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Development and Validation of the Abstinence Motivation Scale

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ABSTRACT

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The purpose of this study was to design the Abstinence Motivation Scale-Sex (AMS-Sex), a scale to assess adolescent motivations for sexual abstinence using the self-determination theory (SDT) motivation continuum as a framework. Previous sexual abstinence research, SDT measurement studies, pilot study data, and expert panel feedback were used to develop the initial 77-item AMS-Sex. The sample consisted of 695 adolescents (aged 15 to 18; *M* age = 16.49, *SD* = 1.08; 50.8% male) recruited online from the across the U.S. Participants completed an online survey. The sample was randomly split into two samples. Independent samples t-tests indicated that sample 1 *(N* = 351; *M* age = 16.53, *SD* = 1.09; 48% male) and sample 2 (*N* = 344; *M* age = 16.46, *SD* = 1.07; 51% male) did not significantly differ by age, gender, parent education, annual household income, sexual behavior, or social desirability. Sample 1 data was used to assess scale reliabilities and run exploratory factor analyses (EFA) to examine the factor structure of the 77-item AMS-Sex. The 77-item AMS-Sex had good internal consistency (α = .99), as did the four subscales. As anticipated, the EFA resulted in a four-factor structure. However, these factors did not represent the anticipated SDT motivation types. Rather, the autonomous motivation items loaded on a single factor; the controlled motivation items loaded onto three factors by source or reference (i.e., parents, peers/others, and self). A second EFA was examined, constraining the model to two factors (i.e., controlled, autonomous). The 77 AMS-Sex items were reduced to a final 24-item AMS-Sex measure with six items per motivation type through a rigorous process using confirmatory factor analysis (CFA) with modification indices and information from CFA loadings, item means, standard deviations, skewness, correlations with social desirability, EFA loadings, and item wording and clarity. Sample 2 was then used to validate the final 24-item AMS-Sex using CFA and structural equation modeling (SEM). CFA was used to assess the four-factor, three-factor, and two-factor models. Model fit indices indicated that the four-factor and three-factor models had acceptable model fit, but the two-factor model did not. SEM was used to assess the relationships between the factors (i.e., types of motivation) and age, gender, social desirability, and sexual behavior for the four-factor, three-factor, and two-factor models. The SEM models indicated that older teens tended to be less motivated towards abstinence; girls were more motivated towards abstinence than boys; and sexual behavior was negatively correlated with all four motivation types, but more strongly with the autonomous motivations; and, in general, autonomous motivations were negative predictors of sexual behavior, while controlled motivations positively predicted sexual behavior. EFAs with the final 24 items were assessed, resulting in a three-factor solution: external, introjected, and autonomous motivations.

Keywords: abstinence, motivation, adolescents

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Introduction

Adolescence is a period of heightened engagement in health risk behaviors, including early sexual intercourse (Arnett, 1999). While an extensive amount of research has identified risk and protective factors, less is known about adolescents' motivations underlying engaging in or abstaining from such behaviors. Given that sexual abstinence during the teen years is generally seen as adaptive, more work is needed regarding motivations to abstain from sex and other related health risk behaviors. Of the few studies that have looked at abstinence motivations, most have been exploratory and atheoretical. Theories of motivation exist that can be leveraged to understand abstinence motivations. In particular, self-determination theory (Deci & Ryan, 2008b; Ryan & Deci, 2008) is a comprehensive and well-validated theory of human motivation that could be used to investigate adolescent abstinence motivations. To move toward this end, the first step is to design and validate a measure of abstinence motivations grounded in self-determination theory. Thus, the purpose of the present study was to develop an instrument for quantitatively assessing motivations to abstain from sex, with subscales for capturing the different types of motivations along the continuum from controlled to autonomous motivation, as outlined in self-determination theory.

Adolescent Risk-taking

Adolescence is typically characterized by increased involvement in risky behavior (Arnett, 1999; Pharo, Sim, Graham, Gross, & Hayne, 2011), defined as any behavior associated with undesirable outcomes (Boyer, 2006; Shaw, Amsel, & Schillo, 2011). Adolescents are more likely than children or adults to break norms, be reckless, and engage in behaviors potentially

harmful to themselves and others (Arnett, 1999; Flanagan, Stout, & Gallay, 2008). Adolescent risk behavior, usually peaking in the late teens to early twenties, includes sexual activity, substance use, unsafe driving, delinquency, and crime (Arnett, 1999; Boyer, 2006; Pharo et al., 2011; Shaw et al., 2011). Teen sexual behavior is one that can be classified as a health risk behavior, which can negatively affect the health and well-being of adolescents.

Sexual intercourse is the second most frequent risk behavior among adolescents. Nearly half (47.4%) of all high school students have had sexual intercourse, with 6.2% reporting their first sexual intercourse occurred before age 13 (Eaton et al., 2012). Although some negative psychosocial (Meier, 2007) and educational (Parkes, Wight, Henderson, & West, 2010) outcomes of early sexual activity have been identified, generally the outcomes of teen sex of most concern are pregnancy and sexually-transmitted infections (STI). Adolescents make up one fourth of the sexually active population but account for almost half of the new STIs each year. When left untreated, these STIs can lead to serious lifetime consequences (e.g., infertility, stillbirths, birth deformities, infant deaths), as well as an increased risk for HIV (Centers for Disease Control and Prevention, 2011). A third of all high school students (33.7%) are currently sexually active, 12.9% of which reported having unprotected sex (Eaton et al., 2012). Among developed countries, the United States has the highest percentage of girls who have sex before age 15 (14.1%; Darroch, Frost, & Singh, 2001). Rates of teen pregnancy in the United States are more than twice as high as the next highest industrialized nation (Alford & Hauser, 2011). Teen childbearing cost U.S. taxpayers $10.9 billion in 2008, an average of $1,647 per child (National Campaign to Prevent Teen and Unplanned Pregnancy, 2011).

Since the turn of the 21st Century, sexual behavior has become increasingly viewed as a normal, natural, and expected part of adolescent development (Santrock, 2012; Tolman &

McClelland, 2011). While adolescent sexual activity is still predominantly considered a development risk for most teens, some researchers believe sexual activity may be an asset for other teens (Romeo & Kelley, 2009; Vrangalova & Savin-Williams, 2011). Also, given recent declines in adolescent sexual intercourse and teen pregnancy and an increased use of contraception, some researchers are proposing the idea of "positive adolescent sexuality development" as a potential explanation. That is, these positive trends may possibly be explained by the recent changes in adolescent sexual behavior, the biggest being a shift from heterosexual sexual behavior to homosexual sexual expression, which is thought to provide same-sex attracted teens the same positive consequences (Diamond & Savin-Williams, 2000; Russell, 2005). However, despite these recent shifts in teen sexual behavior, teen pregnancy and birth rates still remain higher in the United States than in other developed countries (Oman, Vesely, Kegler, McLeroy, & Aspy, 2003) and the decreasing age at which teens initiate sexual activity is a growing concern (Meier, 2007). These concerns add to the debate among proponents of normative sexual behavior in adolescence and those in favor of abstinence before marriage. Although the use of contraceptives (e.g., condoms) may reduce the risk of pregnancy and STIs, sexual abstinence is the only way to prevent these from occurring (Kirby, 2008). Unfortunately, the earlier adolescents initiate sex, the less likely they are to use contraception and the more at-risk they become. Early sexual behavior (i.e., before age 16) has been associated with unprotected sex, unintended pregnancy, and increased likelihood of STIs (Buston, Williamson, & Hart, 2007). Adolescents with early onset of sexual intercourse are also likely to have more depressive symptoms, lower grades in school, fewer positive peer relationships, and increased alcohol and substance use (Zimmer-Gembeck & Helfand, 2008).

Risk and Protective Factors for Early Sex

Prior research has identified a number of important risk and protective factors for early sexual activity. Adolescents from stable single- or two-parent homes are less likely to have sex than adolescents from unstable family situations (e.g., divorce, parent entering new relationship/union). Teens are also less likely to be sexually active if their mothers have a technical degree or higher (Jordahl & Lohman, 2009), their parents have more restrictive attitudes regarding teen sexual behavior, and if their parents are supportive (Maguen & Armistead, 2006) and appropriately monitor their child's behavior (Parkes, Henderson, Wight, & Nixon, 2011). Religion is another protective factor. The more frequently adolescents attend religious services (i.e., at least weekly) the less likely they are to engage in sexual behavior (Lefkowitz, Gillen, Shearer, & Boone, 2004). Adolescents who affiliate with conservative religious denominations are also less likely to have sex (Cochran, Chamlin, Beeghley, & Fenwick, 2004). Other related factors include peer influence (e.g., Maguen & Armistead, 2006; Maxwell, 2002), and developmental or biological factors (e.g., Meschke, Zweig, Barber, & Eccles, 2000; Willoughby et al., 2007).

Adolescent Motivations to Engage in Sexual Behavior

In addition to these risk and protective factors, teens' motives for having early sex have also been addressed (e.g., Cooper, Shapiro, & Powers, 1998; Dawson, Shih, de Moor, & Shrier, 2008). Teen-reported external motives for initiating sex include social pressure from peers or romantic partners (Dawson et al., 2008; Paradise, Cote, Minsky, Lourenco, & Howland, 2001) and desire for physical pleasure (Voisin & Bird, 2012). Psychological motives mentioned by adolescents include efforts to relieve stress or boredom, satisfy curiosity, avoid negative thoughts or feelings, and increase self-esteem (Patrick et al., 2010; Voisin & Bird, 2012). Other

adolescents reported they had not planned to have sex or that sexual intercourse resulted while drunk or high (Dawson, et al., 2008; Paradise et al., 2001).

Adolescent Motivations to Abstain from Sex

Although much of the research looking at adolescent motivations regarding sex has focused on the reasons why adolescents *do* have sex, some work has assessed motivations for both engaging and not engaging in sexual behavior. For example, a few studies looked at primary abstainers (i.e., inexperienced), secondary abstainers, and sexually active teens (i.e., experienced), and their reasons for having and not having sexual intercourse (e.g., Paradise et al., 2001; Patrick et al., 2010; Voisin & Bird, 2012). Adolescents in each of these three groups reported different reasons for why they would have sex. Sexually experienced youth were more likely than sexually inexperienced peers to report intimacy (e.g., express love) or enhancement (e.g., thrill, excitement) motives for having sex. Coping motivations (e.g., relieve loneliness, negative emotions) were not significantly different between the sexually inexperienced and experienced groups. In terms of motives for not having sex, sexually inexperienced youth were more likely to report values (e.g., against beliefs, religious values) and not being ready for sex (e.g., not old enough, not in love, not ready for commitment). Health motivations (e.g., fear of HIV/AIDS and STDs, avoid pregnancy) for abstaining from sex did not significantly differ between the groups (Patrick, Maggs, Cooper, & Lee, 2011).

A longitudinal study of eighth to tenth grade adolescents, with two time points 18 months apart, found that the majority of abstinent teens mentioned (at both time points) abstaining from sex because they were afraid of getting AIDS or afraid of pregnancy, waiting for the right person, not being ready for sex, or waiting until they were older. Over half of the abstinent teens mentioned they personally believed that premarital sex was wrong or they were waiting

until marriage to have sex. Surprisingly, at the initial wave 60% of abstinent teens mentioned abstaining because their parents would be upset, whereas only 5% mentioned parents being upset as a reason at the second wave. Also, most (74%) abstinent teens were still sexually abstinent at the second time-point. Interestingly, 64% of sexually abstinent teens also abstained from alcohol, but 61% of sexually active teens used alcohol (Blinn-Pike, Berger, Hewett, & Oleson, 2004).

Due to the complex nature of adolescent sexuality and the lack of a comprehensive theoretical framework, much of the prior work on adolescent sexual behavior and adolescent sexual abstinence motivation, has been largely exploratory, based on multiple perspectives (Zimmer-Gembeck & Helfand, 2008), or atheoretical (Buhi, Goodson, Neilands, & Blunt, 2011). More specifically, few abstinence motivation studies have been explicitly grounded in existing theories of motivation, self-regulation, or other related constructs (Buhi et al., 2011). Many sexual abstinence studies have no explicit theoretical foundation (e.g., Loewenson, Ireland, & Resnick, 2004; Paradise et al., 2001). Some studies focus on motivations in relation to a specific construct, such as sexual cognitions (e.g., Ott & Pfeiffer, 2009), or in relation to specific contexts, like parent and peer influence (Maguen & Armistead, 2006). But, few are explicitly and coherently based on an existing theory of motivation. One exception is a study by Hulton (2001) which used the transtheoretical model of change to examine adolescent sexual decision-making regarding primary and secondary sexual abstinence. Other exceptions are studies that are somewhat loosely based on theoretical models such as the ecological risk/protective model of resilience (e.g., Blinn-Pike, 1999; Blinn-Pike et al., 2004; Maguen & Armistead, 2006), and ecological systems theory (Abbot & Dalla, 2008).

One theory of motivation that may be particularly well-suited for framing the study of abstinence motivations is self-determination theory (SDT). Self-determination theory takes into account contextual and dispositional antecedents, individual motivation, behavior, and consequences. Self-determination theory has been effective in accounting for variability in school engagement (Vansteenkiste, Lens, & Deci, 2006), health-related behaviors (Hagger & Chatzisarantis, 2009), and in predicting lasting behavior change or maintenance (Ng et al., 2012; Williams, Grow, Freedman, Ryan, & Deci, 1996).

Self-Determination Theory

Self-determination theory posits that people are innately motivated to seek challenges and actively adopt values, behaviors, and practices (Ryan & Deci, 2002). However, people are not naturally motivated to engage in all behaviors. Behaviors that are not inherently interesting or pleasurable tend to be regulated extrinsically (i.e., they are not engaged in for their own sake, but, as a means to another end). SDT suggests that people go through a process of internalization where a behavior that is initially coerced or externally controlled (e.g., punishments, rewards) becomes more internalized, and eventually is autonomously regulated according to personal values or one's sense of identity (Deci, Eghrari, Patrick, and Leone, 1994; Ryan & Deci, 2002). Rather than mere behavioral compliance, internalization more accurately reflects a shift toward self-governing behavior (Deci & Flaste, 1995, p. 92-93).

A person's level of internalization reflects the degree to which their behavior is extrinsically controlled (e.g., acting to gain a reward, approval, or to avoid punishment, embarrassment) or autonomous (e.g., acting willingly, in accordance with self-endorsed values). Rather than a dichotomy (e.g., extrinsic/intrinsic), internalization is better conceptualized as a continuum ranging from controlled motivations to autonomous motivations (Ryan & Deci,

2002). More precisely, this continuum reflects motivation quality, not quantity, under the premise that the type or quality of motivation is more predictive of outcomes than overall amounts of motivation (Deci & Ryan, 2008b).

Motivation types can be grouped into two main categories: controlled and autonomous. There are two types of controlled motivation and three types of autonomous motivation along the continuum (Deci & Ryan, 2008a). The controlled types of motivation include external and introjected motivations. *External motivation* evokes behavior motivated by external rewards, punishments, or external pressure (e.g., from parents or peers) and is characterized by a lack of internalization. *Introjected motivation*, the lowest form of internalized regulation, induces behavior driven by internal pressures (e.g., approval, guilt, sense of obligation; Deci & Ryan, 2008a; Ryan & Deci, 2002; Power, Ullrich-French, Steele, Daratha, & Bindler, 2011). Controlled motivations can take either avoidant or approach orientations, where avoidant motivations represent trying to move away from aversive outcomes (e.g., avoid feelings of guilt or shame) and approach motivations represent moving toward desirable outcomes (e.g., gain approval from others; Assor, Vansteenkiste, & Kaplan, 2009; Elliot, Sheldon, & Church, 1997).

Autonomous motivations include identified, integrated, and intrinsic motivations. *Identified motivation* encourages behavior that the individual believes to be important—they have internalized values related to the behavior. *Integrated motivation* elicits behavior that is congruent with the individual's sense of self and with their values and goals. Self-determination theory posits that external, introjected, identified, and integrated motivations all fall under the extrinsic motivation umbrella (see Table 1), characterized by engagement in order to achieve a particular outcome. Finally, *intrinsic motivation* prompts behavior done for the inherent pleasure gained from doing it (Deci & Ryan, 2008a; Ryan & Deci, 2002). Autonomous types of

motivation tend to be more predictive of positive outcomes (e.g., psychological well-being, better performance, and long-term persistence) and are fostered by autonomy-supportive environments (Deci & Ryan, 2008a; Williams et al., 1996).

Internalization is facilitated when the environment supports the three basic psychological needs of autonomy (i.e., personal initiative, choice, and responsibility), competence (i.e., possessing the knowledge, skills, and confidence necessary to perform the behavior), and relatedness (i.e., feeling cared about, listened to, understood; Ryan & Deci, 2002). When these needs are met, people are more likely to behave autonomously, or agentically and volitionally (Nota, Soresi, Ferrari, & Wehmeyer, 2010; Ryan, 1995).

Self-determination theory has been used to assess motivations primarily in academics, sports and exercise, and other health-related behaviors (e.g., smoking, weight-loss). Student study behavior (e.g., Vansteenkiste et al., 2006), student learning behavior and persistence (e.g., Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004), as well as teacher motivations for preparing and teaching (e.g., Fernet, Senécal, Guay, Marsh, & Dowson, 2008) comprise much of the SDT literature. Another major topic area includes exercise motivations, including jogging, weight training, swimming, and aerobics (e.g., Li, 1999), and athlete participation in sports (e.g., Lonsdale, Hodge, & Rose, 2008). Other health-related behaviors using the SDT framework include weight loss (e.g., Williams et al., 1996), diabetes self-management (e.g., Williams, McGregor, Zeldman, Freedman, & Deci, 2004), and tobacco cessation and diet (e.g., Levesque et al., 2007). But there are many other domains where SDT has been used. For example, work or job motivations (e.g., Van den Broeck et al., 2011; Gagné et al., 2010), and political motivations to be informed, weigh issues, and to vote (e.g., Losier, Perreault, Koestner, & Vallerand, 2001) have been studied using SDT. Despite the vast array of domains studied within the SDT

framework, to our knowledge, there is little research that has looked at motivations why people abstain from certain behaviors. This gap in the SDT research literature may be explained by the theory's focus on understanding autonomous motivations and why people choose to engage in and endorse certain behaviors. Consequently, SDT has predominantly been used to assess individual motivations for *doing* and mastering various behaviors (Deci & Ryan, 2008a; Deci & Vansteenkiste, 2004).

Although hundreds of studies have looked at motivations to engage in healthy behaviors, few have looked at motivations to abstain from unhealthy behaviors. Nevertheless, doing and not doing are not necessarily opposites. Rather, both are in some ways goal-directed (Richetin, Conner, & Perugini, 2011). In other words, abstaining is not necessarily the absence of motivations to engage in a behavior, but it also involves motivations to avoid the behavior. Further, abstaining from one behavior might be a means to a more distal end goal. For instance, abstaining from sex may not just be due to the lack of desire for sex or to the lack of opportunity to have sex, but, may be based on motivations to avoid sex in order to focus on academics and sports, and improve one's future life prospects.

Applying Self-Determination Theory to Understanding Abstinence Motivation

Self-determination theory has infrequently been applied to understanding reasons for abstaining from or avoiding certain behaviors. An exception is a series of studies looking at motivations behind smoking cessation efforts. The majority of these SDT cessation studies, however, have been clinical intervention studies of adult populations (e.g., Williams, Gagné, Ryan & Deci, 2002; Williams, Minicucci et al., 2002; Williams et al., 2006; Williams, Niemiec, Patrick, Ryan, & Deci, 2009). These studies primarily looked at the role of autonomy supportive environments and perceived autonomy among adult smokers in randomized smoking

cessation intervention trials. The authors found that adults in the autonomy-supportive condition (compared to control or community care conditions) would have more autonomous motivations to quit smoking and would have higher abstinence rates 6 to 24 months later.

There are also a couple of studies that have used SDT to examine adolescent motivations for tobacco prevention or abstinence. For example, one study assessed autonomous motivations of both smokers and nonsmokers to either quit smoking or to not start smoking (Williams, Cox, Kouides, & Deci, 1999). Like in the adult studies mentioned previously, the authors hypothesized that the autonomy-supportive intervention would prompt more autonomous motivations and would then lead to lower smoking rates than the controlling "fear-and-demand" intervention. Neither autonomous motivations nor smoking rates differed across treatment groups. However, regardless of the condition they were assigned to, the teens who perceived the instructors to be autonomy-supportive did have significantly more autonomous motivations and reduced smoking rates. Yet, like the cessation studies mentioned previously, this study did not specifically look at the motivation types of the smokers or nonsmokers. Instead, the participants' motivation scores were summed to create a single autonomous motivation score, then, these summed scores were used to test an intervention model intended to reduce smoking and prevent smoking initiation. Another study was a measurement study seeking to develop and validate a scale assessing motivations for smoking cessation in teenagers (Joseph, Grimshaw, Amjad, & Stanton, 2005), but, this scale has not been used in studies examining teen motivations and their relationships with antecedents or outcomes. Nevertheless, these studies have demonstrated that autonomous motivation tends to have positive effects on smoking cessation treatment or intervention outcomes (e.g., reduced smoking, greater persistence). However, they all have been

about motivations to stop engaging in a negative behavior (e.g., smoking) and, thus, do not capture well reasons people may presently be abstaining from negative behaviors.

Present Study

The purpose of the present study was to construct a measure, based on self-determination theory, for assessing adolescents' motivations to abstain from sex. The items were adapted from existing self-determination theory measures, using the Self-Regulation Questionnaire format (SRQ; Ryan & Connell, 1989), which has been used to assess motivations across a variety of domains. The typical self-determination theory measure of motivations asks participants to rate various reasons why they would or do engage in a particular behavior, with each item tapping a specific type of motivation. I used the following sources of information to generate the initial pool of items: existing research on motivations to abstain from sex and alcohol (not based on self-determination theory), existing self-determination theory scales (for a variety of behavioral domains), pilot study data, and consultations with a panel of self-determination theory scholars (those who have experience designing self-determination theory measures). Next, data was collected on this pool of items, and analyses reduced the pool of items to a smaller set of items that demonstrated the best psychometric properties.

Because this is a measurement paper and is exploratory in nature, I did not have any specific research hypotheses. However, the research goal was to design a measure with a valid and reliable four-factor structure depicting external, introjected, identified, and integrated abstinence motivations. The research questions included the following:

RQ1: Do the four motivation factors have a simplex-like structure where motivations are most highly correlated with the motivations closest on the SDT continuum and gradually become less correlated as motivations get farther away on the continuum?

RQ2: Are the autonomous motivations (e.g., identified, integrated) more related to sexual abstinence than the controlled motivations (e.g., external, introjected)?

Method

Item Development for the Abstinence Motivation Scale (AMS)

As noted earlier, I used multiple sources of information to generate the initial items for the AMS: prior abstinence research, pilot data on abstinence, existing SDT measures, and consultation with SDT experts.

Abstinence research. I reviewed ten non-SDT measurement studies that assessed sexual abstinence motivations (e.g., Blinn-Pike et al., 2004; Paradise et al., 2001). See *Appendix A* for a complete list of the abstinence motivation studies. I categorized the items in these scales according the SDT framework, to evaluate how well the items fit the motivation types.

Pilot study. An initial pilot study was conducted online in January 2010. The sample consisted of 419 adolescents ages 15 to 18 (M = 15.68, SD = .98; 56% males; 83% White) from across the United States. The survey had open-ended questions where the participants were asked to provide one main reason and two other reasons why they had not had sexual intercourse. The participants, who had indicated they had had sex at least once in their lives, but not in the past year, were asked to provide reasons why they stopped. The responses were coded using a grounded theory approach (i.e., systematically identifying themes and constructing theories "grounded" in the data; Burck, 2005; Glaser, 2002) to see which themes emerged. Then the responses were coded a second time using a content analysis approach (i.e., identifying themes to test an existing theory; Harding, 2013) with the SDT motivation types as the theoretical themes. In other words, the first approach was inductive (i.e., "bottom-up" or beginning with the particular and moving toward the general in order to see what themes would

emerge, and the second approach was deductive (i.e., "top-down" or going from the general to the particular; Harding, 2013) in order to see how well the responses obtained could be classified into one of the types of motivation. This information was used in identifying appropriate content for the abstinence motivation scale items.

Previous SDT measurement studies. I reviewed existing SDT measures (see *Appendix B*) to get a clear understanding of the types of motives or reasons that fall under each motivation type along the SDT continuum. I also reviewed these SDT measurement studies to determine the process the authors went through to develop their measures. The goal was to identify items for abstinence motivations that were structured similarly to those of other self-determination theory measures, and to establish a process for designing the measure and testing its psychometric properties that would follow established procedures.

Expert panel. Using the information from previous abstinence studies, analyses of the pilot data, previous SDT measurement studies, I created 137 items representing possible reasons why adolescents would abstain from sex. After consulting with an SDT expert, some items were revised or removed, reducing the item pool to 119 items. These revised items for sexual abstinence were used to create an online survey with Qualtrics (www.qualtrics.com). SDT experts were contacted via email and invited to take the survey and provide feedback regarding the AMS items. The experts who consented to participate ($N = 11$), were asked to indicate which type of motivation they thought each item represented. A comment box was provided next to each item so they could provide feedback, suggest changes, etc. The responses were then analyzed for agreement and disagreement for each item. Any items that the experts had classified as both controlled (i.e., external, introjected) and autonomous (i.e., identified, integrated), were removed. We retained all items where classifications were within either

controlled or autonomous. The experts' comments were also considered when deciding whether to retain, revise, or remove items. Items that received minimal negative comments were retained. Items that received numerous or severely negative comments were either removed or extensively revised. Our intent was to retain as many items as possible and use psychometric tests to guide our final decisions.

The revisions based on all of the above information resulted in 77 items for assessing sexual abstinence motivations. The items were all general enough in terms of the behavioral domain that they could easily be reworded to fit equally well for other abstinence motivations (e.g., alcohol, marijuana, or tobacco).

Upon expert recommendation, the amotivation items were removed from the AMS. It was perceived as being too cognitively difficult for participants to reflect on items pertaining to a lack of reasons for not doing something. Also, because our primary interest in this study was to examine adolescent motivations for abstinence, it seemed logical to remove the amotivation items since amotivation, by definition, is the lack of motivation. The retained items made up the AMS item pool that was used in the present study (AMS-Sex: A*ppendix C)*. I did not develop a scale for intrinsic motivation because it seemed implausible that people would abstain from sex and alcohol primarily based on the joy or pleasure inherent in doing so (this sentiment was echoed by a number of the self-determination theory scholars we consulted). Further, intrinsic motivation is typically not included when measuring health-related motivations because intrinsically motivated behaviors are performed because they are inherently interesting, pleasurable, or satisfying, in and of themselves, with no ulterior motive (Deci & Ryan, 2008a; Levesque et al., 2007; Ryan & Deci, 2002).

Measures

Abstinence Motivation Scale-Sex (AMS-Sex). The AMS-Sex consisted of 77-items assessing motivations for abstinence from sex using a 5-point scale ranging from 1 (*not at all a reason for me*) to 5 (*totally a reason for me*). There were items representing four types of motivation: external (25 items; 12 avoidant, 13 approach), introjected (23 items; 14 avoidant, 9 approach), identified (16 items), and integrated (13 items). The question stem for sexual abstinence read, "Below is a list of reasons why some people would abstain from sex (in other words, reasons why people would not have sexual intercourse). Most people have more than one reason, so please respond to each statement based on how much the statement represents a reason you would not engage in sex." Items represented possible reasons for abstaining from sexual intercourse (see *Appendix C*).

Social desirability. Twelve items ($\alpha = .73$) from the short form of the Impression Management subscale of the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991) assessed the extent to which participants were purposely answering in a way that would promote a positive image or to avoid social disapproval. Adolescents were asked to rate how true each statement was of themselves on a 7-point scale ranging from 1 (*not true*) to 7 (*very true*). Items 2, 4, 6, 7, 10, and 11 were reverse-scored. Then an average of the 12 scores was calculated for each participant. See *Appendix D* for the Short IM - BIDR-6 items.

Behavior. One item asked adolescents to indicate how often they had ever had sex using the following 4-point scale: 1 (*never in my lifetime*), 2 (*at least once in my lifetime but not in the last year*), 3 (*at least once in the last year but not in the last 30 days*), and 4 (*at least once in the last 30 days*).

Procedure

The protocol for this study was approved by the Institutional Review Board of Brigham Young University prior to data collection. The primary contacts were parents with adolescent children between the ages of 15 and 18. Survey Sampling International (SSI; www.surveysampling.com). SSI recruits participants from websites, social media, survey panels, and other sources. The email invite sent to the adolescents' parents included a link to the Qualtrics survey, where parents (one parent in each family) were directed to a web page providing information about the study and asking for consent for their adolescent to participate. Those who permit their adolescent to participate were invited to have their adolescent take his or her portion of the survey in private. The adolescent was first directed to a Youth Assent web page that provided information about the study and the expected time the survey would take (approximately 20 minutes), and asked for his or her consent to participate. If the adolescent consented, he or she was directed to the beginning of the survey. Upon completion of the survey, adolescents were asked to have their parent (the initial contact) take the parent survey. The participants were compensated through Qualtrics in the amount of roughly $5-15, depending on how they were initially contacted and their degree of completion.

Sample

The final sample consisted of 695 adolescents aged 15 to 18 (M = 16.49, SD = 1.08; 50.8% male; 69.6% White/European American. The initial sample consisted of 913 adolescents who completed at least a portion of the online survey. However, of the initial 913 adolescents, 138 were dropped for failing the distracter item (i.e., an item where they were asked to put a specific response; participants were dropped who did not indicate the correct response) and 80 additional participants were dropped who had missing data across all abstinence motivation scale

items. Of the 626 parents (out of the 695 families in the final sample) who provided some data in addition to giving permission for their adolescent to participate, roughly 54% were married, 34% had at least a Bachelor's degree, and 56% reported an average annual household income of $50,000 or more.

The sample was randomly split into two groups using the SPSS (version 20) function for randomly splitting a sample into two sub-samples roughly equal in size. The first sample (N = 351; Age: M = 16.53, SD = 1.09; 48% male) was used to perform exploratory factor analysis, carry out item removal and retention, calculate scale reliability, and assess the simplex structure. The second sample (N = 344; Age: M = 16.46, SD = 1.07; 51% male) was used to perform confirmatory factor analysis on the final set of items, as well as to rerun the exploratory factor analysis. Independent samples t-tests indicated that the two samples did not significantly differ on age, gender, parent education, annual household income, sexual behavior, or social desirability.

Analysis Plan

First, data on the complete final sample (N = 695) were screened, and then the sample was randomly split. Second, means, standard deviations, skewness, and correlations with social desirability were obtained on each item. Third, I obtained Cronbach's alphas on items by subscale to assess reliability. Fourth, exploratory factor analyses were conducted on the abstinence motivation items using the first sample. Fifth, confirmatory factor analyses (CFAs) with modification indices (M.I.) were estimated in Mplus (version 7.0). Modification indices that suggested correlated errors or cross-loading were examined, starting with the largest value, to help inform item removal decisions. Suggested correlated-errors might indicate redundant

items, whereas suggested cross-loadings might indicate items that do not effectively differentiate types of motivation (Byrne, 2010; Kline, 2011).

CFA loadings, modification indices, item means and standard deviations, skewness, correlations with social desirability, EFA loadings, and item wording and clarity were all used to decide which items to remove while keeping a balance between avoidant and approach items within the subscales, when possible. I first looked at CFA factor loadings, and removed items with factor loadings below .60 (40% of variance accounted for). Next, I looked at the largest modification index. For suggested correlated errors, I had to decide which of the two items to remove (as correlated errors indicate redundant items). To make this decision, I first compared the two factor loadings. I gave priority to one item over the other if the loading was at least .05 larger than the smaller loading. If this was not the case, then I looked at the means, standard deviations, correlations with social desirability, EFA loadings, item wording, as well as the other remaining modification indices. Items were preferred that had centered means, greater variability, weaker correlations with social desirability, larger EFA loadings, clearer and more concise item wording, and fewer remaining modification indices. For suggested cross-loadings, I generally removed the item because even if it more strongly loaded on the other factor, the item wording did not seem to fit as well as the other items for that factor.

One model modification (item removal) was made at a time, and then a revised model was estimated. Items were removed one at a time until a final, good-fitting four-factor model was achieved. The second sample was then used to validate the final four-factor model, and to test the three- and two-factor CFA models, assess the simplex-like correlations among the motivation subtypes, and assess relationships between motivation types and adolescent sexual behavior.

Results

Preliminary Analyses

I screened the data by, first, assessing univariate, bivariate, and multivariate normality of the 77 AMS-Sex items and demographic variables. Variable means, standard deviations, and skewness and kurtosis estimates were examined. Ideally, the mean for each item would be close to the center of the range of possible response options, which would be 3.00 for the AMS-Sex scale which used a 5-point Likert-type scale. It is also better to have relatively high variance or a larger standard deviation, indicating more variability in the scores on that item (DeVellis, 2012, p. 107). The AMS-Sex items had an average mean of 2.66 (range: 1.67–3.56), with an average standard deviation of 1.46 (range: 1.12–1.66). As a general rule, skewness should have an absolute value of 2.0 or less and kurtosis should have an absolute value of 3.0 or less (Westfall & Henning, 2013). The skewness and kurtosis estimates for the AMS-Sex items were acceptable, ranging from -.57 to 1.65 and -1.62 to 1.40, respectively. See Table 2 for descriptive statistics for all 77 items. Because the skewness and kurtosis estimates were within acceptable ranges and did not easily identify extreme normality concerns, I converted the skewness and kurtosis estimates into z-scores by dividing each item's estimates by their corresponding standard errors. The z-scores were then used to indicate which items were significantly skewed. That is, z-scores greater than 1.96 indicated significant skewness or kurtosis at the .05 significance level.

Histograms, box-plots, and stem-and leaf plots were used to evaluate the distributions of each variable and to identify any univariate and bivariate outliers. The data, especially on many of the AMS-Sex items, appeared to be skewed or non-normally distributed.

A multivariate test of normality indicated significant skewness (Mardia mSkewness = 27033.75; χ^2 (91881) = 3.15, $p < .001$), significant kurtosis (Mardia mKurtosis = 30709.25; χ^2 (1)

= 37.43, $p < .001$), and the multivariate omnibus Doornik-Hansen test indicated that the data were significantly non-normal (χ^2 (162) = 6.52, $p < .001$).

Due to the large sample size ($N = 695$), the analyses mentioned previously may be overly sensitive to relatively small departures from normality. Therefore, with larger samples (e.g., over 200), it has been recommended to look more at the size of the skewness and kurtosis estimates (Tabachnick & Fidell, 2007); as noted earlier, the sizes of these values were all within acceptable ranges (less than 2.0 for skewness and less than 3.0 for kurtosis).

Reliability

A reliability test with all 77 items had a Cronbach's alpha of .99, suggesting that the responses were consistent across the items or that the items are relatively homogeneous. Ideally, the internal consistency values should be above .80 (Henson, 2001). However, part of the reason the internal consistency was so high (e.g., > .90) was because of the large number of items (DeVellis, 2012, p. 109).

The 77 items of the AMS-Sex were divided into four subscales by motivation type (e.g., external, introjected, identified, and integrated). The external and introjected subscales were broken down even further by motivation orientation (i.e., avoidant and approach). The external subscale consisted of 25 items ($\alpha = .97$), with 12 avoidant items ($\alpha = .94$) and 13 approach items ($\alpha = .95$). The introjected motivation subscale consisted of 23 items ($\alpha = .97$), with 14 avoidant items ($\alpha = .96$) and 9 approach items ($\alpha = .93$). The identified motivation subscale consisted of 16 items ($\alpha = .99$). And, finally, the integrated motivation subscale consisted of 13 items ($\alpha = .99$). Because there was a large number of items and because the Cronbach's alphas were so large, the "alpha if item deleted" information was not helpful in deciding which items to remove from the initial scale.

Exploratory Factor Analysis

Principal axis factor analysis with promax rotation and Kaiser Normalization with minimum eigenvalues greater than one was performed with all 77 AMS-Sex items. I chose principal axis factor analysis because it analyzes the shared variance among the items unlike principal components factor analysis which analyzes all of the variance. Promax rotation is an oblique rotation which allows the factors to be correlated (Matsunaga, 2010; Warner, 2008). Because the SDT motivation types are assumed to be correlated, I chose to use a promax rotation. Even though the "eigenvalue greater than one" rule has a tendency to extract too many factors and is not recommended as a reliable criterion to determine the number of factors that should be extracted (Reise, Waller, & Comrey, 2000), I, nevertheless,included this criterion when running my models as an additional piece of information regarding the correct number of factors that should be extracted. I used a scree plot which indicated a four–factor solution. I also ran a parallel analysis looking for the point at which the parallel analysis eigenvalue from the randomly generated dataset was larger than the principal components analysis eigenvalue. The factors are assumed to be mostly random noise or residual error at the point where the parallel analysis eigenvalue is largest. The parallel analysis suggested a two-factor structure. The Kaiser-Meyer-Olkin measure of sampling adequacy had a value of .97 indicating the partial correlations among items was small which suggested that the items sharing a common factor were assessing the same construct. Therefore, it was expected that if exploratory factor analyses were to be performed, the extracted factors would account for a "marvelous" amount of the variance. Also, the Bartlett's test of sphericity was significant, χ^2 (2926) = 29634.28, $p < .001$, indicating the items were intercorrelated, and, therefore, fit for factor analysis. Based on the

analyses stated above, I will report the loadings for both the two-factor and the four-factor EFA models with sample 1.

Items are typically retained in the item pool if their highest factor loading is greater than a pre-determined cutoff value. When describing the EFA models, I am using the liberal cut-off value of .40, which is the lowest acceptable factor loading (Matsunaga, 2010). Factor loadings above .5 are considered adequate to strong (Costello & Osborne, 2005), but more conservative values of .60 or .70 have also been used (Matsunaga, 2010).

As predicted, a four factor solution emerged, but not the anticipated four factors representing the four motivation subtypes of external, introjected, identified, and integrated motivation. Rather, all 28 autonomous items (i.e., identified and integrated) loaded onto the same factor with loadings ranging from .75 to .99. However, the controlled items (i.e., external and introjected) loaded onto three factors based on the person influencing or controlling the behavior (e.g., parents, peers and others, or self). Thus, the first controlled factor consisted of 20 items referencing parental pressure or disapproval (e.g., "I could get in trouble with my parents") with loadings ranging from .48 to .97. The second controlled motivation factor included 20 items referencing peers, friends, or others (e.g., "I would disappoint my friends") with loadings ranging from .46 to .92. Items amsex13 and amsex25 cross-loaded onto the "parent" factor. This is most likely due to their vague reference to "people." Item amsex13, however, loaded slightly higher on the "parent" factor. Item amsex8 had a similar reference to "people" and cross-loaded with both the "parent" and "self" factors, but none of its loadings were greater than .40. The third factor consisted of 10 items referencing internal pressure or desire (i.e., "I would feel guilty") with loadings ranging from .57 to .80. Items amsex24 and amsex47 loaded

exclusively onto the autonomous factor. Item amsex34 cross-loaded onto the autonomous factor and item amsex7 cross-loaded onto the "peers/others" factor.

Items that cross-loaded between the autonomous factor and one or more controlled motivation factors were flagged as candidates to be dropped. For items that did cross-load, the .6/.3 or .5/.2 rule was used to examine the highest and second highest loadings. That is, if the highest factor loading for that item was above .6 and the second highest was below .3, or if the highest loading was above .5 and the second highest loading was below .2, the item could be retained (Matsunaga, 2010). As shown in Table 2, none of the cross-loading items met these criteria and were, therefore, flagged as possible candidates for removal from the AMS-Sex measure. Similarly, the two controlled motivation items that loaded exclusively onto the autonomous factor (i.e., amsex24 and amsex47) were also flagged as possible candidates for removal from the item pool. None of the flagged items were removed at this point.

Principal axis factor analysis was performed a second time, but constraining the model to two factors, as shown in Table 2. The controlled motivation factor consisted of 48 items with factor loadings ranging from .46 to .88. One external item (i.e., amsex24) and three introjected items (i.e., amsex29, amsex34, and amsex46) cross-loaded onto the autonomous motivation factor. All four of these items failed to meet the .6/.3 or .5/.2 retention criteria and were marked as candidates for removal. Like in the four-factor EFA model, the introjected item amsex47 loaded exclusively onto the autonomous motivation factor and was also flagged for consideration for removal. None of the identified or integrated items cross-loaded onto the controlled motivation factor.

The EFA analyses reported above suggested clear evidence for a distinction between controlled and autonomous factors. There was little evidence, however, for distinctions between

external and introjected items within the controlled factor, or identified and integrated items within the autonomous factor.

Item Reduction

As the prior analyses reported above yielded little information pertinent to reducing the number of items, confirmatory factor analyses were performed on sample 1 using Mplus 7.0 (www.statmodel.com) to provide additional information. I wanted to retain items within each motivation type (external, introjected, identified, and integrated), if not to allow for the use of the four subscales, at least to adequately capture the constructs of controlled and autonomous motivation. I also wanted to maintain a balance between avoidant and approach items for the external and introjected subscales, if possible. Thus, I started by running CFAs on the smallest sub-scales, independently, then one step at a time I combined subscales into the same model, until I arrived at a single model with items from all subscales.

First, I began with a simple one-factor model with the 12 external avoidant items. After running each CFA model, I referred to the modification indices (M.I.) beginning with the "BY" (i.e., suggested cross-loading) or "WITH" (i.e., indicated correlated errors, measurement error, or redundancy) statement with the largest M.I. value. For "BY" statements, I ran the model a second time with the suggested modification and compared factor loadings across the two models. In general, I removed the items because the original assignment was better based on item wording and theoretical content validity. For "WITH" statements, item removal was determined comparing several pieces of information: 1) CFA loadings, 2) item means and standard deviations, 3) skewness estimates and z-scores, 4) correlations with social desirability, 5) EFA loadings, 6) item wording and clarity, and 7) remaining modification indices. When roughly three-fourths of the items remained, I repeated the process with the 13 external approach

items. Then, I combined the remaining avoidant and approach items into a single external factor and continued the process. When roughly one half of the original 25 external items remained, I repeated the same process with the introjected items, starting with separate avoidant and approach factors, eliminating about one-fourth of the items in each, then combining them into a single model and eliminating a few more items until about half of the original items remained. I then ran a controlled motivation model that included an external factor and an introjected factor, with all remaining items, and then removed a few more items in this model. Next, I estimated a model with just the identified items, and eliminated about half of those items. I then did the same thing for the integrated items. Then an autonomous motivation model was estimated that included an identified factor and an integrated factor, with all remaining items, and a few more items were removed from this model. Lastly, a combined model was estimated with four factors (external, introjected, identified, and integrated), and any salient remaining modifications were made until good model fit was achieved. This final four-factor model had 24 items, 6 items per motivation type, and fit the data well, χ^2 (246) = 431.31, $p < .001$, CFI = .98, RMSEA = .047 (see Table 3). Standardized factor loadings ranged from .76 to .96 (see Table 2). When re-running EFA on this first sample with the final 24 items (using the same procedure described earlier), a three-factor solution was yielded (see Table 4). All of the external items loaded on one factor, all of the introjected items on the second factor, and all of the autonomous items (identified and integrated items together) on the third factor. There were no salient (>.40) cross-loadings, and factor loadings ranged from .56 to .97. The final AMS_Sex is shown in *Appendix E*.

Sample 2 Validation

Using the final 24 item scale, I conducted EFA and CFA analyses to examine and validate the factor structure using the second sample. The EFA was conducted as the other EFAs

described earlier. As with Sample 1, the EFA yielded a clear three factor solution with factors for external, introjected, and autonomous (see Table 5). Again there were no salient cross-loadings, and the range of factor loadings was from .45 to .96. Thus, all were above the minimal cut-off of .40 for salient factor loadings (Matsunaga, 2010).

To further validate the factor structure, I estimated a four-factor model using confirmatory factor analysis with Sample 2. The model fit the data well based on the CFI, and moderately well based on the RMSEA, χ^2 (246) = 675.51, $p < .001$, CFI = .96, RMSEA = .072. The factor loadings were all statistically significant and ranged from .79 to .94 (see Table 5). Although all factor inter-correlations were significantly positively correlated, they did generally follow the expected simplex structure where motivation types are supposed to be more strongly correlated with other motivation types closer on the continuum than those farther away on the continuum (Ryan & Connell, 1989). The one exception is that the correlation between external and identified was roughly equivalent to that between external and integrated (both round to r = .51; see Table 6).

Next, I estimated a three-factor model (the same one suggested by the EFA) with factors for external, introjected, and autonomous (identified and integrated items all on a single factor; see Table 5). This model similarly fit the data well based on the CFI, and moderately well based on the RMSEA, χ^2 (249) = 711.75, $p < .001$, CFI = .96, RMSEA = .074, but fit significantly worse than the four-factor model based on a chi-square difference test, χ^2 (3) = 36.24, $p < .001$. However, the chi-square difference test can be overly sensitive as sample size gets large. Thus, I also conducted a CFI difference test, where a CFI difference of .01 or greater is considered to reflect a substantial difference in model fit (Cheung & Rensvold, 2002). Based on this test (CFI difference of .03), the models were not substantially different in terms of model fit. Therefore,

although there is some evidence that the four-factor model is the best model, both models fit the data reasonable well and were roughly equivalent in terms of model fit. So, both the four-factor and three-factor model seem to be viable options. Based on this three-factor model, there was also some support for the simplex structure (see Table 6). External was correlated with introjected (r = .68) more strongly than with autonomous (r = .51). However, it is interesting that introjected in this case correlated more strongly with autonomous (r = .81) than with external.

As a final comparison, I estimated a two-factor model with a controlled factor (external and introjected items all on one factor) and an autonomous factor (identified and integrated items all on one factor; see Table 5). This model was a mediocre fit to the data, χ^2 (251) = 1705.46, p < .001, CFI = .86, RMSEA = .13, and fit significantly worse than the three-factor model, χ^2 (2) = 993.71, p < .001, and, hence, also the four-factor model. In terms of the CFI test, there was a difference of .095, which if rounded to .10 would be at the cut-off to suggest poorer model fit. Considering the overall fit of the two-factor model, as well as the chi-square and CFI difference tests, it seems that although the model is not as good as the four-factor and three-factor models, it is not drastically worse. Depending on the context, there may be ways investigators could use a two-factor model and improve the fit to adequate levels. In this two-factor model, the controlled and autonomous motivation factors correlated at r = .68 (see Table 6).

Sample 2 Models with Covariates and Outcomes

First, to examine links between the motivation types and pertinent covariates I reran the four-factor, three-factor, and two-factor models, including age, gender (males = 1, females = 2), social desirability, and sexual behavior, but I did not test for measurement invariance of gender or age. Based on the four-factor model, older teens were less likely to be motivated towards

abstinence on all four motivation types, but this effect was particularly strong for the controlled motivations (external and introjected). Girls tended to be more motivated towards abstinence than boys, across all four motivation types, with the smallest difference for external. Social desirability was moderately positively correlated with introjected, identified, and integrated, but not significantly related to external. Sexual behavior was negatively correlated with all four motivation types, but most strongly with autonomous motivations than controlled motivations. This pattern of findings was essentially echoed in the three-factor model with covariates. In the two factor model, again older teens were less motivated to abstain from sex, and this was more so for the controlled motivations. Girls seemed to be more motivated to abstain than boys, on both controlled and autonomous motivations. Both controlled and autonomous motivations were positively correlated with social desirability, with the correlation being small for controlled and moderate for autonomous. Sexual behavior was moderately negatively correlated with controlled motivation, while it was strongly negatively correlated with autonomous motivation (see Table 7).

Finally, I ran regression models of the motivation types predicting sexual behavior, controlling for age, gender, and social desirability. For the four-factor, three-factor, and two-factor models, gender was not a significant predictor of sexual behavior in the context of the models and was thus dropped to simplify the models. Age was positively predictive of sexual behavior while social desirability was negatively predictive. However, although the model explained 34% of the variance in sexual behavior, none of the four motivation types made a significant unique contribution (i.e., none was a significant predictor). This was likely due to the large overlapping variation among the four types of motivation. In the three-factor model, again age and social desirability were predictive of sexual behavior. However, this time autonomous

motivation was a significant negative predictor of sexual behavior (β = -.58). Lastly, in the two-factor model, again age and social desirability significantly predicted sexual behavior. But, this time both controlled and autonomous motivations were significantly predictive of the outcome. However, interestingly it was autonomous motivation that was a negative predictor (β = -.55), while controlled motivation was a positive predictor (β = .15; see Table 8). The positive beta weight for controlled motivation may be the result of a suppressor effect which occurs when the inclusion of one variable influences the predictive validity of another variable (Smith, Ager, & Williams, 1992). Thus, it seems that the remaining variation in controlled motivation that is not related to autonomous motivation is actually a risk factor for sexual behavior rather than a protective factor.

Discussion

Given the lack of theoretically-driven research on abstinence motivations, the purpose of the present study was to develop a scale to quantitatively assess motivations to abstain from sex, with subscales for capturing the different types of motivations along the self-determination theory continuum from controlled to autonomous motivation. What resulted was a 24-item scale for assessing sexual abstinence motivations that includes items for tapping external, introjected, identified, and integrated motivations for abstinence. There are a number of salient implications of the measurement work done to develop this scale.

First, considering the EFA and CFA analyses, there is some evidence for the viability of using a four- three- , or two-factor solution using this measure. However, the correlations between the two controlled motivations (external and introjected), and between the two autonomous motivations (identified and integrated)—particularly the latter—are so strong that in regression analyses the overlap leaves little unique variability to contribute to the predictor.

Hence, it may be that although in principle the measure does a good job of tapping the four types of motivation, in practice, when predicting outcomes, it may be most useful to use three or two factors, if including them all in the same model as predictors of the same outcomes.

Second, the CFA analyses suggested that identified and integrated items are virtually indistinguishable. Those two factors were highly correlated in all models ($r > .95$). On the other hand, given that the four-factor and three-factor models seemed to fit better than the two-factor model, it appears that perhaps external and introjected items are more distinguishable. This pattern of findings is in line with prior research, and is one of the primary reasons why many scales do not include separate integration sub-scales.

Third, given that the simplex structure seemed to be apparent in relations between the sub-scales, the results provide some evidence for the self-determination theory continuum of motivation. More particularly, the results suggest that the theory can be feasibly applied to the study of abstinence motivations. Thus, future research can now progress looking at sexual abstinence motivations in a more theoretically-grounded way. Even more, future research should continue to expand self-determination theory to the study of avoiding negative behaviors, not just engaging in positive behaviors.

Fourth, the analyses predicting behavior showed that autonomous abstinence motivations more strongly predicted sexual behavior than controlled motivations. This is in line with prior research. In fact, the present study found autonomous motivations to be a fairly strong negative predictor of sexual behavior. Thus, internalized motivations to abstain from sex may be a power protective factor against early sexual activity. Even more interestingly, in the context of autonomous motivations, controlled motivations may actually have somewhat of a counteractive effect on sexual behavior (their unique contribution was as a positive predictor of sex).

Limitations

Although this study resulted in a theoretically-grounded and psychometrically viable scale for assessing motivations to abstain from alcohol, it did have a number of noteworthy limitations. First, all data were self-reported by the adolescents. There is some evidence that adolescents may be the best source of data regarding their attitudes and risk behaviors (Waters, Stewart-Brown, & Fitzpatrick, 2003), and that respondents may be more honest when responding to online measures than paper-pencil measures (Roberts, 2007). Nevertheless, there is still the possibility of socially desirable self-report bias, so when predicting sexual behavior in the final analyses I included social desirability as a control variable, and motivations were still predictive of sexual behavior in some of the models.

Second, there is no entirely systematic way to go about the process of developing items and reducing the number of items. Thus, other approaches may end up with a somewhat different pool of items. Nevertheless, the procedure I followed was rigorous, and in line with prior measurement studies in the self-determination theory area. Third, the sample is not nationally-representative. Thus, rates of sexual behavior may be a bit low, and perceptions of abstinence motivation may differ as a result. Still, I did recruit participants from across the country, with participants from nearly all of the 50 states. Further, the demographics seem to fairly closely reflect those of families nationally.

Third, exploratory and confirmatory factor analyses were used to assess the factorial validity or the convergent (i.e., items meant to measure the same construct load onto the same factor) and divergent (i.e., items meant to measure different constructs load on different factors) validity of the initial 77-item AMS-Sex. However, because the external and introjected items loaded onto three factors by source of motivation rather than loading onto two factors by

motivation type, the desired discriminant validity was not achieved. Similarly, the identified and integrated items loaded onto the same factor rather than two factors, failing to achieve factorial validity. Also, the high correlation between the identified and integrated factors when running the four-factor CFA further indicated a lack of discriminant validity. Other self-determination theory measurement studies have had similar problems with discriminant validity between identified and integrated items. For example, the integrated and identified items of the Treatment Self-Regulation Questionnaire (TSRQ; Levesque et al., 2007) also loaded together forming a single autonomous motivation factor. Other studies did not even include integrated motivation items because of the tendency for them to be highly correlated with identified and/or intrinsic motivation items (e.g., Mullan, Markland, & Ingledew, 1997; Pelletier et al., 1995; Ryan & Connell, 1989). And other SDT studies only had a two-factor structure depicting controlled and autonomous motivations (e.g., Ryan, Plant, & O'Malley, 1995; Ryan, Rigby, & King, 1993; Van den Broeck et al., 2011). It may be that the types of motivation along the SDT continuum may not be as distinct as the theory proposes.

Implications and Future Research

As stated previously, the controlled motivation items of the original 77-item AMS-Sex divided onto three factors representing sources of motivation (i.e., parents, peers, and self). External motivations consisted of parent- and peer-directed items, whereas introjected motivation consisted of parent-, peer-, and self-directed items. During the item reduction process the peer-directed external motivation items were removed and the parent- and peer-directed introjected items were removed, leaving the parent-directed external items and the self-directed introjected items. This may indicate that for sexual abstinence adolescents perceive parents to be more externally motivating (e.g., punishing, angry) than peers and that adolescents are motivated

more by the avoidance of guilt or shame (self-directed introjected motivations) than disapproval from parents or peers. The retained introjected items did, however, reflect guilt and shame which are believed to be the hallmarks of introjected motivation (Ryan & Deci, 2002). Future research is needed to not only look at the type or quality of abstinence motivations adolescents have, but to also look at the influence of parents, peers, and oneself and how they are related to motivation and behavioral outcomes.

Additionally, future research is needed to validate the AMS-Sex and to test for measurement invariance across gender and age. In addition to establishing factorial validity of the AMS-Sex, future studies should test whether the criterion-related validity of the AMS-Sex improves when gender is included in the structural equation model as a categorical variable, rather than a continuous variable. Measurement invariance should be tested by running separate models for males and females and doing a difference test to assess whether the two models were significantly different. This could also be done to test whether motivation types and their relationships with various covariates and outcomes were significantly different between 15-, 16-, 17-, and 18-year-old adolescents.

Conclusions

Given the relatively high rates of adolescent risk-taking behavior, understanding why adolescents are motivated not to engage in these behaviors may be just as important as understanding their motivations to engage in them. The purpose of the present study was to design a reliable measure for adolescent abstinence motivations within the self-determination theory framework. Through a rigorous item-reduction process, it appears that the 24-item AMS-Sex is a good measure. If future studies validate the AMS-Sex, this measure could help extend understanding of adolescents' sexual abstinence motivations and offer practical insights helpful

to healthcare professionals, teachers, religious leaders, parents, and others who may work with or influence adolescents.

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Table 1

Self-Determination Theory Motivation Continuum

Type of motivation	Amotivation	Extrinsic motivation				Intrinsic motivation
Type of regulation	Non-regulation	External regulation	Introjected regulation	Identified regulation	Integrated regulation	Intrinsic regulation
Locus of motivation	None	Not Internalized (controlled)			Internalized (autonomous)	
Behavior	Non- self-determined				Self-determined	

Note. Adapted from Deci and Ryan (2000).

Table 2

Descriptive Statistics and Factor Loadings for Exploratory Factor Analyses and Confirmatory Factor Analysis of Initial 77-Item Abstinence Motivation Scale-Sex (AMS-Sex) for Sample 1

						EFA (four-factor)				EFA (two-factor)		Initial CFA (four-factor)			
					BIDR[c]	Controlled									
Item	*M*	*SD*	Skew[a]	Kurt.[b]	*r*	Parents	Peers	Self	Aut	Cont	Aut	Ext	Intj	Id	Intg
Amsex1	2.25	1.37	.69*	-.86*	-.12*	**.57**				**.81**		**.64**			
Amsex2	2.75	1.46	.17	-1.38*	-.12	**.88**				**.83**		**.80**			
Amsex3	2.87	1.40	.07	-1.28*	.04	**.96**				**.78**		**.80**			
Amsex4	1.83	1.21	1.37*	.77*	.06		**.69**			**.82**		**.74**			
Amsex5	2.39	1.40	.57*	-1.02*	.00	**.83**				**.88**		**.79**			
Amsex6	2.96	1.42	.01	-1.33*	.08	**.96**				**.68**		**.80**			
Amsex7	2.52	1.46	.42*	-1.25*	-.03		.33	.34		**.62**		**.72**			
Amsex8	2.18	1.40	.84*	-.66*	-.01	.30	.35	.34		**.83**		**.75**			
Amsex9	2.96	1.46	-.01	-1.37*	-.09	**.90**				**.72**		**.80**			
Amsex10	1.80	1.17	1.32*	.58*	.04		**.88**			**.81**		**.75**			
Amsex11	2.79	1.42	.12	-1.28*	.10	**.97**				**.83**		**.83**			
Amsex12	1.65	1.08	1.71*	2.13*	-.06		**.94**			**.79**		**.69**			
Amsex13	2.12	1.31	.87*	-.45	.04	**.48**	**.46**			**.84**		**.75**			

Table 2 (continued)

Amsex14	1.93	1.23	1.14*	.20	-.09		**.90**			**.77**		**.75**				
Amsex15	1.96	1.29	1.12*	-.03	-.01		**.92**			**.71**		**.71**				
Amsex16	1.81	1.19	1.28*	.44	-.13*		**.84**			**.77**		**.71**				
Amsex17	2.66	1.43	.26*	-1.26*	-.10	**.84**				**.79**		**.82**				
Amsex18	1.70	1.09	1.49*	1.32*	-.17*		**.91**			**.80**		**.73**				
Amsex19	2.78	1.41	.15	-1.24*	.15*	**.80**				**.73**		**.84**				
Amsex20	1.83	1.21	1.33*	.64*	.15*		**.90**			**.85**		**.78**				
Amsex21	2.92	1.43	.03	-1.32*	.04	**.94**				**.73**		**.81**				
Amsex22	1.84	1.18	1.27*	.53*	.36*		**.88**			**.80**		**.77**				
Amsex23	2.68	1.52	.28*	-1.38*	.01	**.72**				**.70**		**.82**				
Amsex24	3.06	1.49	-.10	-1.38*	-.02				**.45**	.33	**.49**	**.61**				
Amsex25	2.00	1.23	1.02*	-.06	-.10*	.35	**.53**			**.74**		**.75**				
Amsex26	2.95	1.44	-.03	-1.35*	-.17*	**.88**				**.73**			**.78**			
Amsex27	1.75	1.15	1.42*	.98*	.07		**.90**			**.79**			**.73**			
Amsex28	2.58	1.49	.37*	-1.29*	-.04			**.80**		**.60**			**.84**			
Amsex29	2.66	1.52	.28*	-1.41*	.14*			**.66**		**.46**	**.46**		**.81**			
Amsex30	2.43	1.51	.57*	-1.18*	.01			**.79**		**.65**			**.86**			
Amsex31	2.39	1.46	.60*	-1.07*	-.20*			**.74**		**.62**			**.85**			
Amsex32	2.33	1.40	.57*	-1.06*	-.01			**.57**		**.67**			**.82**			
Amsex33	2.18	1.48	.86*	-.77*	-.04			**.62**		**.63**			**.82**			

Table 2 (continued)

Amsex34	2.77	1.55	.18	-1.47*	.24*			**.59**	.38	.36	**.56**		**.78**	
Amsex35	2.34	1.41	.59*	-1.04*	.17*	**.61**				**.87**			**.77**	
Amsex36	1.80	1.22	1.38*	.78*	-.06		**.76**			**.80**			**.71**	
Amsex37	2.63	1.45	.31*	-1.29*	-.14*	**.72**				**.79**			**.79**	
Amsex38	1.90	1.20	1.19*	.37	.02		**.81**			**.79**			**.78**	
Amsex39	1.67	1.10	1.63*	1.78*	-.04		**.87**			**.81**			**.69**	
Amsex40	2.73	1.44	.15	-1.35*	.01	**.78**				**.81**			**.81**	
Amsex41	2.00	1.30	.10*	-.29	-.01		**.79**			**.82**			**.77**	
Amsex42	2.92	1.45	.01	-1.36*	.04	**.78**				**.70**			**.76**	
Amsex43	2.15	1.33	.82*	-.60*	-.05		**.73**			**.69**			**.78**	
Amsex44	2.70	1.47	.21	-1.38*	.02	**.82**				**.81**			**.79**	
Amsex45	1.94	1.24	1.12*	.14	-.03		**.79**			**.77**			**.74**	
Amsex46	2.37	1.49	.62*	-1.08*	.04			.40		**.51**	.36		**.78**	
Amsex47	3.00	1.52	-.03	-1.45*	.01				**.60**		**.70**		**.72**	
Amsex48	1.73	1.16	1.51*	1.19*	.04		**.88**			**.78**			**.71**	
Amsex49	3.17	1.64	-.19	-1.61*	-.05				**.87**		**.90**			**.91**
Amsex50	3.17	1.60	-.18	-1.55*	-.23*				**.95**		**.96**			**.93**
Amsex51	3.16	1.62	-.21	-1.56*	.15				**.93**		**.95**			**.91**
Amsex52	2.90	1.66	.08	-1.64*	.09				**.75**		**.77**			**.83**
Amsex53	3.47	1.53	-.52*	-1.24*	-.16*				**.91**		**.92**			**.91**

Table 2 (continued)

Amsex54	3.24	1.62	-.29*	-1.52*	.04	**.97**	**.98**	**.94**	
Amsex55	3.09	1.60	-.14	-1.55*	-.03	**.94**	**.92**	**.91**	
Amsex56	3.18	1.56	-.25	-1.48*	.02	**.91**	**.93**	**.91**	
Amsex57	3.19	1.57	-.23	-1.47*	-.02	**.92**	**.93**	**.93**	
Amsex58	3.08	1.61	-.08	-1.58*	.14	**.86**	**.87**	**.89**	
Amsex59	3.24	1.61	-.27*	-1.53*	-.06	**.96**	**.97**	**.95**	
Amsex60	3.13	1.62	-.15	-1.59*	.07	**.95**	**.96**	**.94**	
Amsex61	3.29	1.50	-.30*	-1.35*	.21*	**.88**	**.85**	**.83**	
Amsex62	3.10	1.58	-.14	-1.54*	.12	**.92**	**.95**	**.93**	
Amsex63	3.52	1.45	-.54*	-1.09*	.03	**.88**	**.90**	**.88**	
Amsex64	3.25	1.54	-.28*	-1.42*	-.01	**.96**	**.95**	**.92**	
Amsex65	3.17	1.63	-.21	-1.58*	-.05	**.90**	**.93**		**.92**
Amsex66	3.15	1.61	-.23	-1.55*	-.00	**.95**	**.97**		**.95**
Amsex67	3.16	1.58	-.20	-1.51*	.10	**.94**	**.97**		**.93**
Amsex68	3.12	1.59	-.15	-1.55*	.11	**.88**	**.90**		**.92**
Amsex69	3.15	1.60	-.22	-1.53*	-.10	**.87**	**.91**		**.94**
Amsex70	3.13	1.60	-.16	-1.55*	-.08	**.92**	**.94**		**.94**
Amsex71	3.12	1.59	-.16	-1.54*	.09	**.97**	**.97**		**.96**
Amsex72	3.14	1.61	-.21	-1.54*	.10	**.98**	**.96**		**.94**
Amsex73	3.03	1.61	-.08	-1.58*	-.03	**.85**	**.87**		**.92**

Table 2 (continued)

Amsex74	3.11	1.61	-.14	-1.57*	-.03	**.90**	**.92**	**.95**
Amsex75	3.17	1.61	-.23	-1.55*	-.02	**.92**	**.92**	**.93**
Amsex76	3.17	1.57	-.24	-1.49*	-.17	**.99**	**1.01**	**.94**
Amsex77	3.07	1.61	-.11	-1.57*	-.08	**.93**	**.94**	**.94**

Note. Factor loadings > .40 are in boldface. EFA = Exploratory factor analysis; CFA = Confirmatory factor analysis; BIDR = Short form (12 items) of Impression Management subscale from the Balanced Inventory of Desirable Responding (Paulhus, 1991); Aut = Autonomous motivations; Cont = Controlled motivations; Ext = External motivations; Intj = Introjected motivations; Id = Identified motivations; Intg = Integrated motivations.

[a] Skewness: Asterisk indicates item's skewness *z*-score (i.e., skewness estimate/standard error) was statistically significant.

[b] Kurtosis: Asterisk indicates item's kurtosis *z*-score (i.e., kurtosis estimate/standard error) was statistically significant.

[c] Aggregated social desirability scores correlated with each AMS-Sex item.

*$p < .05$.

Table 3

Model Fit Indices for Confirmatory Factor Analyses and Structural Equation Models

Model	χ^2	RMSEA	CFI	TLI	SRMR
CFA					
Sample 1					
Initial 4-factor model (77 items)	χ^2 (2843) = 10963.21, p < .001	.091	.791	.784	.094
Final 4-factor model (24 items)	χ^2(246) = 431.31, p < .001	.047	.984	.982	.038
Final 3-factor model (24 items)	χ^2 (249) = 500.71, p < .001	.054	.978	.976	.039
Sample 2					
Four-factor model	χ^2 (246) = 675.51, p < .001	.072	.959	.954	.037
Three-factor model	χ^2 (249) = 711.75, p < .001	.074	.956	.951	.038
Two-factor model	χ^2 (251) = 1705.46, p < .001	.132	.861	.847	.108

	χ^2	RMSEA	CFI	TLI	WRMR
SEM (with covariates)					
Four-factor model	χ^2 (326) = 527.63, p < .001	.042	.734	.692	.304
Three-factor model	χ^2 (333) = 536.70, p < .001	.042	.732	.695	.310
Two-factor model	χ^2 (339) = 1085.13, p < .001	.080	.017	-.096	.686
SEM (regression)					
Four-factor model	χ^2 (306) = 744.52, p < .001	.065	.959	.953	.035
Three-factor model	χ^2 (312) = 782.575, p < .001	.066	.956	.951	.036
Two-factor model	χ^2 (317) = 1776.33, p < .001	.116	.864	.850	.100

Note. RMSEA = Root mean square error of approximation (values less than .05 indicate good model fit; values between .05 and .08 indicate acceptable fit); CFI = Comparative Fit Index (values greater than .95 indicate good model fit); TLI = Tucker Lewis Index (non-normed fit index; values greater than .95 indicate good model fit); SRMR = standardized root mean square residual (values less than .05 indicate well-fitting model); WRMR = weighted root mean square residual (values less than 1.0 indicate good model fit); CFA = confirmatory factor analysis.

Table 4

Descriptive Statistics and Factor Loadings for Final AMS-Sex Items with Sample 1

					Final CFA				Final EFA		
Item	*M*	*SD*	Skew	Kurt.	Ext	Intj	Id	Intg	Ext	Intj	Aut
Amsex2	2.75	1.46	.17	-1.38	.87				.86		
Amsex 3	2.87	1.40	.07	-1.28	.89				.93		
Amsex 6	2.96	1.42	.01	-1.33	.91				.91		
Amsex 9	2.96	1.46	-.01	-1.37	.88				.86		
Amsex 11	2.79	1.42	.12	-1.28	.91				.91		
Amsex 23	2.68	1.52	.28	-1.38	.85				.72		
Amsex 28	2.58	1.49	.37	-1.29		.89				.80	
Amsex 30	2.43	1.51	.57	-1.18		.92				.90	
Amsex 31	2.39	1.46	.60	-1.07		.91				.90	
Amsex 32	2.33	1.40	.57	-1.06		.86				.87	
Amsex 33	2.18	1.48	.86	-.77		.84				.73	
Amsex 46	2.37	1.49	.62	-1.08		.76				.56	
Amsex 53	3.47	1.53	-.52	-1.24			.91				.91
Amsex 54	3.24	1.62	-.29	-1.52			.95				.97
Amsex 59	3.24	1.61	-.27	-1.53			.94				.92
Amsex 62	3.10	1.58	-.14	-1.54			.94				.93
Amsex 63	3.52	1.45	-.54	-1.09			.88				.86
Amsex 64	3.25	1.54	-.28	-1.42			.92				.90
Amsex 71	3.12	1.59	-.16	-1.54				.96			.96
Amsex 72	3.14	1.61	-.21	-1.54				.95			.97
Amsex 73	3.03	1.61	-.08	-1.58				.91			.84
Amsex 74	3.11	1.61	-.14	-1.57				.96			.90
Amsex 75	3.17	1.61	-.23	-1.55				.93			.93
Amsex 77	3.07	1.61	-.11	-1.57				.95			.92

Table 4 (continued)

Note. CFA = confirmatory factor analysis; EFA = exploratory factor analysis; Ext = external motivation; Intj = introjected motivation; Id = identified motivation; Intg = integrated motivation.

Table 5

Descriptive Statistics and Factor Loadings for Exploratory Factor Analysis and Confirmatory Factor Analyses of Abstinence Motivation Scale – Sex (AMS-Sex) for Sample 2

								CFA									
					EFA			4-factor				3-factor			2-factor		
Item	*M*	*SD*	Skew	Kurt.	Ext	Intj	Aut	Ext	Intj	Id	Intg	Ext	Intj	Aut	Cont	Aut	
Amsex2	2.85	1.49	.09	-1.41	.87			.88				.88			.82		
Amsex 3	2.96	1.44	-.03	-1.31	.90			.89				.89			.84		
Amsex 6	3.05	1.45	-.08	-1.36	.93			.90				.90			.84		
Amsex 9	3.00	1.45	-.01	-1.35	.89			.89				.89			.83		
Amsex 11	2.83	1.46	.14	-1.34	.92			.91				.91			.84		
Amsex 23	2.74	1.49	.19	-1.37	.68			.80				.80			.80		
Amsex 28	2.72	1.51	.21	-1.42		.79			.88				.88		.77		
Amsex 30	2.55	1.53	.40	-1.35		.72			.88				.88		.74		
Amsex 31	2.51	1.52	.43	-1.33		.80			.89				.89		.78		
Amsex 32	2.34	1.46	.67	-.97		.84			.80				.80		.72		
Amsex 33	2.37	1.48	.57	-1.16		.72			.86				.86		.73		
Amsex 46	2.40	1.50	.53	-1.23		.45			.79				.79		.76		
Amsex 53	3.40	1.56	-.44	-1.34			.97			.92				.91		.91	
Amsex 54	3.28	1.59	-.32	-1.48			1.00			.94				.94		.94	
Amsex 59	3.18	1.61	-.21	-1.56			.96			.94				.94		.94	

Table 5 (continued)

Amsex 62	3.18	1.58	-.19	-1.50	.91	.94		.94	.94
Amsex 63	3.55	1.52	-.61	-1.11	.92	.89		.88	.88
Amsex 64	3.32	1.58	-.33	-1.48	.88	.88		.89	.89
Amsex 71	3.13	1.60	-.15	-1.55	.92		.92	.92	.92
Amsex 72	3.14	1.62	-.18	-1.57	.88		.92	.92	.92
Amsex 73	3.09	1.63	-.12	-1.61	.74		.90	.89	.89
Amsex 74	3.07	1.61	-.09	-1.58	.85		.92	.92	.92
Amsex 75	3.18	1.60	-.23	-1.52	.92		.92	.92	.92
Amsex 77	3.04	1.61	-.07	-1.59	.83		.91	.91	.91

Note. EFA = Exploratory factor analysis; CFA = Confirmatory factor analysis; Aut = Autonomous motivations; Cont = Controlled motivations; Ext = External motivations; Intj = Introjected motivations; Id = Identified motivations; Intg = Integrated motivations.

Table 6

Intercorrelations Between Four-Factor, Three-Factor, and Two-Factor CFA Models (Simplex Patterns)

	CFA models								
	Four-factor				Three-factor			Two-factor	
Model	1	2	3	4	5	6	7	8	9
Four-factor model									
1. External									
2. Introjected	.68***								
3. Identified	.51***	.79***							
4. Integrated	.51***	.82***	.99***						
Three-factor model									
5. External									
6. Introjected					.68***				
7. Autonomous					.51***	.81***			
Two-factor model									
8. Controlled									
9. Autonomous								.68***	

Note. CFA = confirmatory factor analysis.

***$p < .001$.

Table 7

Summary of Factor Intercorrelations for Three Structural Equation Models with Covariates

	Four-factor				Three-factor			Two-factor					
Variable	1	2	3	4	5	6	7	8	9	Age	Gender	BIDR	Behavior[a]
						Four-factor model							
1. External										-.32***	.19**	.02	-.21***
2. Introjected	.70***									-.27***	.32***	.22***	-.37***
3. Identified	.52***	.78***								-.14*	.32***	.40***	-.54***
4. Integrated	.52***	.82***	.98***							-.15**	.31***	.37***	-.52***
Age													
Gender										.01			
BIDR										.10	.21**		
Behavior										.20**	-.07	-.40***	
						Three-factor model							
5. External										-.32**	.19**	.02	-.21***
6. Introjected					.70***					-.27***	.32***	.22***	-.37***
7. Autonomous					.52***	.81***				-.15***	.32***	.38***	-.53***
Age													
Gender										.01			
BIDR										.09	.21**		
Behavior										.20**	-.07	-.36***	

Table 7 (continued)

		Two-factor model			
8. Controlled		-.32***	.29**	.13*	.31***
9. Autonomous	.52***	-.15**	.32***	.38***	-.53***
Age					
Gender		.01			
BIDR		.09	.21**		
Behavior		.20**	-.07	-.36***	

Note. BIDR = Short form (12 items) of the Impression Management subscale of the Balanced Inventory of Desirable Responding (Paulhus, 1991).

[a]Self-reported frequency of sexual intercourse rated on scale ranging from 1 (*never in my lifetime*) to 4 (*at least once in the past 30 days*).

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 8

Structural Equation Models Predicting Adolescent Self-Reported Sexual Intercourse

	Behavior[a]				Age	BIDR
Model	β	*S.E.*	*p*	95% CI	*r*	*r*
Four-factor model						
External	.06	.08	.44	[-.09, .21]	-.32***	.02
Introjected	.13	.14	.34	[-.14, .40]	-.26***	.23***
Identified	-.37	.60	.54	[-1.54, .81]	-.14*	.40***
Integrated	-.21	.65	.74	[-1.49, 1.06]	-.15**	.38***
Age	.17***	.05	.00	[.08, .27]		.08
BIDR	-.17**	.06	.01	[-.29, -.05]	.08	
Three-factor model						
External	.06	.07	.42	[-.08, .19]	-.32***	.02
Introjected	.14	.10	.18	[-.06, .34]	-.26***	.23***
Autonomous	-.58***	.09	.00	[-.75, -.41]	-.15**	.39***
Age	.18***	.05	.00	[.08, .27]		.08
BIDR	-.17**	.06	.00	[-.29, -.06]	.08	
Two-factor model						
Controlled	.15*	.07	.03	[.02, .29]	-.33***	.11
Autonomous	-.55***	.07	.00	[-.68, -.41]	-.15**	.39***
Age	.18***	.05	.00	[.08, .27]		.08
BIDR	-.17**	.06	.00	[-.29, -.06]	.08	

Note. CI = confidence interval; BIDR = Short form (12 items) of the Impression Management subscale of the Balanced Inventory of Desirable Responding (Paulhus, 1991).

[a] Self-reported frequency of sexual intercourse rated on scale ranging from 1 (*never in my lifetime*) to 4 (*at least once in the past 30 days*).

*$p < .05$. **$p < .01$. ***$p < .001$.

Appendix A

Abstinence Motivation Studies

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Appendix B

Self-Determination Theory Measurement Studies

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Neyrinck, B., Vansteenkiste, M., Lens, W., Duriez, B., & Hutsebaut, D. (2006). Religious internalization scale.

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Pelletier, L. G., Tuson, K. M., Green-Demers, I., Noels, K., & Beaton, A. M. (1998). MTES: Motivation toward the environment scale.

Pelletier, L. G., Tuson, K. M., & Haddad, N. K. (1997). CMOTS: Client motivation for therapy scale.

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Ryan, R. M., Rigby, S., & King, K. (1993). CRIS: Christian religious internalization scale.

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Appendix C

Initial AMS-Sex

Instructions: Below is a list of reasons why some people would abstain from sex (in other words, reasons why people would not have sexual intercourse). Most people have more than one reason, so please respond to each statement based on HOW MUCH THE STATEMENT REPRESENTS A REASON YOU WOULD NOT ENGAGE IN SEX.

not at all a reason for me	a little bit of a reason for me	somewhat of a reason for me	quite a bit of a reason for me	totally a reason for me

External

Avoidant

1. Because I am afraid I will get caught.
2. Because I do not want to get in trouble with my parents.
3. Because my parents would get upset.
4. Because I feel pressure from others to keep from having sex.
5. Because my parents pressure me to not have sex.
6. Because my parents would not be pleased if I did have sex.
7. Because I do not want to have a bad reputation.
8. Because I am afraid people might find out that I had sex.
9. Because my parents would disapprove of me having sex.
10. Because my friends would disapprove of me having sex.
11. Because my parents would get mad at me for having sex.
12. Because my friends would get mad at me for having sex.

Approach

13. Because I want to please people who do not want me to have sex.
14. Because my friends think I should wait to have sex.
15. Because my friends think sexual abstinence is best.
16. Because my friends really want me to abstain from sex.
17. Because my parents insist that I keep from having sex.
18. Because my friends insist that I keep from having sex.
19. Because my parents say I should stay away from sex.
20. Because my friends think I should stay away from sex.
21. Because my parents expect me to stay away from sex.
22. Because my friends expect me to stay away from sex.
23. Because that's the rule in our family.
24. Because I want to have a good reputation.
25. Because other people think it is a good idea.

Introjected

Avoidant

26. Because I do not want to disappoint my parents.
27. Because I do not want to disappoint my friends.

28. Because I would feel guilty for having sex.
29. Because I would feel bad about myself for having sex.
30. Because I would feel awful for having sex.
31. Because I would feel ashamed for having sex.
32. Because I would feel embarrassed for having sex.
33. Because I would feel like a failure for having sex.
34. Because I would be upset at myself for having sex.
35. Because I do not want my parents to think I am a bad person.
36. Because I do not want my friends to think I am a bad person.
37. Because I do not want to lose the respect of my parents.
38. Because I do not want to lose the respect of my peers.
39. Because other kids won't like me if I am sexually active.

Approach

40. Because I want my parents to think I am a good person.
41. Because I want my friends to think I am a good person.
42. Because I want my parents to see me in a positive way.
43. Because I want my friends to see me in a positive way.
44. Because I want my parents to approve of me.
45. Because I want my peers to approve of me.
46. Because I can only feel good about myself if I do not have sex.
47. Because I feel proud when I can stay away from sex.
48. Because I want other kids to like me for staying away from sex.

Identified

49. Because being sexually active now is against my personal beliefs.
50. Because being sexually active now is against my personal standards.
51. Because being sexually active now is against my personal values.
52. Because I don't believe in sex before marriage.
53. Because I believe sexual abstinence is the responsible thing to do.
54. Because sexual abstinence is personally important to me.
55. Because I have chosen sexual abstinence as a way to reach my personal goals.
56. Because I believe sexual abstinence is a good thing for my personal growth.
57. Because being sexually abstinent will help me become the person I want to be.
58. Because sexual abstinence before marriage is an important principle for me.
59. Because I have strong values regarding sexual abstinence.
60. Because I strongly value sexual abstinence.
61. Because sexual abstinence during adolescence is the reasonable thing to do.
62. Because I believe it is important to be sexually abstinent.
63. Because I believe it is the right thing to do.
64. Because I personally value the benefits of staying away from sex.

Integrated

65. Because having sex now would go against who I am.
66. Because being sexually abstinent is important to my life goals.
67. Because being sexually abstinent is an important part of who I am.
68. Because being sexually abstinent is an expression of who I am.

69. Because being sexually abstinent reflects who I am.
70. Because being sexually abstinent allows me to live true to my core values.
71. Because sexual abstinence is consistent with what I value most in life.
72. Because being sexually abstinent is consistent with my life goals.
73. Because being sexually abstinent is important to my sense of identity.
74. Because being sexually abstinent reflects what I value most in life.
75. Because sexual abstinence is part of the way I've chosen to live my life.
76. Because being sexually abstinence is important to many aspects of my life.
77. Because sexual abstinence is an important part of my identity.

Appendix D

Short IM Scale from BIDR Version 6

Using the scale below as a guide, write a number beside each statement to indicate how true it is.

1 Not true	2	3	4 Somewhat true	5	6	7 Very true

____ 1. I never cover up my mistakes.

____ 2. There have been occasions when I have taken advantage of someone. (R)

____ 3. I always obey laws, even if I'm unlikely to get caught.

____ 4. I have said something bad about a friend behind his/her back. (R)

____ 5. When I hear people talking privately, I avoid listening.

____ 6. I have received too much change from a salesperson without telling him or her. (R)

____ 7. When I was young I sometimes stole things. (R)

____ 8. I have never dropped litter on the street.

____ 9. I never look at sexy books or magazines.

____ 10. I have done things that I don't tell other people about. (R)

____ 11. I have pretended to be sick to avoid work or school. (R)

____ 12. I don't gossip about other people's business.

Appendix E

Final AMS-Sex

Instructions: Below is a list of reasons why some people would abstain from sex (in other words, reasons why people would not have sexual intercourse). Most people have more than one reason, so please respond to each statement based on HOW MUCH THE STATEMENT REPRESENTS A REASON YOU WOULD NOT ENGAGE IN SEX.

not at all a reason for me	a little bit of a reason for me	somewhat of a reason for me	quite a bit of a reason for me	totally a reason for me

External

2. Because I could get in trouble with my parents.
3. Because I worry my parents would get upset.
6. Because my parents would not be pleased if I did have sex.
9. Because my parents would disapprove of me having sex.
11. Because my parents would get mad at me for having sex.
23. Because that's the rule in our family.

Introjected

28. Because I would feel guilty for having sex.
30. Because I would feel awful for having sex.
31. Because I would feel ashamed for having sex.
32. Because I would feel embarrassed for having sex.
33. Because I would feel like a failure for having sex.
46. Because I can only feel good about myself if I do not have sex.

Identified

53. Because I believe sexual abstinence is the responsible thing to do.
54. Because sexual abstinence is personally important to me.
59. Because I have strong values regarding sexual abstinence.
62. Because I believe it is important to be sexually abstinent.
63. Because I believe it is the right thing to do.
64. Because I personally value the benefits of staying away from sex.

Integrated

71. Because sexual abstinence is consistent with what I value most in life.
72. Because being sexually abstinent is consistent with my life goals.
73. Because being sexually abstinent is important to my sense of identity.
74. Because being sexually abstinent reflects what I value most in life.
75. Because sexual abstinence is part of the way I've chosen to live my life.
77. Because sexual abstinence is an important part of my identity.