/hand-to-breast contact (80.6%), petting below the waist/hand-to-genital contact (75.7%), oral sex (65.7%), anal sex (17.2%), and vaginal sex (54.1%). Among sexually experienced participants, the average age of intercourse initiation was 17.28 years (SD = 2.11). Although the majority of participants (66.4%) had never participated in an abstinence program, most (67.4%) reported having made a conscious commitment to practice abstinence at some point—either presently or in the past.

Regarding abstinent behavior, 45.9% (n = 521) of participants reported never having had vaginal sex. Among the total sample, 34.0% (n = 386) were classified as "primary abstainers"—meaning that they had never had vaginal sex and were consciously committed to practicing abstinence, and 12.5% (n = 142) were classified as "secondary abstainers"—meaning they made a conscious commitment to abstinence after having had sex. Although 9.5% (n = 13) of secondary abstainers had been practicing secondary abstinence for more than 4 years, 67.1% (n = 92) had been practicing secondary abstinence for less than 12 months; 5 secondary abstainers failed to report the current durations their commitments.

Primary versus secondary abstainers

Several variables, including self-efficacy to remain abstinent, attitude toward the behavior, subjective norm, perceived barriers, environmental manipulation, and the subscales of the main motivation and religious ties scales, were subjected to t-tests to identify significant differences in mean scores between primary and secondary abstainers. Table 2 shows that primary abstainers scored significantly higher than secondary abstainers on self-efficacy to remain abstinent, attitude toward behavior, subjective norm, and environmental manipulation scales. In contrast, secondary abstainers scored significantly higher than primary abstainers on perceived barriers to abstinence.

Table 2 also shows that primary abstainers (n = 386) scored significantly higher than secondary abstainers (n = 142) on all three religious ties subscales: attachment and involvement, commitment, and beliefs. In addition, primary abstainers scored higher on the faith and important others motivation subscales, while secondary abstainers scored significantly higher on the power and past, success, school, and self, and feelings toward self motivation subscales.

Table 2 Mean differences in predictor variables for primary and secondary abstainers

Variable	Scale range	Primary abstainers (N = 386)		Secondary abstainers (N = 142)		t	df	p	Cohen's d[a]
		M	*SD*	*M*	*SD*				
Self-efficacy	1–4	3.83	.41	3.36	.67	7.68	174.39	<.001	.84
Attitude toward behavior	26–325	188.81	45.05	175.51	55.05	2.45	194.64	.015	.26
Subjective norm	20–250	168.91	54.41	138.85	57.97	5.30	488	<.001	.53
Perceived barriers	8–40	24.59	6.85	26.80	6.39	–3.28	513	.001	.33
Environmental manipulation	6–30	18.59	5.27	16.59	5.48	3.74	512	<.001	.37
Religious ties	12–60								
Attachment & involvement	5–25	21.24	3.02	20.00	3.47	3.51	435	<.001	.38
Commitment	3–15	11.99	3.02	10.76	3.15	3.55	432	<.001	.39
Beliefs	4–20	16.90	2.68	15.29	3.14	5.17	431	<.001	.55
Motivation	25–125								
Faith	3–15	13.12	2.88	11.02	3.99	5.70	129.29	<.001	.60
Important others	3–15	10.89	3.12	9.51	3.57	4.02	220.36	<.001	.41
Power & past	3–15	5.84	2.25	6.47	2.31	–2.77	516	.006	.27
Opportunity	3–15	5.61	3.06	6.05	3.14	–1.41	516	ns	.14
Protection	3–15	11.09	3.35	11.43	2.91	–1.05	511	*ns*	.10
Success, school, and self	4–20	9.24	3.97	11.02	4.38	–4.37	520	<.001	.42
Feelings toward self	3–15	10.15	3.08	11.46	2.59	–4.85	288.78	<.001	.46
Partner	2–10	6.37	2.57	6.69	2.50	–1.25	515	ns	.12

[a] The formula for Cohen's d is $M_1 - M_2/\sqrt{[(\sigma_1^2 + \sigma_2^2)/2]}$

Predictors of secondary abstinence

To test the hypothesized relationships depicted in Fig. 1, we divided the model into three sections. Figure 1 displays the three model sections using different lines for outlining the boxes and ovals (representing variables): Section 1 variables are outlined with solid lines, Section 2 variables are outlined with uneven, dotted lines, and Section 3 variables are outlined with small dotted lines.

A series of binary logistic regression models tested Section 1, with "commitment to secondary abstinence" as the dependent variable and eight predictor variables: gender, ethnicity, age, attitude toward the behavior (abstinence), subjective norm regarding abstinence, participation in an abstinence program, religious ties, and previous (negative) experiences (Table 3). The variables were added sequentially to each model until the final model tested all the factors simultaneously. The models were examined only for participants that had ever had vaginal sex. The final regression model showed that attitude toward the behavior (abstinence) (OR = 1.01; p = .002), subjective norm regarding abstinence (OR = 1.01; p = .001), religious ties (OR = 1.01; p = .046), and previous negative experiences (OR = 1.05; p = .02) were statistically significant predictors of committing to secondary abstinence, after controlling for various demographic variables. Participation in an abstinence education program significantly reduced the likelihood of committing to secondary abstinence (OR = .57; p = .049) (see Model 5, Table 3). The final model explained 33.4% of the total variance.

The second section of the model hypothesized that making an initial commitment to abstinence would influence age of intercourse initiation (the mediating variable), which would, in turn, influence a commitment to secondary abstinence. This hypothesis was also tested through sequential regression models (Baron & Kenny, 1986). The first model examined making an initial commitment to abstinence as predicting age of initiation (β = .063, p = .119, model adjusted R^2 = .002). The second model examined making an initial commitment to abstinence as predictive of secondary abstinence (OR < .097, ns). The final model examined both making an initial commitment to abstinence (OR < .0012, ns) and age at initiation (OR =1.02, ns) as predictors of secondary abstinence. Results revealed none of the models contained significant predictors.

Several multiple regression models were also used to test the third, and final, section of the model. Section 3 hypothesized that perceived barriers to abstinence, environmental manipulation, motivation for abstinence, and religious ties would significantly predict the dependent variable, self-efficacy for abstinence among secondary abstainers (Table 4). The regression models were also run with sequential addition of variables. Results for the final model (with all variables) revealed fewer perceived barriers

Table 3 Odds ratios for predictors of secondary abstinence excluding primary abstainers

Predictors	Model 1			Model 2			Model 3			Model 4			Model 5		
	Nagelkerke R^2 = .008			Nagelkerke R^2 = .013			Nagelkerke R^2 = .215			Nagelkerke R^2 = .220			Nagelkerke R^2 = .334		
	Exp (B)	(95% CI)	p	Exp (B)	(95% CI)	p	Exp (B)	(95% CI)	p	Exp (B)	(95% CI)	p	Exp (B)	(95% CI)	p
Gender	.693	(.474, 1.015)	.060	.692	(.470, 1.019)	.062	1.036	(.655, 1.637)	ns	1.009	(.638, 1.596)	ns	1.221	(.733, 2.034)	ns
Ethnicity	1.056	(.760, 1.468)	ns	1.010	(.725, 1.408)	ns	1.096	(.757, 1.588)	ns	1.128	(.776, 1.639)	ns	1.126	(.758, 1.672)	ns
Age	1.018	(.955, 1.085)	ns	1.013	(.950, 1.081)	ns	.989	(.912, 1.073)	ns	.983	(.906, 1.067)	ns	.948	(.866, 1.036)	ns
Participation in Abstinence Ed. Program				.736	(.475, 1.141)	ns	.638	(.385, 1.057)	.081	.645	(.389, 1.070)	.089	.572	(.328, .998)	.049
Attitude toward the behavior (abstinence)							1.011	(1.007, 1.016)	<.001	1.011	(1.005, 1.016)	<.001	1.010	(1.004, 1.017)	.002
Subjective norm (regarding abstinence)							1.010	(1.005, 1.015)	<.001	1.008	(1.002, 1.013)	.005	1.010	(1.004, 1.016)	.001
Religious ties										1.014	(.996, 1.031)	ns	1.019	(1.000, 1.039)	.046
Previous negative experiences													1.051	(1.008, 1.096)	.020

(β = –.33; p < .001), less environmental manipulation (β = –.23; p = .035), and greater religious ties (β = .30; p = .003) to be significant predictors of self-efficacy for secondary abstinence (see Model 4, Table 4). Total variance explained by the final model was 14.8%.

Predictors of primary abstinence

While not this study's main objective, a series of logistic regression analyses (with sequential adding of variables) were conducted to identify significant predictors of primary abstinence. Results of the final model revealed that younger age (OR = .79; p < .001), participation in an abstinence education program (OR = 1.43; p = .039), more positive attitude toward abstinence (OR = 1.007; p < .001), a more supportive subjective norm regarding abstinence (OR = 1.01; p < .001), and greater religious ties (OR = 1.03; p < .001) significantly predicted primary abstinence in this sample (see Model 4, Table 5); gender and ethnicity, however, did not. The final model explained 41.7% of the variance.

Discussion

Percentage of participants who practiced primary and secondary abstinence

This study provided estimates of the percentage of participants who practiced both primary and secondary abstinence. Of the total sample, 34.0% were classified as "primary abstainers," individuals who had never had vaginal sex and had made conscious commitments to practicing abstinence. Those who had never had sex, but also never made a conscious and purposeful decision to refrain from it, were not included in this group.

"Secondary abstainers"—participants who reported having made a conscious commitment to abstinence after having had vaginal sex—comprised 12.5% of the total sample. This is one of the first estimates of percentage of participants who practiced secondary abstinence in a college population. Comparisons to other populations are difficult given the paucity of published research on this particular behavior. The rate was higher than the 2.6% percentage of participants who practiced secondary abstinent behavior among 9th and 12th grade students in Minnesota (Loewenson et al., 2004). Given their older age and more frequent opportunities to be sexually active, it seems logical that college students would exhibit higher rates of secondary abstinence than high school students, but we cannot discount the possibility that this sample suffered from self-selection bias (one of this study's important

Table 4 Beta coefficients for predictors of self-efficacy to practice abstinence for primary and secondary abstainers

Predictors	Model 1		Model 2		Model 3		Model 4	
	Adj. R^2 = .083		Adj. R^2 = .078		Adj. R^2 = .090		Adj. R^2 = .148	
	β	p	β	p	β	p	β	p
Perceived barriers to abstinence	–.299	<.001	–.302	.001	–.342	<.001	–.331	<.001
Environmental manipulation			.000	ns	–.078	ns	–.230	.035
Motivation for abstinence					.158	ns	.127	ns
Religious ties							.301	.003

limitations). Given the novelty of the research topic, abstainers may have chosen to participate in the study in larger numbers than their non-abstinent peers, thus biasing the percentage of participants who practiced rates upward.

Predictors of abstinence

Logistic regression analyses revealed that younger age, participation in an abstinence education program, more positive attitudes toward abstinence, more favorable subjective norm regarding abstinence, and greater religious ties significantly predicted primary abstinence in our sample. It is important to note, however, that attitude toward the behavior, subjective norm, and religious ties each exhibited small odds ratios of 1.00, 1.01, and 1.03, respectively, and could well have been a function of the large sample size, as power to identify statistical significance is partially a function of sample size (Cohen, Cohen, West, & Aiken, 2003). The largest effect sizes were seen for age and participation in an abstinence education program such that older students were approximately 20% less likely to practice primary abstinence and students that had participated in abstinence education were approximately 40% *more* likely than their peers to be primary abstainers.

In identifying factors influencing *secondary* abstinence, the proposed theoretical model was divided into three sections for testing. When testing the first section of the model, binary logistic regression analyses revealed attitude toward the behavior, subjective norm, religious ties, and having more negative previous experiences with sex significantly predicted secondary abstinence but, once again, exhibited small odds ratios (1.01, 1.01, 1.01, and 1.05, respectively). The largest effect size was seen for participation in an abstinence education program. In contrast to the results for primary abstinence, participation in such a program actually *reduced* the likelihood (by over 40%) that a student would be classified as a secondary abstainer.

Such different effects of reported participation in abstinence education programs for primary and secondary abstainers seem difficult to explain, but if in this population of college students these effects were, indeed, true, this is an important phenomenon to examine. While increased likelihood of primary abstinence would be viewed as a success for most abstinence program personnel, the significant reduction in likelihood of committing to secondary abstinence would be contrary to most abstinence program goals. These data, however, inevitably raise the question: Is there something about abstinence education programming that actually discourages abstinence among those that have already initiated sexual activity? While our data cannot answer a question such as this (suggesting potential effects of abstinence education), further research exploring this finding is clearly warranted.

In the absence of any sound data-based explanations for this finding, theoretical perspectives offer guidance. The psychological theory of self-persuasion offers one possible explanation (Zimbardo, 1965). If abstinence education programs deliver messages portraying sexual activity as wrong and/or detrimental to youth, it is possible that sexually active youth in these programs counter instructors' messages by internally creating arguments against the pro-abstinent message. Such counter messages constitute, in essence, a defense of their own previous behavior, almost as a protective mechanism. When this happens, self-persuasion theory suggests that arguing a specific attitude position (in this case, building internal arguments to support or defend their past sexually active behavior) could result in modification of personal attitudes to be similar to the position argued (Zimbardo, 1965). Such a phenomenon might well be occurring among sexually active youth who participate in abstinence education programs.

Ultimately, this study cannot explain the role of abstinence education in secondary abstinence. While plausible that programs may be directly affecting behavior, our study's findings may also have suffered from measurement error. Given that abstinence education programs was not defined for study participants, many could have interpreted their experiences with 1-hour lectures on the topic, for instance, as participation in a "program." The effects of such experiences on likelihood of behavior would be, however, trivial or non-existent. Regardless of the

Table 5 Odds ratios for predictors of primary abstinence

Predictors	Model 1			Model 2			Model 3			Model 4		
	Nagelkerke R^2 = .067			Nagelkerke R^2 = .095			Nagelkerke R^2 = .396			Nagelkerke R^2 = .417		
	Exp (B)	(95% CI)	*p*	Exp (B)	(95% CI)	*p*	Exp (B)	(95% CI)	*p*	Exp (B)	(95% CI)	*p*
Gender	.822	(.633, 1.067)	ns	.769	(.588, 1.005)	.055	1.212	(.863, 1.702)	ns	1.120	(.794, 1.581)	ns
Ethnicity	1.072	(.846, 1.357)	ns	1.151	(.905, 1.465)	ns	1.187	(.882, 1.599)	ns	1.246	(.920, 1.688)	ns
Age	.782	(.725, .843)	<.001	.787	(.728, .850)	<.001	.807	(.732, .889)	<.001	.795	(.720, .878)	<.001
Participation in Abstinence Ed Program				1.825	(1.395, 2.388)	<.001	1.416	(1.010, 1.986)	.043	1.434	(1.018, 2.021)	.039
Attitude toward the behavior (abstinence)							1.009	(1.005, 1.013)	<.001	1.007	(1.003, 1.011)	<.001
Subjective norm (regarding abstinence)							1.016	(1.012, 1.019)	<.001	1.012	(1.008, 1.016)	<.001
Religious ties										1.030	(1.017, 1.044)	<.001

possibilities, the lack of explanation for the role of abstinence education highlights an important focal point for future research. As long as abstinence programs are being delivered to sexually active youth, it is imperative that program personnel be concerned that programs are having positive, intended effects.

Testing of the second section of the hypothesized model revealed no support for the proposed relationship of an initial commitment to abstinence affecting secondary abstinence via the mediating variable of age of initiation of intercourse. Furthermore, neither age of initiation nor making an initial commitment to abstinence were independent predictors of practicing secondary abstinence. This was surprising, as one would expect that initiation at an earlier age would allow for a greater time frame in which adolescents could change their minds about sexual behavior and choose to commit to abstinence.

In testing the third section of the model, multiple regression analyses revealed fewer perceived barriers, less environmental manipulation, and greater religious ties were significant predictors of self-efficacy for abstinence. This indicates participants with greater confidence they could remain abstinent were those that exhibited greater ties to a faith community and perceived there were fewer situations and events that would make abstinence difficult. In addition, those with high self-efficacy reported less manipulation of their environments (i.e., avoiding being alone with a partner, avoidance of alcohol, not dating, etc.) for the purpose of making abstinence easier. This was actually the opposite of what was expected. Self-efficacy Theory suggests that higher self-efficacy, particularly coping efficacy, would be associated with the adoption of "strategies and courses of action designed to change hazardous environments into more benign ones" (Bandura, 1997, p. 141), i.e., greater environmental manipulation. That was not seen in this sample, but perhaps this sample perceived few barriers to abstinence (thereby viewing their environments as less hazardous) and, as a result, felt little need to change any factors in their social or physical environments.

Differences between primary and secondary abstainers

Primary abstainers exhibited significantly higher levels of self-efficacy, more positive attitudes toward abstinence, stronger perceptions of abstinence-supportive norms, and higher levels of environmental manipulation, when compared to secondary abstainers in this sample. The largest difference was seen for participants' self-efficacy levels (Cohen's d = .84). Such a finding is supported by Self-efficacy theory, which suggests that mastery experiences (such as always having been successful practicing abstinence) lead to higher self-efficacy (Bandura, 1997). In

contrast, secondary abstainers scored significantly higher than primary abstainers on Perceived Barriers to Abstinence; this seems logical when considering that secondary abstainers have actually faced barriers to abstinence, as they have already initiated vaginal sex. This difference was, however, smaller in magnitude (Cohen's d = .33).

Analyses examining differences in Religious Ties subscale scores between primary and secondary abstainers revealed that primary abstainers scored significantly higher than secondary abstainers on all three religious ties subscales, with the largest effect size found for the subscale of beliefs (Cohen's d = .55). This finding was in line with Social Control Theory, which suggests that greater religious ties (encompassing beliefs, involvement, commitment, and attachment) would provide stronger controls against the "undesirable" behavior (Hirschi, 1969). It may be that the stronger religious ties of primary abstainers have served as more effective controls against sexually active behavior (thus, they had not yet initiated vaginal sex).

Findings related to differences in motivation subscale scores were mixed. While primary abstainers scored higher on the faith (with a mid-range Cohen's d effect size of .60) and important others motivation subscales, secondary abstainers scored significantly higher on the power and past, success, school, and self, and feelings toward self motivation subscales (with Cohen's d effect sizes falling in the small-medium range between –.27 and –.46). Again, these results did not mean that the motivation dimensions for which one group scored higher were not important motivators for the other group as well; the results did, however, point to some interesting differences between the groups. Primary abstainers were more motivated than secondary abstainers by religion-related factors and by the opinions of important others such as friends, family, and parents. In contrast, secondary abstainers were more motivated by factors related to themselves and their futures (such as feeling better about themselves, avoiding or relieving feelings of guilt, making good grades, and being successful), previous experiences (having contracted an STI, having participated in an abstinence program), and maintaining power in the relationship.

Such motivational differences offer clues for practitioners working to tailor messages to either sexually experienced or sexually inexperienced adolescents. The results suggested that different dimensions of motivation may carry varying degrees of importance depending on the type of abstinence being practiced. In addition, the differences in the motivational mechanisms suggest that primary abstinence and secondary abstinence may be very distinct experiences. Such possibility warrants further examination, especially as, from the standpoint of the programs, the two types of abstinence are not viewed as distinct phenomena.

Limitations

This research on secondary sexual abstinence was unique in that it fills a gap currently unexplored in the literature. It is, to our knowledge, one of the first estimates of the practice of secondary abstinence among a college sample. In addition, it provides valuable insight into the types of motivators that may be unique for secondary abstinence, including adolescents' desire to feel better about themselves (including the desire to relieve or avoid guilt) and to set themselves up for future success. Further, it raises an important question regarding the effect that abstinence education may have on sexually experienced youth.

The study did, however, have limitations. The data, for instance, were self-reported and cross-sectional. While statistically significant associations were identified, it was not possible to determine whether one variable "caused" another. Furthermore, although data accuracy was enhanced by the use of online questionnaires that converted responses into spreadsheet format, it is still possible that social desirability bias or inability to accurately remember past experiences may have affected the truthfulness of participants' responses. The potential impact of social desirability was likely reduced through the use of anonymous online data collection (Daley, McDermott, McCormack Brown, & Kittleson, 2003; King & Bruner, 2000). In addition, findings related to self-efficacy to remain abstinent should be interpreted with caution as this study employed a single item to measure self-efficacy, which is generally regarded as a complex and multidimensional construct.

In addition, the research was limited because findings cannot be generalized to populations other than that sampled. In addition to reduced representation due to the low response rate, the universities' locations in Texas make them unique, and further limit the potential to generalize findings to other college populations. In addition, the ability to generalize even to the entire population of students from this university system was questionable due to some of this sample's characteristics. For instance, the rates of sexual activity (54.1% of the sample had had vaginal sex) were low compared to national data revealing that 46.7% of high school students (Centers for Disease Control and Prevention, 2004) and 86.1% of college students in the U.S. have had sex (Centers for Disease Control and Prevention, 1997).

These rates suggest that the sample may be biased in favor of abstinence. While it is possible that sexual activity rates were low among this group of students, it is also possible that this research appealed more to abstinent students than to those who were currently sexually active. Further analyses of participants who completed less than half of the survey revealed that the group of students who did not finish reported significantly higher rates of having had vaginal sex. This supports the hypothesis that bias

towards abstinence might be present, thus limiting the external validity of the study. This lack of generalizability suggests that the findings of this study should be interpreted with caution until they can be replicated in a more representative sample.

In spite of its limitations, however, this research fills a gap in the scientific literature regarding the study of secondary sexual abstinence. It illustrates that there are, in fact, college students that choose to practice abstinence after having initiated sexual intercourse, many of whom are eager to share their opinions and experiences regarding secondary abstinence. Increased understanding of the multiple facets of secondary abstinence, especially the various dimensions of motivation, may help health professionals interact more effectively with and offer important guidance to their clients/students.

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