



Adolescent motivations to abstain from sex and alcohol: a self-determination theory approach

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ABSTRACT

The purpose of this study was to design and validate a measure of adolescent motivations to abstain from sex and alcohol, grounded in self-determination theory, and to examine the roles of controlled and autonomous abstinence motivations in predicting these two risk behaviors. The sample included 799 U.S. adolescents, 15–18 years old. The abstinence motivation measure included 10 items, with five items each for controlled and autonomous abstinence motivations. The measure demonstrated strong psychometrics properties and validity. Controlled and autonomous motivations to abstain from sex and alcohol both correlated negatively with sex and alcohol behaviors. However, in structural equation models only autonomous abstinence motivation for a specific behavior predicted that behavior. A mediation model also found that autonomous but not controlled abstinence motivations mediated relations between religious involvement and risk behaviors. This study generated a theoretical-based measure of adolescent abstinence motivation. Additionally, autonomous abstinence motivations more strongly and uniquely predicted sex and alcohol behaviors than controlled abstinence motivations.

Adolescence is a time of heightened risk-taking (Arnett, 2017), such as risky sexual activity and hazardous alcohol use. Research on risk and protective factors for sex (Lee et al., 2018) and alcohol use (Schulenberg et al., 2014) has focused on biological factors such as gender and puberty, personality characteristics such as self-control, and social contexts such as family and peers. Less is known about adolescents' motivations for engaging in or abstaining from these same risk behaviors (Hardy et al., 2015; Moore & Hardy, 2020). Further, we know more about what motivates youth to have sex (Morrison-Beedy et al., 2017) and drink alcohol (Van Tyne et al., 2012) than why they might abstain from such behaviors. Self-determination theory (Ryan & Deci, 2017) provides a framework for examining such abstinence motivations (Hardy et al., 2015; Moore & Hardy, 2020). The purposes of the present study were to develop a measure of adolescent motivations to abstain from sex and alcohol using a self-determination theory framework, evaluate the role of abstinence motivations in protecting against engagement in sex and alcohol use, and assess abstinence motivations as a mediator linking

religious involvement to abstinence from sex and alcohol use.

Motivations to abstain from alcohol and sex

Motivations to engage in behaviors (i.e., participation motivations) are distinct from motivation to refrain from them (i.e., nonparticipation motivations), rather than merely being opposite ends of a continuum (Aelterman et al., 2016; Halvari et al., 2013; Richetin et al., 2011). Indeed, adolescents' motivations to have sex appear distinct from their motivations to abstain from sex (Patrick et al., 2011), and their motivations to drink alcohol appear distinct from their motivations to abstain from alcohol (Anderson et al., 2013). Thus, adolescent motivations to abstain from risk behaviors ought to be studied in addition to their motivations to engage in them.

Both qualitative and quantitative research are emerging examining adolescents' motivations to abstain from sex and alcohol (or other substances). In a qualitative study, researchers (Patrick et al., 2010) identified the following reasons for abstinence from sex and substance use: physical or behavioral

consequences, ethical objections, social disapproval, and incompatible activities and goals. Additionally, a quantitative study (Blinn-Pike et al., 2004) found that sexual abstinence motivation items factored into fear-based postponement (e.g., fear of pregnancy), emotionality and confusion (e.g., too embarrassed), and conservative values. Similarly, another quantitative study of motivations to abstain from drinking alcohol assessed the following reasons (identified using factor analysis of items in prior research): not wanting to feel a loss of control, wanting to avoid adverse consequences (e.g., interference with responsibilities), and convictions (e.g., religion; Anderson et al., 2013). Another quantitative study identified the following three types of motivations for sexual abstinence based on prior literature on sexual activity and validated these types of motivations when creating a separate measure: health motivations (e.g., fear of sexually transmitted infections), values motivations, and not being ready (Patrick et al., 2011). Lastly, one quantitative study developed a measure to abstain from alcohol based on five specified types of motivation identified for drinking alcohol in prior research: dispositional risk, family constraints, religious constraints, indifference, and fear of consequences (Stritzke & Butt, 2001). While these studies have provided insight into the varieties of abstinence motivations, they have not been grounded in theories of motivation.

Self-determination theory as a framework for studying abstinence motivations

Self-determination theory (Ryan & Deci, 2017) can be leveraged as a theoretical framework for studying abstinence motivations. This theory posits three universal human needs: autonomy, competence, and relatedness. Autonomy is the sense of volition regarding one's behavior, competence is the feeling of effectiveness or mastery (e.g., talents), and relatedness is having social connections. Developmental contexts that provide for these needs are more likely to facilitate internal or autonomous motivations for behavior (i.e., youth will do things because they want to, not just because they feel compelled). This may be even more salient during adolescence, as youth increasingly assert their autonomy and seek to discover or form their own salient identities (Soenens & Vansteenkiste, 2011). Adolescence is also a time of heightened accessibility and vulnerability to risk behaviors (Arnett, 2017). Abstinence from sex (Kugler et al., 2017) and alcohol (U.S. Department of Health and Human

Services, 2007) during adolescence is often seen as adaptive, given that early sex can lead to sexually transmitted infections and pregnancy and early alcohol use can lead to consequences such as risky driving, illicit drug use, and substance use disorders. Thus, providing nurturing developmental contexts during adolescence helps foster autonomous abstinence motivations, which are important to positive youth development.

Self-determination theory outlines the following continuum of human motivation from the least to most self-determined or autonomous: external, introjected, identified, integrated, and intrinsic. Intrinsic motivation is when people behave because the target behaviors are inherently interesting or enjoyable. The other four types of motivation (external, introjected, identified, and integrated) are collectively considered extrinsic motivation because the behaviors are seen as instrumental to avoiding undesired outcomes or approaching desired outcomes. Specifically, external motivation entails socially-contingent punishments or rewards, while introjected motivation involves internal punishments or rewards (e.g., avoiding guilt, shame, or feelings of disapproval; gaining self-esteem and feelings of approval). Identified motivation is based on acceptance or valuing of the behavior while integrated motivation implies that behaviors have become connected to one's identity and life goals. Using the example of running, an intrinsically motivated person would run because it is their passion. In terms of extrinsic motivation, people might run because of employee incentive programs for health (external), they do not want to feel like a lazy person (introjected), they value their health (identified), or because being a runner is an important part of who they are (integrated).

These five types of motivation may also be categorized as either controlled or volitional. Both external and introjected motivations, as extrinsic motivators, are considered "controlled" because people behave out of external or internal compulsion rather than personal volition. In contrast, the other identified types of motivation, including identified, integrated, and intrinsic, are considered "autonomous" because people behave volitionally. The more extrinsic motivation is autonomous, the more it is considered "internalized." Autonomous motivation is deemed more adaptive than controlled motivation as it is predictive of more meaningful and sustained behavior contributing to a person's psychological well-being (Ryan & Deci, 2017).

Most self-determination theory research targets participation motivations for engaging in adaptive behaviors (e.g., exercise) rather than to nonparticipation motivations for refraining from maladaptive behaviors (e.g., smoking). Yet, like participation motivations, nonparticipation motivations may also range from controlled to autonomous categorization (Vansteenkiste & Mouratidis, 2016). For example, researchers have studied motivations to avoid searching for a job (Vansteenkiste et al., 2004), to avoid participating in physical education (Aelterman et al., 2016), to refrain from complying with classroom rules (Aelterman et al., 2019), to quit smoking (Williams et al., 2009), to abstain from alcohol (Moore & Hardy, 2020), and to abstain from sex and marijuana (Hardy et al., 2015). In fact, nonparticipation motivations often predict less engagement in the behavior, even after controlling for participation motivations (e.g., Aelterman et al., 2016, 2019; Halvari et al., 2013).

Abstinence motivations and risk behaviors

When youth have internalized motivation to abstain from risk behaviors, they should exhibit lower levels of those risk behaviors. Indeed, two prior studies have demonstrated this tendency. In the first study (Hardy et al., 2015), teens with more overall internalized motivation to abstain (operationalized by the relative autonomy index, a weighted composite of controlled and autonomous motivations) engaged in less sex and marijuana use. Further, in the same study, person-centered analyses showed that clusters of teens with high autonomous abstinence motivation engaged in less risk behaviors regardless of the level of controlled motivation. Motivations were also behavior specific, with motivations to abstain from a particular risk behavior more strongly linked to that behavior than other risk behaviors. In the second study (Moore & Hardy, 2020), autonomous abstinence motivations predicted less alcohol use over time, while controlled abstinence motivations predicted more alcohol use. Thus, autonomous motivations to abstain from risk behaviors seem adaptive, while controlled abstinence motivations may be inert or maladaptive.

Abstinence motivations as mediators

Abstinence motivations may function as mediators of the influence of social contexts, such as religious communities, on risk behaviors. A recent review of the role of religious involvement in adolescent behaviors noted that often the most salient mediators are social

cognitions, such as attitudes and norms, pertaining to the target behavior (Hardy, Nelson, et al., *in press*). As such, abstinence motivations may mediate relations between religious involvement and risk behaviors. Studies consistently find that more religious adolescents engage in lower levels of risk behaviors such as engaging in sex and using alcohol (for a review, see Hardy, Nelson, et al., *in press*). As noted earlier, there is also emerging evidence that abstinence motivations predict risk behaviors. Thus, what remains unknown is whether religious involvement predicts abstinence motivations, and whether religious involvement indirectly links to risk behaviors via abstinence motivations. Nevertheless, there is evidence linking religious involvement to more conservative attitudes regarding sex (Winter et al., 2014) and alcohol (Vaughan et al., 2011) among adolescents.

The present study

We had three goals in conducting this research. First, we wanted to design a reliable and valid measure for assessing abstinence motivations that was standard across risk behaviors. The two prior studies of abstinence motivations use preliminary items rather than validated scales (Hardy et al., 2015; Moore & Hardy, 2020). Further, the preliminary items were specific to particular risk behaviors. We wanted to design a single set of items that could be directed toward assessing motivations to abstain from sex or alcohol (and perhaps other risk behaviors in future research). Second, we wanted to examine the relative role of controlled and autonomous abstinence motivations in predicting engagement in sex and alcohol use. Both prior studies showed the adaptive nature of autonomous abstinence motivations, but the findings regarding controlled abstinence motivations were somewhat mixed. Additionally, one of the prior studies contrasted abstinence motivations pertaining to sex and marijuana (Hardy et al., 2015), while the other focused solely on alcohol use (Moore & Hardy, 2020). Thus, research is needed to contrast abstinence motivations for sex and alcohol, respectively. Based on the prior research reviewed earlier, we hypothesized that autonomous abstinence motivations would be more strongly related to risk behaviors than controlled abstinence motivations. Third, we wanted to test whether abstinence motivations mediate relations between religious involvement and risk behaviors. As noted earlier, no research to date has examined relations between religious involvement and abstinence motivations or assessed this mediating process.

To establish validity, we examined correlations between abstinence motivation, religious motivation, academic motivation, and global motivation. We included religious motivation in our test because this measure was one of the more recently developed and validated scales of motivation grounded in self-determination theory (Hardy et al., *in press*; Neyrinck et al., 2010). We chose academic motivation because this is one of the more established and frequently used self-determination theory motivation measures (Ryan & Connell, 1989). Lastly, we included global motivation because it captures general motivation orientation rather than domain-specific motivation (Pelletier et al., 2004).

In the analyses of the four motivations (controlled and autonomous sex abstinence motivations and controlled and autonomous alcohol abstinence motivation) predicting the two behaviors (engaging in sex and alcohol use), we added several control variables. First, we added six demographic variables that have been linked to risk behaviors in prior research, specifically, age, gender, ethnicity, household composition, parent education, and parent income (Lee et al., 2018; Schulenberg et al., 2014). Typically, teens identified as older, male, ethnic minority, from single-parent homes, and low socioeconomic status are more likely to engage in risk behaviors. Second, we controlled for social desirability to demonstrate that the effects go beyond self-report social desirability bias. Third, we controlled for liberal attitudes toward sex and alcohol to demonstrate that motivations to abstain from risk behaviors go beyond liberal versus conservative social views about them.

Method

Sample

The sample included 799 adolescents from across the U.S. (ages 15-18 years old, $M = 16.46$, $SD = 1.07$; 50% male; 69% European American, 14% African American, 9% Hispanic, 3% Asian American, and 5% other ethnicities). In terms of family background, 55% of adolescents lived with both of their biological or adoptive parents.

Procedures

This study was approved by the Institutional Review Board at Brigham Young University (#F110013). We recruited parents with teenagers 15-18 years of age from across the country via emails from Survey Sampling International (SSI), an online survey panel.

Sampling was not random. Rather, interested parents followed a link to a website with information about the study. However, we used quotas based on demographics (e.g., ethnicity) to ensure the sample was roughly representative of U.S. families. Those who consented to participate and allow their teen to participate were directed to the online survey, administered through Qualtrics software. Parents directed their teen to complete the teen portion of the survey first. Once teens completed their portion, they turned the survey back over to their parent who then completed the parent portion. In total, 624 parents took the parent survey (69% female). Families who reached the end of the survey received compensation roughly in the amount of \$4 per family, but the compensation type depended on how the participants were recruited by SSI and their own preferred mode of compensation. In the present study, we only used the teen-report data. The survey, data, and code are accessible online (<https://osf.io/vyj5p/>; DOI 10.17605/OSF.IO/VYJ5P).

Measures

Control variables

In our primary model, we first controlled for several demographic variables, including: age, gender, ethnicity (other vs. white), household composition (other vs. two biological parents), parent education (the education of the parent who participated in the study, ranging from junior high to a graduate degree), and parent income (income of the parent who participated in the study, ranging from zero to \$200K or more). Second, we controlled for social desirability using the 12-item ($\alpha = .80$) Short Impression Management Scale (SIMS) (Paulhus, 1991), with responses ranging from 1 (*not true*) to 7 (*very true*). Third, we controlled for liberal attitudes about sex and alcohol, which were assessed using items based on prior research (e.g., Hardy, Hurst, et al., 2019). We developed four items for sex ($\alpha = .96$; sample item: "It is okay for teens my age to have sexual intercourse") and four items for alcohol ($\alpha = .96$; sample item: "It is okay for teens my age to drink alcohol") with responses ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The four respective items were averaged to create composite scores for liberal attitudes toward sex and liberal attitudes toward alcohol.

Abstinence motivations

As part of this study, we designed the Abstinence Motivation Scale (AMS) to assess motivations for

abstaining from risk behaviors (e.g., sex and alcohol), based on self-determination theory (Ryan & Deci, 2017). We started by generating an initial pool of items based on the following sources of information: prior research using self-determination theory motivation scales, prior research on risk behavior abstinence motivations, and our own qualitative pilot work. The initial item pool included 119 items capturing amotivation (the complete absence of both intrinsic and extrinsic types of motivation), external motivation, introjected motivation, identified motivation, and integrated motivations for abstaining from sex and alcohol. The amotivation items that assessed participants' lack of intentionality were ultimately dropped due to our greater focus on motivation. We obtained feedback from eight self-determination theory experts on this 119-item pool. They completed an online survey during which they classified each item according to amotivation, external motivation, introjected motivation, identified motivation, or integrated motivation categories. The experts also had the opportunity to provide open-ended feedback. Based on the input received from the experts, we modified some items and reduced the item pool to 77 items total (25 external items, 23 introjected items, 16 identified items, and 13 integrated items). For consistency, we removed items which the experts did not classify similarly.

We then collected data from adolescent participant using the reduced 77-item pool. The survey instructions pertaining to sex were as follows: "Below are 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." The instructions pertaining to alcohol were as follows: "Below are a list of reasons why some people would abstain from alcohol (in other words, reasons why people would not drink alcohol). 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 DRINK ALCOHOL." Each of the 77 items were rated on a 5-point Likert scale from 1 (*not at all a reason for me*) to 5 (*totally a reason for me*). Following the process outlined in the results section, we reduced these 77 items to a final 10-item scale with five controlled motivation items (a combination of external and introjected items; $\alpha = .92$ for sex, $\alpha = .92$ for alcohol) and five autonomous motivation items (a combination of identified and integrated items; $\alpha =$

.97 for sex; $\alpha = .97$ for alcohol). See Appendix A for the final measure with instruction, response scale, items, and scoring information. We used these final 10 items to create latent variables for controlled and autonomous abstinence motivations for sex and alcohol.

Religious motivation

We assessed controlled and autonomous religious motivations using 28 items from the Religious Motivation Scale (Neyrinck et al., 2010; for a shorter, updated version of this measure, as well as extensive validity analyses, see Hardy et al., *in press*). Youth were asked to provide the religious activity that is the most important to them and which best expresses their religious beliefs. Then, youth participants rated their reasons for performing the specified religious activity from 1 (*strongly disagree*) to 5 (*strongly agree*). Sixteen of the 28 items assessed controlled religious motivation (a combination of external and introjected motivation items; sample external item: "Others would get mad at me if I didn't do it"; sample introjected item: "Because I would feel ashamed if I didn't do it"; $\alpha = .94$). Twelve items were used to assess autonomous religious motivation (a combination of identified, integrated, and intrinsic motivation items; sample identified item: "Because I find it personally important"; sample integrated item: "Because it connects well with what I want in life"; sample intrinsic item: "Because I enjoy it"; $\alpha = .98$). Items were averaged to create composite scores for controlled and autonomous religious motivation.

Academic motivation

Controlled and autonomous academic motivations were assessed using the 32-item Self-Regulation Questionnaire (for validity evidence, see Ryan & Connell, 1989). Youth were presented with the following four questions about their academics: Why do I do my homework? Why do I work on my classwork? Why do I try to answer hard questions in class? And, why do I try to do well in school? After answering the four questions, participants rated their various responses to the questions from 1 (*not at all true*) to 4 (*very true*), based on their reasons for doing those behaviors. Eighteen of the 32 questionnaire items assessed controlled academic motivation (a combination of external and introjected motivation items; sample external item: "Because I'll get in trouble if I don't"; sample introjected item: "Because I'll feel bad about myself if I don't do it"; $\alpha = .92$), and 14 items assessed autonomous academic motivation (a

combination of identified motivation and intrinsic motivation items; sample identified item: "Because it's important for me to do my homework"; sample intrinsic item: "Because I enjoy doing my homework"; $\alpha = .94$). Items were averaged to create composite scores for controlled and autonomous academic motivation.

Global motivation

Controlled and autonomous global motivations (meaning general orientation to motivation across domains of life) was assessed using the 18-item General Motivation Scale (for validity evidence, see Pelletier et al., 2004). Youth rated their general reasons for doing the 18 items from 1 (*do not agree at all*) to 7 (*completely agree*). Six of the 18 items assessed controlled global motivation (a combination of external and introjected motivation items; sample external item: "... because I do not want to disappoint certain people"; sample introjected item: "... because I would feel guilty for not doing them"; $\alpha = .84$). Eight items assessed autonomous global motivation (a combination of identified, integrated, and intrinsic motivation; one of the intrinsic motivation items was accidentally omitted from the survey; sample identified item: "... because I choose to make a commitment to what it important to me"; sample integrated item: "... because they represent who I am"; sample intrinsic item: "... because of the pleasant feelings I get while I am doing them"; $\alpha = .92$). Items were averaged to create composite scores for controlled and autonomous global motivation.

Sex and alcohol behaviors

Frequency of engagement in sex and alcohol behaviors was assessed using a single item for each behavior, adapted from prior research (e.g., Smith & Denton, 2005). Youth rated the frequency with which they had sexual intercourse and used alcohol using the following four-point scale: 1 (*never in my lifetime*), 2 (*once in my lifetime, but not the past year*), 3 (*at least once in the past year, but not in the last 3 months*), and 4 (*at least once in the last 3 months*).

Religious involvement

Religious involvement was assessed using six items ($\alpha = .90$) adapted from prior research (e.g., Smith & Denton, 2005). These items are congruent with validated scales of religious involvement that have been used for decades (Hill & Hood, 1999). Youth rated frequency of engagement in various private (e.g., prayer, private scripture study) and public (e.g.,

worship service attendance, participation in youth religious activities) religious behaviors on a scale from 1 (*never*) to 8 (*several times a day*). Items were averaged to create a composite score for religious involvement.

Analysis plan

First, to reduce the item pool to the final item set, we examined item psychometric properties and ran exploratory factor analyses (in IBM SPSS, version 25), and a series of confirmatory factor analyses (in Mplus, version 8). These analyses were done using half of the data (Sample 1). Second, we conducted analyses for the purpose of establishing validity. In Mplus, we specified latent variables for controlled and autonomous abstinence motivations for sex and alcohol and observed variables for all other study variables. We then estimated a confirmatory factor analysis to obtain descriptive statistics and bivariate correlations. These analyses were done using the other half of the data (Sample 2). Third, we conducted analyses for the purpose of examining controlled and autonomous abstinence motivations as predictors of sex and alcohol behavior. Specifically, we estimated a structural model (in Mplus) with controlled and autonomous abstinence motivations for sex and alcohol to predict sex and alcohol behaviors while controlling for sex and alcohol attitudes, social desirability, and various demographics. These analyses were done on the total sample (the two halves of the data combined). Fourth, we conducted analyses for the purpose of testing a mediation model linking religious involvement to risk behaviors via abstinence motivation. For these mediation analyses, we conducted a series of mediation models (in Mplus) to assess the role of controlled and autonomous abstinence motivations as mediators linking religious involvement to sex and alcohol behaviors. Again, these analyses were done on the total sample (the two halves of the data combined).

All structural equation models were estimated in Mplus using the robust maximum likelihood estimator (MLR), which is better suited for handling analyses with skewed data. While none of our variables were highly skewed (skewness > 2), some variables were moderately skewed (skewness > 1). Global model fit was evaluated using the comparative fit index (CFI) and root mean squared error of approximation (RMSEA). CFI values greater than .90 indicate adequate fit, while those greater than .95 indicate good fit. For RMSEA values, less than .08 indicates an acceptable fit, while values less than .05 indicate good

fit (Little, 2013). Model fit comparisons were conducted using chi-square difference testing.

Results

Item reduction

We started item reduction analyses on the pool of 77 items for each behavior (sex and alcohol). Items were nearly identical across behavior, except for minor wording differences related to the target behavior being tailored to abstinence motivations relative to that behavior (e.g., “having sex” vs. “drinking alcohol”). To properly conduct the item reduction process, we randomly split the sample (Sample 1 $N=403$; Sample 2 $N=396$). All the initial item reduction analyses were conducted on Sample 1. In SPSS, we obtained means, standard deviations, skewness, correlations with social desirability, and exploratory factor analyses (separately, for abstinence motivation items pertaining to each behavior—sex and alcohol) on Sample 1. These measurements were examined, looking for highly skewed items, items highly correlated with social desirability, and items with low factor loadings or cross loadings across controlled and autonomous abstinence motivations factors. Based on this information and to maintain clarity of item wording, we reduced the item set to 40 items, which included 10 items each for external, introjected, identified, and integrated motivations.

Next, we conducted a series of confirmatory factor analyses of Sample 1 in Mplus to further reduce the items. These analyses were conducted separately for the sex and alcohol abstinence motivation items. For each analysis, we specified two latent variables (controlled and autonomous abstinence motivation), with 20 items loaded on each. We examined model fit, factor loadings, and modification indexes. We also considered item wording, as well as our desire to retain items capturing all four of the types of motivation. We used all this information to decide which items to drop. We dropped one item at a time, and then reran the model. We repeated this process until we had 10 items each for controlled and autonomous abstinence motivation.

Following this item reduction, we restarted the same process but included controlled and autonomous items together in the same model, with two latent variables specified. We then repeated the same process until we had reduced the item set to 10 total items, with five items each for controlled and autonomous abstinence motivation. We reduced the items in a way that retained items that best captured the constructs,

but we stopped at five items per scale because three to six items is considered to be an ideal number of items per latent variable (Koran, 2020). Then in Sample 1, we ran EFAs on these 10 items separate for each behavior domain (sex and alcohol), using principal axis factor with direct oblimin rotation. For both sets of items, this yielded two factors with eigen values greater than one. In the pattern matrix for the sex abstinence motivation items, the loadings of each item on its own subscale (controlled or autonomous motivation) were at least .84, while cross-loadings were all smaller than .09. In the pattern matrix for the alcohol abstinence motivation items, the loadings of each item on its own subscale were at least .81, while cross-loadings were all smaller than .08. Finally, in Sample 1, we estimated two confirmatory factor analysis models (one for each behavior domain) in Mplus with this final set of five items per scale, loaded on two latent variables (with a covariance between them). This model fit the data well for sex, $\chi^2(34) = 47.13$, $p = .07$, CFI = 1.00, RMSEA = .03, and for alcohol, $\chi^2(34) = 45.98$, $p = .08$, CFI = 1.00, RMSEA = .03.

Next, we reran the EFAs in Stata on the final items, separately for each behavior domain (sex and alcohol), this time using Sample 2. This similarly yielded two factors (controlled and autonomous factors) for each behavior domain, with factor loadings roughly equivalent to those from Sample 1. We then estimated the two confirmatory factor analysis models in Mplus, this time using Sample 2, and the models fit the data well for sex, $\chi^2(34) = 57.76$, $p = .01$, CFI = .99, RMSEA = .04, and for alcohol, $\chi^2(34) = 45.09$, $p = .10$, CFI = 1.00, RMSEA = .03.

Then, we combined the two samples ($N=799$) and specified all four latent variables (controlled and autonomous sex abstinence motivations and controlled and autonomous alcohol abstinence motivations) in the same confirmatory factor analysis model in Mplus, which also fit the data well, $\chi^2(34) = 410.91$, $p < .001$, CFI = .99, RMSEA = .04. All factor loadings were large and significant (see Table 1). All four latent variables were significantly correlated (see Table 2), with the strongest correlations between the two controlled motivation latent variables and between the two autonomous motivation latent variables, followed by the correlations between the two motivations within each specified behavior group (sex and alcohol).

As our final evaluation of the psychometrics of the measures, we tested for measurement invariance across gender. We used the alignment approach in Mplus (Asparouhov & Muthén, 2014), which

Table 1. Final revised sex and alcohol abstinence motivation scale and standardized factor loadings.

Item	Factor loadings sex/alcohol	
	Controlled motivation	Autonomous motivation
1. Because my parents would get mad at me for (having sex/drinking alcohol).	.87/.81	
2. Because I try to please people who do not want me to (have sex/ drink alcohol).	.72/.72	
3. Because my parents might lose respect for me if I (have sex/ drink alcohol).	.85/.85	
4. Because my parents will think I am a good person if I stay away from (sex/ alcohol).	.89/.89	
5. Because my parents will approve of me if I stay away from (sex/alcohol).	.88/.88	
6. Because (sexual abstinence/abstaining from alcohol) is personally important to me.		.94/.93
7. Because I strongly value (sexual abstinence/abstaining from alcohol).		.93/.94
8. Because (having sex/drinking alcohol) now would go against who I am.		.91/.91
9. Because (being sexually abstinent/abstaining from alcohol) allows me to live true to my core values.		.93/.92
10. Because (sexual abstinence/abstaining from alcohol) is an important part of my identity.		.91/.92

Note. $N = 799$.

Table 2. Bivariate correlations among controlled and autonomous motivations.

	1	2	3
1. Sex- Controlled Motivation	—		
2. Sex- Autonomous Motivation	.53	—	
3. Alcohol - Controlled Motivation	.78	.39	—
4. Alcohol - Autonomous Motivation	.42	.76	.55

Note. $N = 799$; All of the correlations were statistically significant based on at least a $p < .001$ alpha level.

systematically uses the configural model to test for approximate invariance. Essentially, the alignment approach identifies which items are invariant across which groups. Of the 20 items tested, one item was variant across groups in terms of the intercept, and one in terms of the factor loading. All other intercepts and loadings were invariant across gender. The Mplus alignment approach yields values for R-squared indicating the degree to which variance in the configural model loadings and intercepts is accounted for by variation in the latent means and variances across groups. The closer the value is to 1, the more confidence one can have in scalar invariance. In this case, the majority of the variance (64%) across groups was at the level of latent variable means and variances. In short, the measure appears largely invariant across gender.

Validity analyses

To assess the validity of the Abstinence Motivation Scale, we tested a model, which was fit in Mplus with specified latent variables for controlled and autonomous abstinence motivations for sex and alcohol use. For this model, we also used correlations between these four latent variables and correlated them with numerous other existing controlled and autonomous motivations scales from other measures based on self-determination theory. This model fit the data well, $\chi^2(356) = 620.86$, $p < .001$, CFI = 0.98, RMSEA = .03. Means and standard deviations of all the variables were also computed (see Table 3). In terms of

correlations (see Table 4), the controlled subscales for both the sex and alcohol abstinence motivations had large, significant, and positive associations with the controlled subscales of religious academic, and global motivations. The autonomous subscales for both sex and alcohol of the abstinence motivation scale had large, significant, and positive associations with the autonomy subscales of religious, academic, and global motivations. All cross subscales also had medium to large, significant, and positive correlations.

In addition to the validity analyses, correlations were also estimated between controlled and autonomous abstinence motivations latent variables and observed variables for religious involvement, attitudes toward sex and alcohol, and sexual and alcohol activity (see Table 4). There were significant positive correlations between religious involvement and all four abstinence motivation subscales. The controlled and autonomous subscales were all correlated with less liberal attitudes toward sex and alcohol, and less sexual and alcohol behavior. We ran a Wald test to see if the autonomous motivation variables related more strongly to attitudes and behaviors than the controlled motivation variables. As hypothesized, autonomous motivations to abstain from sex and alcohol were significantly more strongly correlated with sex and alcohol attitudes and behaviors than controlled motivations to abstain from sex and alcohol.

Regression analysis predicting behaviors

To examine the relative role of controlled and autonomous abstinence motivations in predicting behavior, we estimated a single model in Mplus with all four abstinence motivation latent variables (controlled and autonomous abstinence motivations for sex and alcohol) predicting sex and alcohol behaviors, controlling for attitudes toward sex and alcohol, age, gender, ethnicity, household composition, parent education, parent income, and social desirability (see Table 5). This

Table 3. Means and standard deviations.

Variable	M	SD
Sex-controlled motivation	2.83	1.28
Sex-autonomous motivation	3.23	1.51
Sex-attitudes	2.43	1.27
Sex-behavior	1.64	1.09
Alcohol-controlled motivation	3.20	1.29
Alcohol-autonomous motivation	3.51	1.44
Alcohol-attitudes	2.03	1.17
Alcohol-behavior	1.94	1.16
Religious involvement	3.09	1.73
Religious controlled motivation	2.72	0.90
Religious autonomy motivation	3.52	1.10
Academic controlled motivation	2.92	0.61
Academic autonomy motivation	2.80	0.71
Global controlled motivation	4.44	1.31
Global autonomy motivation	5.23	1.29

Note. $N = 799$; descriptive statistics were estimated as part of the confirmatory factor analysis model with all of these variables and their covariances.

Table 4. Correlations with sex and alcohol abstinence motivations.

Variable	Controlled	Autonomous
Sex - attitudes	-.33/-.27	-.66/-.55
Alcohol - attitudes	-.25/-.30	-.52/-.59
Sex - behavior	-.21/-.17	-.47/-.38
Alcohol - behavior	-.25/-.31	-.46/-.57
Religious involvement	.28/.23	.46/.36
Religious controlled motivation	.47.44	.28/.26
Religious autonomy motivation	.28/.28	.49/.44
Academic controlled motivation	.47/.51	.36/.41
Academic autonomy motivation	.22/.24	.48/.48
Global controlled motivation	.51/.50	.35/.39
Global autonomy motivation	.20/.25	.54/.55

Note. $N = 799$; Coefficients for sex are before the slash, while those for alcohol are after the slash. All of the correlations were statistically significant based on at least a $p < .001$ alpha level.

model fit the data well, $\chi^2(340) = 556.20$, $p < .001$, CFI = 0.99, RMSEA = 0.03. As hypothesized, autonomous motivations to abstain from sex significantly predicted less sexual activity ($\beta = -.26$, $p < .001$), while autonomous motivations to abstain from alcohol predicted significantly less alcohol use ($\beta = -.31$, $p < .001$), even after accounting for all of the specified control variables. The controlled abstinence motivations did not significantly predict the behaviors. Additionally, liberal attitudes toward sex significantly and positively predicted sex, while liberal attitudes toward alcohol similarly predicted alcohol use.

Mediation analyses

We estimated a series of mediation models in Mplus to evaluate the role of abstinence motivations in mediating relations between religious involvement and sex and alcohol behavior (see Figure 1). For each behavior separately (sex and alcohol), we estimated mediation models with observed religious involvement as the predictor, latent autonomous and controlled

Table 5. Structural equation model for autonomous motivations predicting behaviors.

Variable	Sex		Alcohol	
	β		β	
Sex-controlled motivation	.07		.01	
Sex-autonomous motivation	-.26***		.03	
Sex-attitudes	.35***		.01	
Alcohol-controlled motivation	.02		-.001	
Alcohol-autonomous motivation	-.02		-.31***	
Alcohol-attitudes	-.002		.37***	
Age	.15***		.12***	
Gender	.07*		-.01	
Ethnicity	.05		.01	
Home dimension	-.002		-.03	
Parent education	-.01		-.04	
Parent income	-.05		-.03	
Social desirability	-.02		-.11**	

Note. $N = 799$; * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

abstinence motivations as mediators, and observed risk behavior as the outcome. We also estimated the correlation between the two latent motivation variables. For each behavior we estimated two models: a partial mediation model that included direct and indirect paths from religious involvement to behavior and a full mediation model that only included the indirect path. We compared the fit of the partial and full mediation models to each other using chi-square difference tests.

The sex partial mediation model fit the data well, $\chi^2(50) = 54.86$, $p = .30$, CFI = 1.00, RMSEA = .01, as did the full mediation model, $\chi^2(51) = 57.08$, $p = .26$, CFI = 1.00, RMSEA = .01. The full model was retained, as it did not fit significantly worse than the partial mediation model (based on a chi-square difference test) but was more parsimonious. Religious involvement predicted more autonomous ($\beta = .46$, $p < .001$) and controlled ($\beta = .28$, $p < .001$) sex abstinence motivations. Autonomy abstinence motivations in turn predicted less sexual activity ($\beta = -.50$, $p < .001$). In short, as hypothesized, there was a significant indirect effect from religious involvement to sexual activity via autonomous motivations to abstain from sex ($\beta_{\text{indirect}} = -.23$, $p < .001$). On the other hand, since controlled abstinence motivation was not significantly predictive of behavior, there was not a significant indirect effect through that mediator.

The alcohol partial mediation model fit the data well, $\chi^2(50) = 83.48$, $p = .002$, CFI = .99, RMSEA = .03, as did the full mediation model, $\chi^2(51) = 84.47$, $p < .001$, CFI = .99, RMSEA = .03. The full model was retained, as it did not fit significantly worse than the partial mediation model (based on a chi-square difference test) but was more parsimonious. Religious involvement predicted more autonomous ($\beta = .35$, $p < .001$) and controlled ($\beta = .23$, $p < .001$) alcohol abstinence motivations. In turn, autonomous

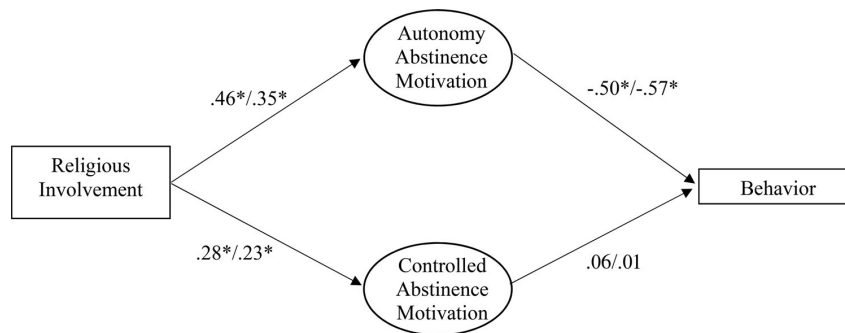


Figure 1. Mediation models of abstinence motivations mediating religious involvement on behavior.

Note. $N = 799$; $*p < .05$. These coefficients are from the full mediation models for sex and alcohol. Coefficients from the sex model appear before the slash, while those from the alcohol model appear after the slash.

motivation predicted less alcohol use ($\beta = -.57$, $p < .001$). In short, as hypothesized, there was a significant indirect effect from religious involvement to alcohol use via autonomous motivations to abstain from alcohol ($\beta_{\text{indirect}} = -.20$, $p < .001$). On the other hand, since controlled abstinence motivation was not significantly predictive of behavior, there was not a significant indirect effect through that mediator.

Discussion

The purposes of the present study were to develop measures of adolescent motivations to abstain from sex and alcohol using a self-determination theory framework, evaluate the role of abstinence motivations in protecting against engagement in sex and alcohol use, and assess abstinence motivations as a mediator linking religious involvement to abstinence from sex and alcohol use. We succeeded in developing a theory-based, psychometrically sound, and valid measure of abstinence motivation that can be applied to adolescent motivations to abstain from sex and alcohol, and perhaps other risk behaviors. The measure is a 10-item self-report measure that includes subscales for controlled and autonomous abstinence motivations (5 items each).

We created a theory-based measure of adolescent motivations to abstain from sex and alcohol, based on self-determination theory. While some prior studies have examined abstinence motivation, they generally have done so in a descriptive manner by identifying a variety of motivations for abstinence (Anderson et al., 2013; Blinn-Pike, 2004; Patrick et al., 2010, 2011; Stritzke & Butt, 2001). The present study was the first study of abstinence motivation grounded in a theory of motivation: that of self-determination theory—one of the leading contemporary personality and

motivation theories (Ryan & Deci, 2017). Grounding the measure in this theory allowed us not only to describe motivations for abstinence, but better understand the different types of motivation that influence abstaining behaviors.

The measure we developed captures controlled and autonomous forms of abstinence motivation. It is psychometrically sound and valid. Validity was provided by examining associations with a variety of other variables. Our controlled and autonomous abstinence motivations subscales correlated positively with controlled and autonomous subscales from three other self-determination theory measures, including religious motivation (Hardy et al., *in press*), academic motivation (Ryan & Connell, 1989), and global motivation (Pelletier et al., 2004). Further, our research demonstrated that controlled abstinence motivation was more strongly associated with the controlled subscales of these other measures, and that autonomous abstinence motivation was more strongly associated with the autonomous subscales. Additionally, controlled and autonomous abstinence motivations correlated positively with religious involvement, negatively with liberal attitudes about sex and alcohol, and negatively with sex and alcohol behavior. These associations were stronger for autonomous than controlled abstinence motivation.

Further evidence for the distinct nature of controlled and autonomous abstinence motivations comes from the structural equation models specifying both as the predictors of sex and alcohol behaviors. In line with prior research (Hardy et al., 2015), when pitted against each other, higher autonomous abstinence motivation predicted less sexual activity and alcohol use, while controlled motivation was not significantly related. Moreover, each behavior-specific autonomous motivation (sex or alcohol) only predicted that

behavior, not the other. Thus, in line with prior self-determination research (Ryan & Deci, 2017), in the domain of risk behavior abstinence, motivation is behavior specific. Accordingly, autonomous motivation is more powerful and adaptive than controlled motivation. Future research might evaluate whether controlled motivations can be transformed into autonomous motivations over time. Further, future studies might unpack the mechanism behind the behavioral specificity of motivation, which could guide efforts to more effectively and efficiently motivate specific behaviors.

We also tested a mediation model because religious involvement was positively associated with controlled and autonomous abstinence motivations, and the two types of motivation were bivariately associated with behavior. Through the mediation model, we identified that autonomous abstinence motivation (but not controlled abstinence motivation) mediated relations between religious involvement and behavior. Essentially, more religious youth are more autonomously motivated to abstain from sex and alcohol and are less likely to be involved in those behaviors. This pattern provides evidence for one previously unexamined mechanism underlying protective effects of religion (for a review of prior work on religious involvement as a mediator, see (Hardy, Nelson, et al., *in press*; Pearce et al., 2019). The research suggests that religious communities, in general, are fostering autonomous abstinence motivations, not just controlled abstinence motivations. Future research might examine ways religious communities can increasingly focus on fostering autonomous abstinence motivations and diminish emphasis on controlled abstinence motivations.

Implications

This study has important implications for theory, research, and practice. In terms of implications for theory, this study provided further evidence for the utility of applying self-determination theory to the understanding of nonparticipation motivation. Most prior self-determination theory research has focused on motivations to participate in behaviors (e.g., school, work, exercise, sports, music, and therapy (Ryan & Deci, 2017), rather than abstain from participating in certain behaviors. Yet the present study is part of a growing body of work demonstrating that the theory can be applied equally well to the study of nonparticipation motivation (e.g., Aelterman et al., 2016, 2019; Hardy et al., 2015; Moore & Hardy, 2020).

This broadens the scope and applicability of the theory.

In terms of implications for research, we developed a psychometrically sound, valid, theory-based measure for adolescent abstinence motivations. The measure captures controlled and autonomous forms of abstinence motivation, allowing researchers to differentiate abstinence motivation based on the degree of internalization. The measure also includes standard items across the behavior domains of sex and alcohol, opening the possibility that this measure could be used to research additional risk behaviors (although this will need to be established in future research). We hope this measure spurs further research to understand factors that might promote or hinder adolescents' motivations to abstain from risk behaviors.

In terms of implications for practice, these findings may provide useful insights to parents, educators, religious leaders, youth workers, program developers, and policy makers regarding factors that effectively motivate abstinence from risk behaviors such as sex and alcohol. In particular, people working with adolescents may benefit from understanding the difference between controlled and autonomous abstinence motivations, and the factors that promote each. Autonomous motivation (i.e., youth abstaining because they want to) is promoted when developmental contexts satisfy adolescents' needs for autonomy, competence, and relatedness (Ryan & Deci, 2017). Effective developmental contexts tend to be authoritative (e.g., authoritative parenting), characterized by warmth, structure, and support for autonomy (Hardy et al., 2008). On the other hand, youth are more likely to have controlled motivation (i.e., abstaining because they feel compelled to) in authoritarian developmental contexts (e.g., authoritarian parenting), which rely on contingent punishments and rewards, or induction of shame or fear. Although it may seem like either way parents and leaders are motivating abstinence, the present study results, as well as prior research in other domains, consistently demonstrates that controlled motivation is inert at best, and maladaptive at worst. Thus, parents and leaders should focus on nurturing autonomous abstinence motivations. This can be done several ways (for more discussion of strategies, see Ryan & Deci, 2017), such as by giving them choices (e.g., regarding what behaviors are acceptable), providing rationale (e.g., for why it might be a good idea to abstain from sex and alcohol during adolescence), and showing empathy (e.g., for how difficult it is to maintain abstinence from risk behaviors).

Limitations

This study has a few noteworthy limitations. First, the data were cross-sectional and correlational, limiting our ability to make causal inferences. Future studies should employ experimental or longitudinal designs to better establish temporal ordering and causality of links between abstinence motivations and risk behaviors. Second, the measure we developed is based upon self-reporting, which leaves it prone to social desirability bias. We tried to address the social desirability bias by selecting items less strongly correlated with social desirability and controlling for social desirability in many of the analyses. Future research might explore more implicit approaches to measuring abstinence motivations. Third, our measure was targeted at motivations to abstain from sex and alcohol. We selected a final item set that worked well for both behavior targets. While we hope it will also be applicable to other risk behaviors (e.g., marijuana use), that is left for future research. Fourth, if researchers want to assess abstinence motivations in multiple behavioral domains within the same study using the items we did, then they will need to consider possible shared method variance. However, we reran all our models that involved both behavioral domains, adding correlated measurement errors for each item across behavioral domains, with similar results and only a few coefficients differing by a hundredth of a point. Fifth, our measure was largely but not completely invariant across gender. Thus, analyses of gender differences using this measure should be done cautiously. Sixth, the two risk behaviors (sex and alcohol) were each assessed using a single item regarding self-reported frequency of engaging in those behaviors. This is a common strategy (e.g., Smith & Denton, 2005), but limits the scope of interpretations, so future research is needed with more sophisticated risk behavior assessment.

Conclusions

The purposes of the present study were to develop measures of adolescent motivations to abstain from sex and alcohol using a self-determination theory framework, evaluate the role of abstinence motivations in protecting against engagement in sex and alcohol use, and assess abstinence motivations as a mediator linking religious involvement to abstinence from sex and alcohol use. We developed a psychometrically sound and valid measure of adolescent motivations to abstain from sex and alcohol. We found that, while both controlled and autonomous abstinence motivations were related to less sexual activity and alcohol

use, autonomous abstinence motivation was more powerful in predicting these behaviors. Finally, autonomous abstinence motivations mediated relations between religious involvement and sex and alcohol behaviors. We hope this study points the way toward greater understanding of and further research into adolescents' motivations to abstain from risk behaviors.

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Appendix A

Abstinence motivation scale

Instructions: Below is a list of reasons why some people would abstain from [sex/alcohol] (in other words, reasons

why people would not [have sexual intercourse/drink alcohol]). 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/DRINK ALCOHOL].

- 1 = Not at all a reason for me
- 2 = Slightly a reason for me
- 3 = Somewhat a reason for me
- 4 = Very much a reason for me
- 5 = Totally a reason for me

1. Because my parents would disapprove of me [having sex/drinking alcohol].
2. Because my parents say I should stay away from [sex/alcohol].
3. Because my parents expect me to stay away from [sex/alcohol].
4. Because my parents might think I am a bad person if I [have sex/drink alcohol].
5. Because my parents will approve of me if I stay away from [sex/alcohol].
6. Because [being sexually abstinent/abstaining from alcohol] will help me become the person I want to be.
7. Because I believe it is important to be [sexually abstinent/abstain from alcohol].
8. Because I personally value the benefits of staying away from [sex/alcohol].
9. Because [being sexually abstinent/abstaining from alcohol] is an important part of who I am.
10. Because [being sexually abstinent/abstaining from alcohol] allows me to live true to my core values.

Note: If you want to measure motivations to abstain from sex, use all the bracketed statements related to sex (in instructions and items); if you want to measure motivations to abstain from alcohol, use all the bracketed statements related to alcohol.

Scoring the adolescents risky behavior abstinence motivations scale

Controlled Motivations: Mean of items 1,2,3,4,5.

Autonomous Motivation: Mean of items 6,7,8,9,10.