TOWARD THE DEVELOPMENT OF A NEW SCALE OF

ADOLESCENT SEXUAL RISK TAKING

by

DIANA L. YOUNG

(Under the Direction of Adam S. Goodie)

ABSTRACT

The present research aims to construct a realistic and valid scale of adolescent sexual risk taking. This scale is comprised of four subscales of risk taking relevant to the decision-making literature: perceived risks, expected benefits, history of engagement, and likelihood of engaging in the behavior in the future. In Study 1, undergraduate participants responded to 23 behavioral items specific to an adolescent population in this way. Exploratory factor analyses revealed an easily-interpretable factor structure across all subscales, and hypothesized relationships among the Risks, Benefits, History, and Likelihood subscales emerged. Study 2 results provided strong support for the proposed factor structures and directly tested competing structural models that predicted likelihood to engage in sexual risk. Results are discussed as they relate to adolescent risk taking from a decisional perspective.

INDEX WORDS: ADOLESCENCE, RISK TAKING, SEXUAL BEHAVIORS, BENEFITS, RISKS, LIKELIHOOD, HISTORY

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DIANA L. YOUNG

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DIANA L. YOUNG

Major Professor:		Adam S. Goodie
Committee:		Richard L. Marsh
		Robert P. Mahan

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
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DEDICATION

I would like to dedicate this manuscript to my family, who has been a constant source of support and encouragement throughout my entire education. Without my favorite cheerleaders, I don't know how I would have remained sane during the past 5 years.

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INTRODUCTION

Toward the development of a new scale of adolescent sexual risk taking

Over the past few decades, adolescent researchers and health experts have had a vested interest in understanding and improving adolescent well-being. A large proportion of this research is aimed at suppressing potentially dangerous aspects of adolescent sexual risk taking. Recent media coverage has shed light on new adolescent activities that, some say, lead young adults to engage in sexually promiscuous behavior. The discourse on adolescent sexual risk taking has evolved into a question of how to prevent increases in teenage pregnancy and STI transmission, but the manner in which sexual risk taking has been studied is greatly non-preventative in a literal sense. As intervention efforts have had an emphasis on oral and vaginal sex (e.g., Remez, 2000; Halpern-Felsher, Cornell, Kropp, & Tschann, 2005; Cornell & Halpern-Felsher, 2006; Brady & Halpern-Felsher, 2007), little preventative education exists regarding precursor sexual behaviors that are commonly experienced before sexual intercourse or oral sex. The present research aims to examine adolescent sexual risk taking through the development of a new and valid scale that examines aspects of risk thought to drive risk taking behavior: perceptions of risks and benefits, and history of engagement in risky sexual behaviors.

Statistics of adolescent (high-school age) sexual behavior

Adolescents are at high risk for adverse consequences related to unsafe sexual activity, including the transmission of sexually-transmitted infections and pregnancy. Recent research has found that almost 50% of high school students have had sexual intercourse (Kahn, Kinchen,

Williams, Ross, Lowry, Hill et al., 1998); more striking is the finding that approximately 1 in 6 high school students have had 4 or more sexual partners by the time they graduate (Grunbaum, Kann, Kinchen et al., 2003). These statistics have grown as of late; the proportion of sexually active adolescents has risen over the past few decades, while the average age of first engagement in sexual intercourse has dropped (Sawyer & Smith, 1996). Survey data from the 1980s and 1990s reported that 21% of adolescent males engage in sexual intercourse by the age of 15 (Ku, Sonenstein, & Pleck, 1993).

These findings are coupled with more recent research that suggests an alarming proportion of sexually-active teens who compound risky sexual behavior with other risky behaviors such as drug or alcohol use (Kahn et al., 1998; Duncan, Strycker, & Duncan, 1999). Adolescent sexual risk taking is also negatively related to the use of protective measures such as condoms (DiClemente, Durbin, Siegel, Krasnovsky, Lazarus, & Comacho, 1992). Furthermore, as adolescents mature, their risk taking behaviors increase, as evidenced by increases in sexual activity and decreases in condom use.

Potential influences of adolescent risk taking

It is a commonly accepted assumption that adolescents are more likely to accept risks than adults (Arnett, 1992). There is a growing body of work that proposes that naturalistic risky decision making involving high emotional intensity may drive the observed increase in risk taking (Cuaffman & Steinberg, 2000; Steinberg, 2004). Further, researchers have posited a psychosocial aspect of adolescent risk taking; peer influence has been known to greatly influence adolescent propensity to participate in risky behaviors (Gardner & Steinberg, 2005; Steinberg, 2005). The relationship between social pressure on risky behavior is particularly pervasive with respect to adolescent sexual risk taking (Cerwonka, Isbell, & Hansen, 2000).

Neurological evidence supports the notion that adolescent risk taking differs from adult decision making; adolescence has been found to be a period of profound neocortex maturation, during which an individual's risk taking competence may not be fully developed even though emotionality centers of the brain are (Drevets & Raichle, 1998). Moreover, the neural mechanisms that underlie the processing of emotional information overlap greatly with those related to reward magnitude (Nelson, Leibenluft, McClure, & Pine, 2005; Steinberg, 2007).

However, findings from the decision literature regarding adolescent risk taking vary. Some suggest that teens' aptitudes for reasoning through risky decisions do not differ drastically from those of adults (Fischhoff, 1992; Furby & Beyth-Marom, 1992). Most research of this type finds that adolescent abilities to evaluate the magnitudes of risks and benefits associated with dangerous risks closely resembles that of adults (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993).

Decision research perspectives on sexual risk taking

Risk taking is domain-specific. Although many conceptions of risk taking exist in the decision literature, most conceive of a person's willingness to accept risk as a combination of two elements: perceptions of the potential risks inherent in the risky behavior and perceptions of the expected benefits associated with a positive outcome (MacCrimmon & Wehrung, 1988; Sitkin & Pablo, 1992; Slovic & Weber, 2002). Research over the past few decades has largely argued for a domain specific approach to examining risk, as perceptions of risks and benefits associated with risk may differ depending on the type of risk (e.g., monetary, social, sexual, or recreational; Hovarth & Zuckerman, 1993; Blais & Weber, 2001; Weber, Blais, & Betz, 2002; Kruger, Wang, & Wilke, 2007). An individual's willingness to engage in risk, then, is partly a function of both how risky he/she perceives the behavior to be and how beneficial the behavior is

expected to be. Perceptions of the risks and benefits are subjective in nature (Slovic & Weber, 2002), leading to individual differences in the perceptions of the risks and benefits associated with risks. Whereas attempts have been made to specify broad domains of risk, those created from a decision making perspective have not attempted to assess sexual risk taking outside of a singular behavior – sexual intercourse.

Perceived benefits of sexual risk taking. Adolescent perceptions of the positive outcomes, or benefits, of unprotected sex have been found to be better predictors of sexual risk-taking than perceived costs (Siegel, Cousins, Rubovits, Parsons, Lavery, & Crowley, 1994; Parsons, Siegel, & Cousins, 1997). These researchers suggested that perceived benefits may be weighted more heavily than perceived costs in adolescent decisions about unsafe sex.

Parsons, Halkitis, Bimbi, and Borkowski (2000) and others (Lavery, Siegel, Cousins, & Rubovits, 1993; Siegel et al., 1994; Moore & Gullone, 1996; Parsons et al., 1997) found that college students' sexual risk behaviors were primarily driven by their perceptions of the benefits associated with unprotected sex. Parsons and colleagues found that, for three distinct measures of sexual risk behavior, perceptions of the positive outcomes associated with sexual intercourse were predictive of likelihood to engage in sex. On the other hand, the perceived costs associated with sex were unrelated to sexual risk behaviors.

A limited number of studies examined adolescents' engagement in oral sex. This research found that adolescents' perceptions of the benefits associated with oral sex were highly favorable, especially in comparison with vaginal sex. In response to open-ended questions about why teenagers choose to have oral sex, one-fourth of ninth-grade participants listed expected pleasure, improvement in one's relationship, and popularity as expected benefits (Cornell & Halpern-Felsher, 2006).

Perceived risk of sexual risk taking. In general, risk perception is negatively correlated with risk-taking behavior; the higher the perceived risk of a behavior, the lower the likelihood that an individual will engage in the risky behavior (Reyna & Farley, 2006; Mills, Reyna, & Estrada, 2008). Many theoretical models of health and behavior, including the Health Belief Model (Rosenstock, 1974), Social Cognitive Theory (Bandura, 1994), and the Theory of Planned Behavior (Ajzen, 1985), view risk judgments as an essential element in making decisions related to well-being. This would suggest that, in the case of sexual risk taking, teens' fear of the potential negative consequences may be a large negative predictor of their likelihood to engage in the behavior. However, empirical evidence rarely implicates risk perceptions as strong negative predictors of adolescent risk taking. Some has even found opposing results, positing a positive correlation between risk perception and willingness to take risks (e.g., Johnson, McCaul, & Klein, 2002).

Adolescents are generally viewed as being unable to judge the risks associated with a given risky behavior appropriately, leading the public to assume that teens see themselves as being invulnerable to harm or negative consequences. In the specific case of oral sex, adolescent participants have expected that oral sex will result in fewer physical health risks (e.g., pregnancy or STI) and social or emotional risks (e.g., relationship becoming worse, gaining a bad reputation, or feeling guilty) than vaginal sex (Halpern-Felsher, Cornell, Kropp, & Tschann, 2005; Remez, 2000). Halpern-Felsher and colleagues also found that a surprisingly high number of students estimated that the probability of contracting STIs from oral sex was nonexistent. Participants also believed that they would have significantly fewer negative social and emotional risks with oral sex than with vaginal sex. However, these results have not always been found empirically. Adolescent participants in some lab studies have been found to overestimate their

own odds of a multitude of adverse events as a function of risky sexual behavior, including unintended pregnancy and acquiring a sexually-transmitted disease (Fischhoff, Parker, Bruine de Bruin, Downs, Palmgren, Dawes, & Manski, 2000).

One common trend in the adolescent risk literature suggests that, although perceived benefits appear to play a major role in predicting future engagement in risky sexual behaviors, perceived risks are not significantly predictive of sexual risk taking (Parsons, Halkitis, Bimbi, & Borkowski, 2000). One aspect of adolescent sexual decision making that does seem to be associated with perceived risks, however, is health-seeking behavior – albeit in the opposite direction than generally expected (Barth, Cook, Downs, Switzer, & Fischhoff, 2002). Social stigmas and other negative consequences were found to be large negative predictors of college students' willingness to get screened for sexually-transmitted infections.

History of engaging in risky sexual behavior. In Sitkin and Pablo's (1992) theory of risk propensity, past engagement in risk taking is viewed as a major predictor of future risk acceptance. This finding is prevalent in adolescent populations as well as adult populations. Adolescents who have previously engaged in various risk taking behaviors perceive the risks associated with these behaviors as smaller, better known, and more controllable than adolescents who are naïve to those behaviors (Benthin, Slovic, & Severson, 1993).

Some research has led to the suggestion that history of engaging in a risky behavior in the absence of adverse negative consequences may moderate the relationship between perceived risks and likelihood of engaging in the same behavior in the near future. This relationship has been found indirectly with samples of smokers and nonsmokers; regular smokers perceive the general risks associated with smoking as lower than individuals who do not smoke (Halpern-Felsher, Millstein, Ellen, Adler, Tschann, & Biehl, 2001). Additionally, this finding was

supported among at-risk female adolescents regarding sexual risks. Downs and colleagues asked female adolescents about their sexual history and perception of risks associated with sexual activity (Downs, Bruine de Bruin, Murray, & Fischhoff, 2004). Individuals who have had one risky sexual experience and did not receive negative outcomes (such as pregnancy) tend to perceive themselves as being less likely to receive negative consequences – leading to a decrease in the perception of risks associated with vaginal sex – which in turn leads to increased sexual activity.

Similarly, other research posits a moderating effect of risk taking history on the relationship between expected benefits and likelihood to engage in risk in the future. Goldberg and colleagues found that the relationship between expected benefits associated with drinking and an adolescent's likelihood to drink in the near future changes dramatically once an individual drinks even once (Goldberg, Halpern-Felsher, & Millstein, 2001). Goldberg and colleagues posited an "adjustment" theory to explain their findings; once adolescents engage in a risky activity, they adjust their perceptions of the activity based on both their positive experiences, or benefits, and the lack of any negative consequences that followed the activity. Results from a study investigating the risks and benefits associated with smoking corroborate this adjustment theory (Urberg & Robbins, 1981).

The Present Research

Research that investigates adolescent sexual risk taking generally focuses on one main risky sexual behavior: vaginal sex. The present research aimed to develop a scale of adolescent sexual risk taking that directly taps into behaviors that would be considered precursors to sexual intercourse. Some of these behaviors include kissing, groping, going on a single date with someone, and participating in oral sex.

In two studies, The Adolescent Sexual Risk Taking Scale (ASRTS) was developed. The ASRTS taps into a variety of sexual behaviors that adolescents may consider risky. For each behavioral item, four independent components of risk are addressed: perceptions of the risks associated with the behavior, perceptions of the benefits associated with the behavior, history of engaging in the behavior, and likelihood of engaging in the behavior in the near future.

The aim of developing a new scale of adolescent sexual risk taking was twofold. First, data elicited with the original version of the ASRTS allowed for the identification of common factors among the behavioral items within each subscale, specifying commonalities in how adolescents regard specific sexual behaviors. This was evident after conducting exploratory factor analyses on data obtained in Study 1. Second, important relationships among the four subscales of the ASRTS were revealed, exposing basic components of risk that are especially predictive of future engagement in various types of sexual risk taking. This was evident after conducting confirmatory factor analyses and structural modeling of the relationships of subscales in Study 2.

Hypotheses. The first objective was to test relationships between items within each subscale. Each subscale of the original version of the ASRTS tapped into 23 distinct sexual behaviors that vary greatly in terms of objective levels of health risk. It was predicted that adolescents' perceptions of the risks and benefits associated with each of these behaviors would be perceived in a similar manner across groups of items, grouping behaviors according to how much risk or benefit the participants perceive in each item. Accordingly, it was hypothesized that:

H1a: Exploratory factor analyses would reveal a multidimensional structure among behaviors.

H1b: This multidimensional structure would be based on risk severity, with

precursor behaviors that rank low on the perceived risk subscale forming one

factor, and precursor behaviors that rank high on the perceived risk subscale

forming a second factor.

Another major goal of Study 1 was to examine the relationships between risk perception, benefit perception, sexual history, and likelihood of engaging in sexual behaviors. The decision literature regularly suggests that likelihood estimates are positively related to the expected benefits of and previous engagement in the risky activities, while at the same time negatively related to the perceived risks. Additionally, research in fields outside of judgment and decision making generally come to the conclusion that adolescent perceptions of the benefits associated with the sexual behaviors are the best predictors of sexual risk taking, as many adolescents have deflated perceptions of the risks associated with sexual behaviors. As such, the following predictions were made regarding the relationships among subscales:

H2a: Likelihood subscale scores would be positively related to those on the

History and Expected Benefits subscales.

H2b: Likelihood subscale scores would be negatively related to those on the

Perceived Risks subscale.

H2c: Expected Benefits would be the biggest predictor of Likelihood and History

scores.

Given that each subscale was expected to reveal multidimensionality among behavioral items, the degree of predictability from each subscale on Likelihood ratings may not be equal. Although the degree to which scores on the Risk, Benefits, and History subscales would predict Likelihood subscale scores remained unclear, it was hypothesized that:

H3a: Magnitudes of the relationships between subscale scores would differ based

on type of sexual behavior.

More specific hypotheses regarding the nature of the relationships among subscales would be

explored after initial analyses were conducted in Study 1. These predictions are described in

Study 2.

EXPERIMENT 1 – SCALE DEVELOPMENT

Method

Participants

Two-hundred and fifty undergraduate students (male = 52; mean age = 18.76)

participated in Study 1. Participants were recruited from the Research Pool of the Psychology

Department at the University of Georgia in exchange for partial introductory psychology course

credit. Experimenters studied up to three participants at a time at individual computer

workstations. All measures were presented using MediaLab v2008™ presentation software.

Measures

The study session consisted of a series of three computer-based measures that were

presented in the same order for all participants: a demographics questionnaire, the Adolescent

Sexual Risk Taking Scale, and a post-study questionnaire.

Demographics Questionnaire. Participants completed a short demographics questionnaire

that requested personal information pertaining to gender, age, race, and college grade level.

The Adolescent Sexual Risk Taking Scale. The original scale is shown in full in

Appendices A and B. The scale consisted of 23 distinct items pertaining to sexual behaviors.

Individual items in the scale were generated based on a deductive approach: adolescent mentors

and counselors were interviewed based on their first-hand knowledge of adolescent risky

behaviors. The experts – all based in the Athens-Clarke County area – provided anecdotal

evidence that was subsequently used to develop items. A sexual behavior was included in the

final pool of items if a minimum of three out of five experts independently generated that

behavior in their interview. Sample items include the following: 'kissing someone on the mouth,' 'being naked in front of someone you are interested in,' 'giving oral sex,' 'flirting with someone you are interested in,' and 'viewing internet pornography.' Refer to Appendix A for the complete list of behavioral items presented to participants in Study 1.

Each risky sexual behavior item was presented four times, once in reference to each of the four subscales: Likelihood of engaging in the behavior in the near future, Perceived Risks associated with the behavior, Expected Benefits associated with the behavior, and History of engagement in the behavior. These subscales were identified based on a recent review of domain-specific risk taking scales (Young, in progress); well-validated scales of risk taking commonly incorporate some combination of these four components of risk. Instructions for each subscale followed a similar formula (e.g., for the Expected Benefits subscale, '... please indicate how beneficial you perceive each activity/behavior to be'). Each item for the Likelihood, Perceived Risks, and Expected Benefits subscales was answered using a 7-point Likert scale ranging from 1 ('Not at all…') to 7 ('Extremely…'), while items in the History subscale were answered using 'Yes' or 'No' binary response options. Items were presented one at a time. Please refer to Appendix B for instructions and rating scales for the four subscales.

Post-study questionnaire. This post-study questionnaire consisted of three open-ended questions. First, participants were asked to list the types of risks that they considered when making perceived riskiness ratings. The same question was asked regarding types of benefits that were considered during the Expected Benefits subscale. Finally, participants were given the opportunity to name specific sexual behaviors that were not included as items but that they had expected to see in the questionnaire. This post-study questionnaire can be found in Appendix C.

Procedure

After completing basic demographic questionnaires, participants in Study 1 responded to all items of the ASRTS in one sitting, one subscale presented after another. The 23 behavioral items were randomized within each subscale, and each subscale was presented randomly within the ASRTS. Participants finished the study session by completing the Post-Study Questionnaire.

Results

Exploratory factor analyses, reliabilities, and correlational analyses were conducted on the data from Study 1 to elicit latent constructs among the behavioral items and examine preliminary relationships among subscales.

Exploratory factor analyses

Separate exploratory factor analyses (EFAs) were conducted on each subscale of the ASRTS using SPSS statistical software. I used maximum likelihood analysis with varimax rotation to assess convergence within each factor of the subscale as well as divergence between factors. EFA with maximum likelihood estimation is considered a more appropriate form of analysis than principal components analysis when the primary objective of the study is to identify latent constructs for future confirmatory factor analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999). For this data, three latent factors were extracted across all four subscales, each of which produced eigenvalues above 1.0; additionally, all extracted factors passed a scree test. Based on a subjective cutoff of the number of factors that appeared to sufficiently explain each subscale, I then conducted a second set of EFAs that forced the extraction of the three strongest factors. Each factor structure accounted for 40-50% of the total variance of the given subscale. Table 1 presents the factor structures for the four subscales when three factors were directly extracted.

I used a two-stage approach to categorize items to factors (Nunnally, 1978). First, I examined the strength of factor loadings for each item. A conservative factor loading minimum of .50 was used on each EFA to ensure that a given item clearly represented the latent construct underlying each factor. Second, factor loadings were compared across subscales; if an item did not sufficiently load onto any factors on more than one subscale, it was deleted from all final subscales. This process led to the removal of 5 items from further analysis (items 19-23).

Analyses revealed that all four subscales were comprised of identical factor structures; the same clusters of items loaded onto the same factor in similar magnitudes across all subscales. As such, items 1-8 loaded on the first factor for each subscale, items 9-15 loaded on the second factor, and items 16-18 loaded on the third factor. Further inspection of the relationships among items in these extracted factors indicates easily-interpretable latent constructs. Items 1-8 share the common trait of being advanced sexual behaviors that have a relatively large potential to lead to sexual intercourse (such as participating in oral sex or being naked in front of someone else). Items 9-15 can be considered tamer, naïve sexual behaviors that may not directly lead to sex (e.g., going on a single date with someone or kissing someone on the cheek). Finally, items 16-18 represent self-initiated sexual behaviors that do not necessarily require having a sexual partner (viewing pornographic materials and masturbation). This interpretation was appealing for the given context and lent itself well to further inspection in Study 2. Figure 1 presents the finalized factor structure of behavioral items onto the three latent constructs: Advanced sexual behaviors, Naïve sexual behaviors, and Self-initiated sexual behaviors.

To determine whether an alternative factor structure better explains the data, I also conducted a single maximum likelihood analysis with varimax rotation on all 92 items on the ASRTS. This single EFA yielded a factor structure that was neither parsimonious (20 distinct

factors with eigenvalues greater than 1.0) nor easy to interpret (no comprehensible latent constructs could be found among the factors). Therefore, the parsimonious 3-factor structure was preserved for reliability and correlational analyses in Study 1.

Reliability analysis and inter-item correlations

Separate values of coefficient alpha and mean inter-item correlations for the Likelihood, History, Expected Benefits, and Risk Perception subscales were examined to assess degree of relatedness among items that loaded onto the same factors. Alpha values across subscales and factors suggest adequate reliability, with no alpha value below .70 and most values ranging between .80 and .90. Additionally, inter-item correlations within all subscale factors were moderate, supporting the notion that items within each factor are highly related. Coefficient alpha values and inter-item correlations within subscale factors are presented in Table 2.

Factor and subscale correlations

To assess relationships among factors for each subscale, scores for each factor were obtained as the average score on the items that sufficiently loaded onto a given subscale. Correlations across participants of factors among the four subscales are reported in Table 3a, with an average correlation among factors of .45. Correlations of subscales among the three factors are reported in Table 3b, which indicate similar trends in subscale relationships across the three behavioral factors.

Discussion

Results from factor analyses suggest a common multidimensional factor structure for all four risk subscales. Further, the same sets of behavioral items load onto the same latent factors for each subscale. These factor structures are readily interpretable and suggest latent constructs are organized based on two behavioral characteristics: severity of the risky behavior and degree

of interpersonal involvement. These aspects lead to three distinct latent constructs, which are specified as Naïve, Advanced, and Self-initiated sexual behaviors. Therefore, Study 1 provided strong initial support for H1a (exploratory factor analyses would reveal a multidimensional structure among behaviors) and H1b (the factor structure would be based on risk severity, with precursor behaviors that rank low on the perceived risk subscale forming one factor, and precursor behaviors that rank high on the perceived risk subscale forming a second factor).

Furthermore, subscale relationships that were theorized based on previous findings in the JDM and adolescent literatures were also supported, with strong positive relationships among perceived benefits, history, and likelihood subscale scores and negative relationships between perceived risk scores and all other subscale scores. These findings provide support for H2a (Likelihood subscale scores would be positively related to those on the History and Expected Benefits subscales) and H2b (Likelihood subscale scores would be negatively related to those on the Perceived Risks subscale). Moreover, the bi-serial correlations from Table 3b suggest that the expected benefits of risky sexual behaviors are the largest predictors for likelihood of engagement in those behaviors in the near future (H2c).

EXPERIMENT 2 – SCALE VALIDATION

As such strong factor structures emerged in Study 1, Study 2 was conducted to validate the factor structures for a revised, 18-item ASRTS with a new undergraduate sample. A second goal of Study 2 was to directly test the efficacy of competing structural models that interconnect the four subscales of the ASRTS.

Based on past research, three possible relationships may best explain future likelihood to engage in risky sexual behaviors. As a majority of empirical work in adolescent risk taking suggests, expected benefits, perceived risks, and history of engagement in the risky activity may directly predict future likelihood to engage in that type of sexual behavior. Specifically, expected benefits and history of engagement would be strong positive predictors of likelihood, while perceived risks would be a very low negative predictor. In a structural model that depicts these relationships, the Likelihood factor would act as the criterion variable upon which the remaining three factors would act at predictors.

Alternatively, Urberg and Robbins (1981) and Goldberg et al. (2001) suggest that sexual history may also moderate the relationship between expected benefits and likelihood to engage in that behavior in the near future. The second model tested this interaction between History and Benefits to explain additional variance in Likelihood scores.

Finally, there may be a moderating effect of history of engagement in risk on the relationship between perceived risks and future likelihood to engage in that risky activity, as suggested independently by Halpern-Felsher and colleagues (2001) and Downs et al. (2004). The third potential model, therefore, keeps the three direct effects of Risks, Benefits, and History on

Likelihood, but includes an additional link between Likelihood and a History-by-Risks interaction.

Individual confirmatory factor analyses were first conducted on all four subscales individually to validate the common factor structures found in Study 1. Second, three competing structural models were tested on each of the three behavioral factors: Advanced, Naïve, and Self-initiated sexual behaviors. Based on the aforementioned proposed structural models developed from findings of past research, the following three hypotheses were pitted against one another for each of the three types of risky sexual behaviors:

H4a: Perceived Risks, Expected Benefits, and History directly predict Likelihood

(No Moderation model).

H4b: Perceived Risks, Expected Benefits, and History directly predict Likelihood,

and a History-by-Benefits interaction explains additional unique variance in

Likelihood scores (History-by-Benefits interaction model).

H4c: Perceived Risks, Expected Benefits, and History will directly predict

Likelihood, and a History-by-Risks interaction explains additional unique

variance in Likelihood scores (History-by-Risks interaction model).

Method

Participants

Two-hundred and fifty-nine undergraduate participants (male = 102; mean age = 19.39) were recruited for Study 2 from the same population as Study 1. Participants were recruited from the Research Pool of the Psychology Department at the University of Georgia in exchange for partial introductory psychology course credit. Experimenters ran up to three participants at a time at individual computer workstations using MediaLab v2008^{TM} presentation software.

Procedure

After completing the basic demographic questionnaire, participants in Study 2 responded to the revised version of the ASRTS in one sitting, with one subscale presented after another. The 18 subscale items were randomized within each subscale, and each subscale was presented randomly within the ASRTS. Participants finished the study session by completing the same post-study questionnaire as in Study 1.

Results and Discussion

Table 4 shows correlations among subscale item scores for all four subscales. From Table 1 it is apparent that the overall interitem correlations among items that were found to load onto the same factor in Study 1 were still high; for the Likelihood subscale, the average interitem correlation for factor-linked items (mean $r = .545$) was substantially higher than that for Likelihood items in different factors (mean $r = .269$). The same trends were found for the mean interitem correlations in the History (.539 versus .247), Perceived Risks (.500 versus .293), and Expected Benefits (.532 versus .225) subscales. Viewed from a traditional perspective (Campbell & Fiske, 1959), the relationships found through these correlations provide evidence of both convergent validity and discriminant validity across all subscales.

Confirmatory factor analyses

Data from all four subscales of the ASRTS in Study 2 were subjected to confirmatory factor analyses (CFAs) using LISREL8.54 statistical software (Jöreskog & Sörbom, 1993). I first fit a model to the Likelihood subscale data based on the factor structure found in the Study 1 EFAs, with items 1-8 directly loaded onto the first factor, items 7-15 loaded onto a second factor, and items 16-18 loaded onto a third factor. I also fit an alternative single-factor model to the ASRTS Likelihood subscale data to compare goodness-of-fit. As is shown in Table 5a, the 1-

factor model resulted in a proper solution but a significantly worse fit to the data than did the 3-factor model ($\Delta\chi^2 = 560.37$, $p < .001$). Thus, results in Table 5a support the 3-factor structure of the Likelihood subscale data, and the same 3-factor CFA was tested on the remaining subscales to determine goodness-of-fit.

Factor loadings for all four subscale CFAs were in the range of .50-.95, providing strong support for the factor structure found in Study 1. Factor loadings for all four CFAs can be found on Table 6.

After validating the proposed factor structures found in Study 1, I sought to test theoretically-valid structural models that utilize the Benefits, Risks, and History constructs to predict Likelihood scores across all three sexual behavior types. Three competing theories of adolescent risk taking were directly tested: a direct effects model that incorporated no interaction, a model that includes a history-by-benefits interaction to predict likelihood to engage in risk in the future, and a model that includes a history-by-risks interaction to predict likelihood. These moderating relationships can be tested in the form of latent interactions using a two-step approach suggested by Ping (1996); here, measurement parameters for latent indicators and errors are first estimated in a measurement model, and then those resulting estimates are used to calculate the indicator loadings and error variances for the interaction.

Measurement models

All models in this study can be conceptualized as including endogenous (Likelihood) and exogenous (Benefits, Risks, History, History-by-Benefits, and History-by-Risks) latent constructs. For simplicity, however, the measurement model was created in LISREL as an all-Y model. Diagonal elements of the theta-epsilon matrix were constrained to be the unreliability values found from each model's confirmatory factor analyses. Also, all off-diagonal elements of

the theta-epsilon matrix of errors of measurement were fixed to 0, which is consistent with the belief that the disturbance terms are uncorrelated. Finally, as product terms are required for the calculation of latent interactions, item scores were mean-centered prior to model fitting.

Structural models

    Self-initiated behaviors. The first Self-initiated sexual behaviors structural model that was tested proposes that three exogenous constructs (Benefits, Risks, and History) have a direct effect upon the endogenous construct (Likelihood). The structural component of this model was specified as follows: for the beta (BE) matrix, the three paths from Benefits, Risks, and History to Likelihood were specified as free to be estimated. As this was tested as an all-Y model, no gamma (GA) matrix was specified. The diagonal elements of the psi (PS) matrix were specified as free to be estimated. The off-diagonal elements of the psi matrix that related exogenous constructs to each other were also specified as free to be estimated, allowing for correlated structural disturbances. All other elements in the structural model matrices were set to 0.

    The second structural model tested for Self-initiated sexual behaviors proposes that History moderates the relationship between Expected Benefits and Likelihood. Here, a subset of product term covariance values were incorporated into the model to account for the differential relationship between sexual history and perceived benefits and the resulting change in the model's ability to predict likelihood to engage in the behaviors in the future. Only 3 of the 9 possible product term indicators were included in the latent interaction models, as it has been found that the inclusion of many indicators places unnecessary demands on the data regarding the stability of the sample covariance matrix (Jaccard & Wan, 1992). For the current model, 15 manifest indicators were taken into account, which included the 12 items utilized in the previous model and 3 new History-by-Benefits product term indicators.

The third structural model proposes that History moderates the relationship between Perceived Risks and Likelihood. This latent interactions model was tested in the same manner as the second model, again incorporating 15 variables, in which 3 are History-by-Risks product term indicators.

Table 7a shows that, out of the three tested models for Self-initiated sexual behaviors, the No Moderation model provided the best relative fit to the data. For both the History-by-Benefits and History-by-Risks models, the latent interaction was not significant ($\beta = .15$ and .10, respectively; p > .05). The resulting path model for the No Moderation model can be seen in Figure 2. Following standard convention in the path analysis literature, ovals in the path models represent latent variables, squares represent observed variables, and single-headed arrows represent direct effects.

The largest predictor of Likelihood in the Self-initiated behaviors' No Moderation model was risk taking history ($\beta = .79$), followed by expected benefits in the sexual behavior ($\beta = .27$), then perceived risks ($\beta = .01$). Only the History and Expected Benefits pathways were statistically significant. The resulting model therefore suggests that, while history of engagement in those behaviors greatly influences future engagement in those behaviors, the risks associated with self-initiated sexual behaviors are not taken into account when an adolescent decides whether to engage in those activities.

Advanced and Naïve behaviors. As the two remaining behavioral factors (Advanced and Naïve sexual behaviors) each incorporate many items, I created 3 item parcels per subscale for both factors to estimate appropriate structural models. Item parceling is a relatively new technique used in instances where the number of manifest indicators for a given structural model would otherwise be large. There are many advantages of using item parcels rather than

individual items as manifest indicators of the latent constructs; for example, the technique helps keep the sample-size-to-parameter ratio at a more appropriate level, as long as the items to be parceled are unidimensional in nature (Bandalos & Finney, 2001; Bentler & Chou, 1998; Russell, Kahn, Spoth, & Altmaier, 1998). In the present case, the inclusion of 8 unique behavioral items and four distinct subscales in the structural model for Advanced behaviors would lead to a covariance matrix incorporating 512 values, which would lead to biased estimates of structural parameters as well as poor-fitting solutions as determined by indices such as the root mean squared error of approximation (RMSEA), comparative fix index (CFI), the Tucker-Lewis Index (TLI; also known as the non-normed fit index), and a chi-square test. As this same issue would arise for both the Advanced and Naïve behavior factors, three item parcels per latent construct were formed for both sets of analyses. Items were randomly assigned to item parcels, whereby the items for each parcel were averaged together. For each latent construct, I set the path from the latent construct to one of the item parcel indicators equal to 1.0 to scale the latent variable (Bollen, 1989). Additionally, uniquenesses were computed from parcel reliabilities and included in the models to account for unreliability in the parcels as a function of measurement error.

For the Advanced sexual behaviors, I tested three structural models on the item parcel indicators, with three parcels representing each of the four subscales. Three structural models were tested for the Advanced behavior parcels: a No Moderation model, a model incorporating the History-by-Benefits interaction, and a model incorporating the History-by-Risks interaction. Table 7b reveals the goodness-of-fit indices for the three tested Advanced sexual behavior models. The No Moderation model fit the data well compared to the two interaction models as evidenced by statistically significant chi-square difference tests. The relationships between all

three exogenous factors and the endogenous Likelihood factor are statistically significant

(Expected Benefits β = .48; Perceived Risks β = -.15; History β = .42); the resulting no

moderation path model, with path estimates, can be seen in Figure 3.

For the Naïve sexual behaviors, I tested the same three structural models that were tested

in the Advanced and Self-Initiated models: a No Moderation model, a model incorporating a

History-by-Benefits interaction, and a model incorporating a History-by-Risks interaction.

As Table 7c shows, the No Moderation model fit the data poorly compared to both interaction

models as evidenced by negatively-valued chi-square differences with additional degrees of

freedom. Both interaction models have similar chi-square values and show similar improvement

in fit when compared to the No Moderation model. Out of the two interaction models, the model

that incorporated the History-by-Benefits interaction term yielded a significant interaction path

to Likelihood (β = .19), while the model incorporating the History-by-Risks interaction term did

not (β = -.01). However, to examine the possibility that a model incorporating both History

moderations may be the best model, I tested this as a fourth model. This dual-interaction

structural model fit quite poorly to the data as denoted by low goodness-of-fit indices, so the

History-by-Benefits interaction model was deemed the best-fitting model out of the four. The

resulting structural model for the History-by-Benefits interaction model led to the following path

estimates to predict the Likelihood construct (Expected Benefits β = .34; Perceived Risks β = -

.19; History β = .21; History-by-Benefits β = .19); this model can be seen in Figure 4.

GENERAL DISCUSSION

In two experiments I investigated the validity and efficacy of a new scale of adolescent sexual risk taking (the ASRTS) based on four components of risk; this scale addresses many sexual activities that adolescents may encounter prior to sexual intercourse. In Study 1, older adolescent participants stated the perceived risks and benefits associated with a large number of risky sexual activities; they also disclosed their own experience with the sexual activities and stated the likelihood of engaging in those activities in the near future. In Study 2, a new sample of older adolescent participants responded to a revised scale, which provided validation to the revised ASRTS. Additionally, multiple theorized models of adolescent sexual risk taking were pitted against one another using structural equation modeling techniques. Structural modeling results demonstrated differences in the degree to which adolescents use subjective estimates of expected benefits, perceived risks, and past sexual experiences to decide upon future engagement in sexual risks. These differences are a function of both the extremity of the sexual activity and the amount of interpersonal involvement inherent in the activity.

Common three-factor structure of sexual behaviors

One of the most striking findings from this research is the pervasive three-factor structure among risky behavior items that was initially found in the EFAs from Study 1 and validated in the CFAs from Study 2. First, this factor structure suggests that adolescents dichotomize risky sexual behaviors based on how extreme they view the behavior to be. As a result, adolescents lump together behaviors that exceed an extremity threshold when they assess the risks, benefits, and likelihood of engaging in those behaviors in the future. Second, sexual behaviors that are

viewed as strictly interpersonal are viewed similarly, while behaviors that can be experienced alone are viewed in a qualitatively different manner.

The assertion of a dichotomization of behavior extremity is supported by anecdotal evidence from the expert interviews. Many of the counselors and mentors who helped construct items for the ASRTS noted the "slippery slope" that teens struggle with when beginning a new relationship with someone they are interested in. In multiple interviews, the experts mentioned how, once past a certain point in a given sexual event (which many teens disclosed as being the point at which they had begun passionately kissing a sexual partner), the teens would note feeling as though they had only one more big decision to make: either move on to the next-extreme sexual activity, which may lead to sex, or to halt the progression of sexual risk-taking altogether.

Distinct structural models predict likelihood of engaging in sexual risks

This study also shows strong support for the conclusion that the cognitive mechanisms underlying risk taking across the three sexual behavior factors may, at least in part, lead to differences in one's willingness to engage in risk taking. The structural models for Self-initiated and Advanced behaviors are similar in that both incorporate solely the direct effects of Risks, Benefits, and History to predict Likelihood. Risks were found to negatively predict Likelihood, while Benefits and History both positively predict Likelihood. The directionality of these paths also aligns well with the background literature. However, close inspection of Figures 2 and 3 clearly show differences in the relative strength of these paths. For Advanced behaviors, an adolescent's likelihood of engaging in risk is mainly a function of the expected benefits of the activity and that adolescent's sexual history, while perceived risks play a smaller role. For Self-

initiated behaviors, on the other hand, risk taking history is significantly more predictive of future risk taking than are the expected benefits.

The best-fitting model for the Naïve behaviors, however, includes a History-by-Benefits latent interaction. This model uniquely conforms to the hypothesis drawn from studies by Urberg and Robbins (1981) and Goldberg et al. (2001). It is important to note, however, the significantly worse fit to the data that the No Moderation model had for Naïve sexual behaviors than it had for either the Self-initiated or Advanced behaviors. This may be attributable to one of a number of issues, including a lack of unidimensionality among Naïve item parcels. The poor fit may also suggest that there is a qualitative difference in the relationships among perceived risks, expected benefits, likelihood of engagement, and history of engagement in naïve sexual behaviors. Further research is needed to extricate this issue.

Limitations and future directions

While the results presented here provide strong evidence of the efficacy of this scale as it relates to adolescent sexual risk taking using an older adolescent sample (university undergraduates), the overall goal of this research is to make a scale that is applicable to all age ranges of adolescents. At present, it cannot be guaranteed that the estimated structural models found in Study 2 apply for younger adolescents. Changes in the structural models of adolescent sexual risk taking as a function of age may be attributable to a number of circumstances. For example, the types of health concerns younger adolescents have (Byler, Lewis, & Totman, 1969) differ greatly compared to older adolescents (Violato & Holden, 1988). These changes in health concerns over time may lead to differences in the way risks and benefits of sexual activity predict likelihood to engage in sexual risks, or in adolescents' awareness of the negative consequences (Lewis, 1981). Additionally, risk identification abilities may change across the

developmental lifespan (Lewis, 1981), although more recent research suggests that older adolescents may be no better than younger adolescents at identifying potential long-term consequences associated with risky activities (Halpern-Felsher & Cauffman, 2001). Future research aims to assess the validity of this scale for younger populations and examine differences in the structural models of sexual risk taking as a function of age.

Moreover, the post-study questionnaire was administered in both studies, but the resulting data was not directly incorporated in any analyses. The goal of administering the post-study questionnaire was to determine categories of risk and benefit factors that may be useful in the development of future adolescent sexual risk-taking research. Common risk themes that participants mentioned include health and social risks. Aside from the "it would feel good" benefit of engaging in some of the sexual activities, participants frequently noted an array of social and interpersonal benefits as well. A more elaborate scale of adolescent sexual risk taking would investigate the wide array of risk and benefit factors that adolescents use in their decision-making process.

CONCLUSIONS

The primary goal of the current research was to develop a valid and realistic scale of adolescent sexual risk taking and takes a judgment and decision making approach to examine potential explanations of risk-taking behavior. This approach, which utilized four components of risk taking, uncovered differential relationships among risk components as a function of sexual behavior type. The findings help elucidate the cognitive mechanisms by which adolescents decide whether to engage in risky sexual activities, and they further illuminate the need to examine sexual behaviors that are considered precursor sexual behaviors. Although the purpose of the present research was to validate the Adolescent Sexual Risk Taking Scale, the overall utility of this research is far from complete. Researchers who are interested in risk taking and adolescence will find utility in coupling the administrations of the ASRTS with a multitude of other tasks and measures to answer a number of questions important for both understanding adolescent risk taking and increasing overall well-being.

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APPENDIX A: ORIGINAL SCALE ITEMS

1. ____ Groping someone over their clothes, or letting someone grope you over your clothes.
2. ____ Fondling someone under their clothes, or letting someone fondle you under your clothes.
3. ____ Giving oral sex.
4. ____ Receiving oral sex.
5. ____ Being naked in front of someone you are interested in.
6. ____ Participating in vaginal sex.
7. ____ Participating in the act of inserting fingers into the vagina/anus.
8. ____ Engaging in non-penetrative sexual activities (also called "dry humping").
9. ____ Holding hands with someone you are interested in.
10. ____ Kissing someone on the cheek, or letting someone kiss you on the cheek.
11. ____ Kissing someone on the mouth.
12. ____ Passionately kissing someone.
13. ____ Spending time alone with someone you are interested in.
14. ____ Laying down or napping next to someone you are interested in.
15. ____ Going on a single date with someone you are interested in.
16. ____ Viewing internet pornography.
17. ____ Viewing pornographic magazines.
18. ____ Masturbating.
19. ____ Participating in anal sex. †
20. ____ Flirting with someone you are interested in. †
21. ____ Wearing revealing or provocative clothing. †
22. ____ Going on a group date with someone you are interested in. †
23. ____ Sexting (sending graphic text messages or pictures to someone else). †

Note: † This item was deleted from the final scale.

APPENDIX B

INSTRUCTIONS FOR EACH SUBSCALE

Likelihood to Engage in Risks

For each of the following statements, please indicate the likelihood that you would engage in the described activity/behavior if you were to find yourself in that situation. Provide a rating from *Extremely Unlikely* to *Extremely Likely*, using the following scale:

1	2	3	4	5	6	7
Extremely Unlikely	Moderately Unlikely	Somewhat Unlikely	Not Sure	Somewhat Likely	Moderately Likely	Extremely Likely

Perception of Risks

People often see some risk in situations that contain uncertainty about what the outcomes or consequences will be and for which there is the possibility of negative consequences. However, riskiness is a very personal and intuitive notion, and we are interested in your gut level assessment of how risky each activity/ behavior is.
For each of the following statements, please indicate how risky you perceive each activity/behavior. Provide a rating from *Not at all Risky* to *Extremely Risky,* using the following scale:

1	2	3	4	5	6	7
Not at all Risky	Slightly Risky	Somewhat Risky	Moderately Risky	Risky	Very Risky	Extremely Risky

Expected Benefits

People may differ in how beneficial they would expect to experience after engaging in various risky behaviors. We are interested in your gut level assessment of how beneficial each activity/behavior is.
For each of the following statements, please indicate how beneficial you perceive each activity/behavior to be. Provide a rating from *Not at all Beneficial* to *Extremely Beneficial*, using the following scale:

1	2	3	4	5	6	7
Not at all Beneficial	Slightly Beneficial	Somewhat Beneficial	Moderately Beneficial	Beneficial	Very Beneficial	Extremely Beneficial

Risk-Taking History

For each of the following statements, please indicate whether you have engaged each behavior at some point in your life. State whether you have engaged in each behavior in the following way:

1 = Yes, I have engaged in this behavior   2 = No, I have not engaged in this behavior

APPENDIX C

POST-STUDY QUESTIONNAIRE

1. Individuals may consider more than one type of risk factor when responding to the questions that asked for ratings of how risky they perceive various sexual behaviors to be. What types of risks did you consider when making your ratings? Please be as specific as possible.

2. Individuals may consider more than one type of benefit when responding to the questions that asked for ratings of how beneficial they would expect various sexual behaviors to be. What types of benefits did you consider when making your ratings?

3. Were there any behaviors that you expected to be asked about in the questionnaire but did not see? Please be specific.

Table 1. Exploratory factor analyses of Adolescent Sexual Risk Taking Scale.

Item Number	Likelihood Subscale			History Subscale			Perceived Risks Subscale			Expected Benefits Subscale		
	1	2	3	1	2	3	1	2	3	1	2	3
Advanced sexual behaviors												
1	*.717*	.226	.220	*.592*	.367	.085	*.546*	.306	.477	*.757*	.133	.067
2	*.931*	.187	.218	*.660*	.391	-.002	*.613*	.352	.379	*.784*	.108	.088
3	*.687*	.003	.345	*.860*	.101	-.037	*.768*	.076	.097	*.682*	.036	.124
4	*.752*	.002	.421	*.864*	.105	.037	*.767*	.081	.226	*.769*	-.142	.122
5	*.745*	.081	.277	*.841*	.173	.057	*.574*	.262	.379	*.654*	.101	.194
6	*.656*	.019	.261	*.744*	.081	.054	*.634*	.165	.141	*.735*	-.111	.121
7	*.520*	-.032	.442	*.580*	.159	.182	*.632*	.142	.334	*.707*	.042	.172
8	*.650*	.184	.162	*.629*	.241	.024	*.523*	.267	.401	*.646*	.120	.116
Naïve sexual behaviors												
9	.000	*.643*	-.176	.114	*.748*	-.046	-.053	*.704*	.082	-.110	*.822*	-.051
10	.004	*.590*	-.034	.082	*.749*	.062	.158	*.615*	.125	-.070	*.704*	-.035
11	.266	*.671*	.014	.277	*.769*	-.030	.285	*.647*	.044	.179	*.700*	-.103
12	.476	.417	.073	.454	*.640*	-.092	.489	*.525*	.136	.312	*.610*	-.089
13	.106	*.723*	.030	.006	*.530*	.122	.218	*.651*	.037	.063	*.658*	.022
14	.422	*.554*	.099	.261	*.614*	.010	.332	*.612*	.245	.252	*.657*	.020
15	.074	*.702*	-.103	.226	*.696*	-.060	.177	*.699*	-.043	-.050	*.746*	-.124
Self-initiated sexual behaviors												
16	.247	-.177	*.888*	.168	-.014	*.795*	.213	.081	*.882*	.361	-.135	*.801*
17	.237	-.145	*.807*	.091	.068	*.630*	.190	.037	*.854*	.311	-.097	*.767*
18	.408	-.037	*.596*	.315	.016	*.667*	.382	.069	*.658*	*.550*	-.035	.382
19†	.446	.062	.274	.461	.083	.180	.218	.115	.445	*.512*	.083	.181
20†	.137	.398	-.077	.038	.395	.068	.076	*.622*	.160	.094	*.740*	.003
21†	.381	.071	-.062	.267	.196	-.318	.285	.258	.360	.389	.067	.144
22†	-.115	*.633*	-.133	.023	.307	-.104	.016	.499	.099	-.135	*.669*	-.168
23†	.311	-.221	.429	.315	-.012	.112	.438	.084	.237	.154	-.114	.270
Eigenvalue	7.41	4.25	1.35	7.37	2.98	2.01	8.57	2.89	1.59	6.49	5.13	1.33
% explained variance	22.48	15.25	12.60	22.66	17.36	7.48	18.91	17.43	14.50	23.22	19.97	7.42

Note: Factor loadings greater than or equal to .50 are shown in bold and italics.
 † This item was deleted from the final scale.

Table 2. Cronbach alphas and mean inter-item correlations for each subscale.

	Alpha				Inter-Item Correlations			
	L	H	R	B	L	H	R	B
Advanced Sexual Behaviors	.896	.911	.912	.901	0.528 (0.412 - 0.707)	.563 (0.390 – 0.805)	.571 (0.373 – 0.763)	.532 (0.396 – 0.744)
Naïve Sexual Behaviors	.871	.860	.817	.846	0.500 (0.372 - 0.676)	0.497 (0.222 - 0.729)	0.408 (0.236 - 0.618)	0.464 (0.344 - 0.667)
Self-initiated Behaviors	.737	.760	.848	.877	0.573 (0.481 - 0.743)	0.516 (0.440 - 0.586)	0.667 (0.555 - 0.806)	0.703 (0.648 - 0.809)

Table 3. Pearson correlations of factors within each subscale (a) and subscales within each factor (b).

(a)

Factor	Likelihood Subscale			History Subscale			Risks Subscale			Benefits Subscale		
	Adv	Naïve	Self	Adv	Naïve	Self	Adv	Naïve	Self	Adv	Naïve	Self
Adv	1.00			1.00			1.00			1.00		
Naïve	.546**	1.00		.516**	1.00		.678**	1.00		.191**	1.00	
Self	.620**	.369**	1.00	.282**	.325**	1.00	.613**	.599**	1.00	.603**	.064	1.00

*** Significant at the p<.01 level*

(b)

Subscale	Advanced Sexual Behaviors				Naïve Sexual Behaviors				Self-initiated sexual behaviors			
	L	H	R	B	L	H	R	B	L	H	R	B
L	1.00				1.00				1.00			
H	-.628	1.00			-.431	1.00			-.756	1.00		
R	-.666	.330	1.00		-.401	.186	1.00		-.454	.416	1.00	
B	.709	-.504	-.531	1.00	.372	-.14	-.307	1.00	.600	-.552	-.396	1.00

Note: All correlations in Table 3b are statistically significant at the p<.05 level.

44

Table 4. Revised ASRTS interitem correlations for Likelihood (a), History (b), Perceived Risks (c), and Expected Benefits (d) subscales.

(a)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	------																	
2	.643	------																
3	.560	.713	------															
4	.602	.678	.694	------														
5	.597	.645	.554	.675	------													
6	.509	.558	.496	.608	.749	------												
7	.421	.592	.521	.573	.592	.503	------											
8	.471	.505	.423	.511	.645	.601	.470	------										
9	.216	.102	.098	.189	.250	.205	.119	.268	------									
10	.222	.145	.112	.230	.204	.234	.108	.200	.474	------								
11	.281	.352	.264	.380	.451	.401	.290	.357	.514	.522	------							
12	.428	.448	.384	.527	.620	.520	.425	.488	.424	.444	.698	------						
13	.231	.222	.189	.269	.276	.285	.132	.202	.385	.468	.456	.464	------					
14	.405	.385	.282	.450	.508	.486	.283	.490	.477	.449	.546	.611	.473	------				
15	.198	.099	.057	.158	.155	.137	.014	.166	.416	.493	.430	.376	.487	.410	------			
16	.280	.479	.395	.368	.347	.347	.491	.203	.071	.016	.147	.144	.063	.069	-.111	------		
17	.208	.446	.400	.392	.339	.332	.439	.225	.036	.020	.118	.169	.097	.117	-.158	.796	------	
18	.282	.556	.465	.390	.469	.425	.547	.322	.117	.083	.200	.303	.091	.203	-.054	.739	.653	------

(b)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	------																	
2	.684	------																
3	.589	.698	------															
4	.656	.727	.702	------														
5	.485	.534	.475	.626	------													
6	.390	.411	.378	.510	.676	------												
7	.499	.582	.529	.603	.577	.459	------											
8	.463	.500	.436	.600	.666	.556	.502	------										
9	.176	.202	.137	.243	.262	.289	.153	.233	------									
10	.178	.199	.181	.235	.297	.323	.194	.269	.531	------								
11	.286	.320	.291	.378	.437	.435	.313	.394	.494	.621	------							
12	.369	.413	.375	.487	.583	.567	.403	.527	.448	.482	.776	------						
13	.178	.199	.129	.235	.234	.257	.141	.209	.812	.488	.401	.393	------					
14	.325	.341	.278	.412	.470	.517	.332	.419	.509	.384	.591	.662	.471	------				
15	.212	.214	.153	.268	.282	.275	.142	.210	.631	.374	.402	.399	.581	.389	------			
16	.247	.320	.324	.277	.258	.354	.377	.299	.085	.121	.178	.250	.069	.182	.046	------		
17	.167	.269	.253	.215	.176	.257	.285	.190	.056	.063	.084	.158	.009	.056	.006	.594	------	
18	.117	.248	.245	.174	.265	.370	.315	.291	.094	.113	.111	.177	.058	.165	.016	.609	.471	------

(c)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	------																	
2	.734	------																
3	.561	.620	------															
4	.507	.583	.579	------														
5	.455	.473	.498	.675	------													
6	.446	.451	.371	.611	.626	------												
7	.542	.634	.497	.594	.605	.533	------											
8	.441	.546	.458	.633	.635	.671	.545	------										
9	.054	.100	-.031	.121	.102	.252	.094	.197	------									
10	.134	.130	.132	.211	.238	.293	.174	.207	.518	------								
11	.378	.340	.291	.352	.337	.386	.384	.291	.338	.495	------							
12	.370	.416	.406	.476	.364	.392	.396	.422	.286	.430	.583	------						
13	.197	.217	.188	.297	.289	.360	.281	.369	.379	.320	.351	.333	------					
14	.281	.331	.175	.430	.371	.478	.395	.486	.470	.353	.427	.443	.436	------				
15	.181	.174	.116	.230	.243	.317	.199	.311	.328	.252	.334	.325	.403	.467	------			
16	.324	.399	.323	.433	.421	.465	.408	.505	.066	.133	.144	.184	.281	.250	.105	------		
17	.336	.414	.297	.438	.432	.455	.432	.516	.047	.146	.142	.250	.275	.254	.138	.859	------	
18	.387	.475	.314	.520	.506	.543	.504	.604	.129	.153	.231	.266	.219	.285	.111	.662	.695	------

(d)

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	------																	
2	.581	------																
3	.560	.826	------															
4	.481	.584	.550	------														
5	.501	.605	.580	.648	------													
6	.480	.468	.490	.536	.733	------												
7	.558	.613	.592	.475	.558	.489	------											
8	.240	.322	.351	.403	.484	.609	.341	------										
9	.078	-.071	-.090	.141	.115	.104	-.012	.277	------									
10	.090	-.078	-.088	.204	.188	.270	-.047	.260	.639	------								
11	.215	.171	.236	.337	.390	.361	.217	.330	.608	.499	------							
12	.313	.361	.412	.465	.452	.392	.347	.436	.487	.434	.689	------						
13	.208	.171	.172	.274	.226	.137	.133	.207	.498	.373	.557	.544	------					
14	.199	.205	.220	.405	.403	.369	.241	.428	.497	.441	.537	.640	.515	------				
15	.027	.009	.008	.117	.161	.108	.024	.203	.472	.414	.510	.485	.637	.462	------			
16	.338	.456	.358	.351	.398	.414	.427	.227	-.031	.038	.099	.109	.012	.031	-.069	------		
17	.385	.402	.339	.350	.376	.364	.437	.236	-.027	.062	.117	.100	-.013	.031	-.052	.788	------	
18	.331	.519	.448	.391	.406	.402	.399	.242	.017	.070	.171	.200	.086	.129	.026	.661	.610	------

Table 5. Goodness-of-fit statistics for revised ASRTS: model comparison for Likelihood

Subscale (a) and 3-factor model statistics for all subscales (b).

(a)

Model	Proper solution	df	χ^{2a}	CFI	TLI	RMSEA
3-factor	Yes	135	611.22*	.93	.92	.12
1-factor	Yes	135	1171.59*	.84	.82	.22

Note. Proper solution = whether all parameter estimates were within admissible ranges (i.e.,
standardized factor loadings and factor correlations < $\lvert 1.00 \rvert$; nonnegative unique
variance estimates); df = model degrees of freedom; CFI = comparative fit index; TLI =
Tucker-Lewis index; RMSEA = root-mean-square-error of approximation.
[a] All chi-square values are significant at p < .01.

(b)

Subscale	df	χ^2	CFI	TLI	RMSEA
Likelihood	135	606.95*	.93	.92	.12
History	135	721.91*	.90	.89	.14
Risks	135	657.98*	.91	.90	.12
Benefits	135	750.95*	.89	.88	.14

Table 6. Confirmatory factor analyses for revised ASRTS.

Item	Likelihood Subscale			History Subscale			Perceived Risks Subscale			Expected Benefits Subscale		
	1	2	3	1	2	3	1	2	3	1	2	3
Advanced Behaviors												
1	.72			.74			.69			.68		
2	.82			.82			.76			.84		
3	.75			.76			.68			.82		
4	.83			.88			.81			.72		
5	.84			.74			.77			.79		
6	.76			.61			.72			.70		
7	.69			.71			.76			.72		
8	.67			.69			.76			.50		
Naïve Behaviors												
9		.63			.84			.61			.72	
10		.66			.66			.63			.63	
11		.80			.71			.69			.81	
12		.77			.68			.66			.78	
13		.63			.79			.57			.72	
14		.72			.67			.69			.72	
15		.59			.67			.55			.67	
Self-Initiated Behaviors												
16			.95			.88			.90			.92
17			.84			.68			.95			.85
18			.78			.69			.73			.72

Table 7. Goodness-of-fit statistics for Self-initiated sexual behavior items (a), Advanced sexual behavior item parcels (b), and Naïve sexual behavior item parcels (c).

(a)

Model	df	χ^2	CFI	TLI	Δdf	$\Delta\chi^2$
No moderation	48	235.43*	.96	.94		
History x Benefits	89	599.58*	.90	.88	41	364.15*
History x Risks	89	422.48*	.93	.92	41	187.05*

(b)

Model	df	χ^2	CFI	TLI	Δdf	$\Delta\chi^2$
No moderation	48	293.88*	.96	.95		
History x Benefits	89	505.90*	.95	.94	41	212.02*
History x Risks	89	426.32*	.95	.95	41	132.44*

(c)

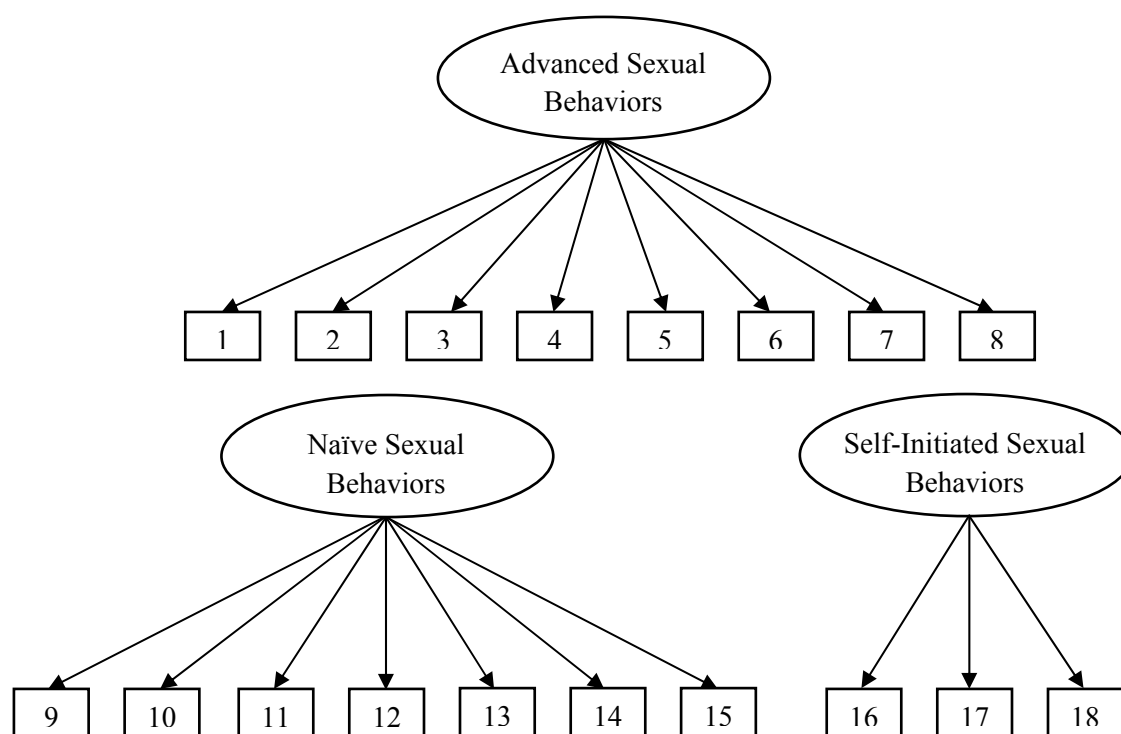| Model	df	χ^2	CFI	TLI	Δdf	$\Delta\chi^2$
No moderation	48	428.76*	.85	.80		
History x Benefits	89	414.66*	.91	.90	41	-14.1
History x Risks	89	385.80*	.92	.91	41	-42.96
Dual moderation	139	1053.64*	.84	.82	91	624.88*

* Significant at the p < .05 level

Figure 1. Latent factor structure of ASRTS.

Note: Rectangles are measured variables and circles represent the underlying constructs. All factor loadings retained in each construct are significant at the $p < .01$ level.
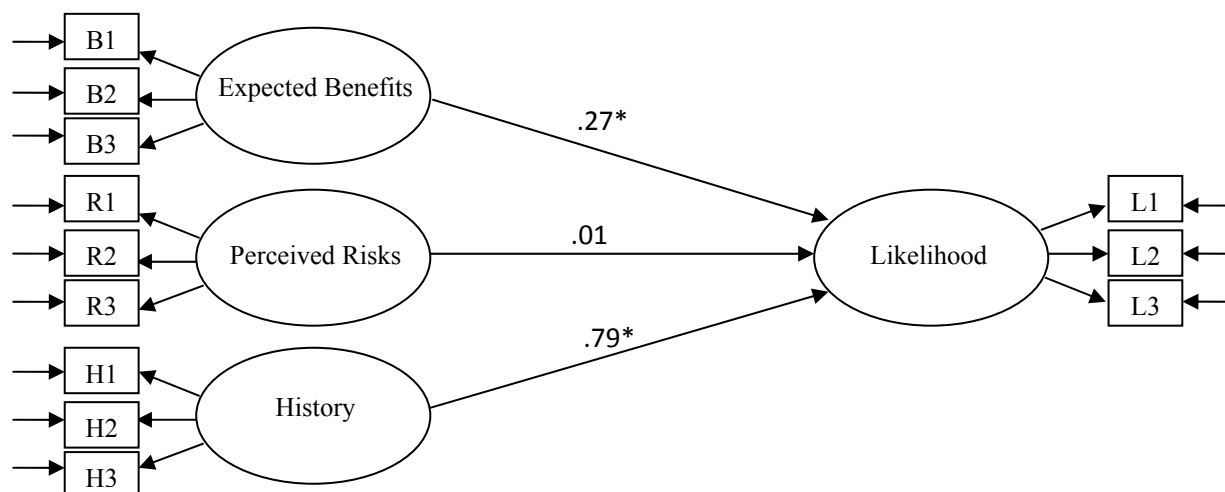
Figure 2. Estimated structural model for Self-initiated sexual behaviors.
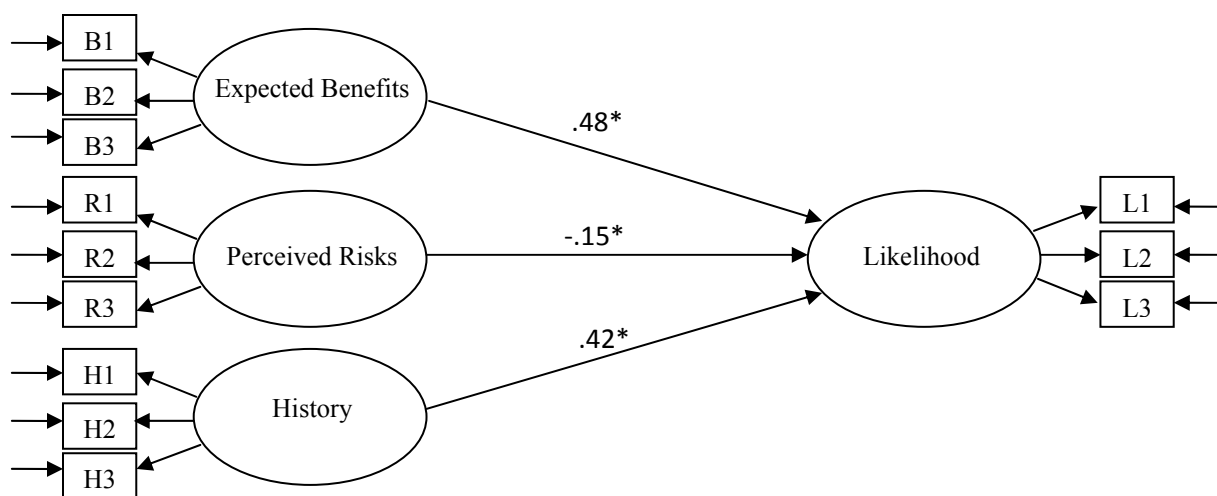
Note: All coefficients are standardized.

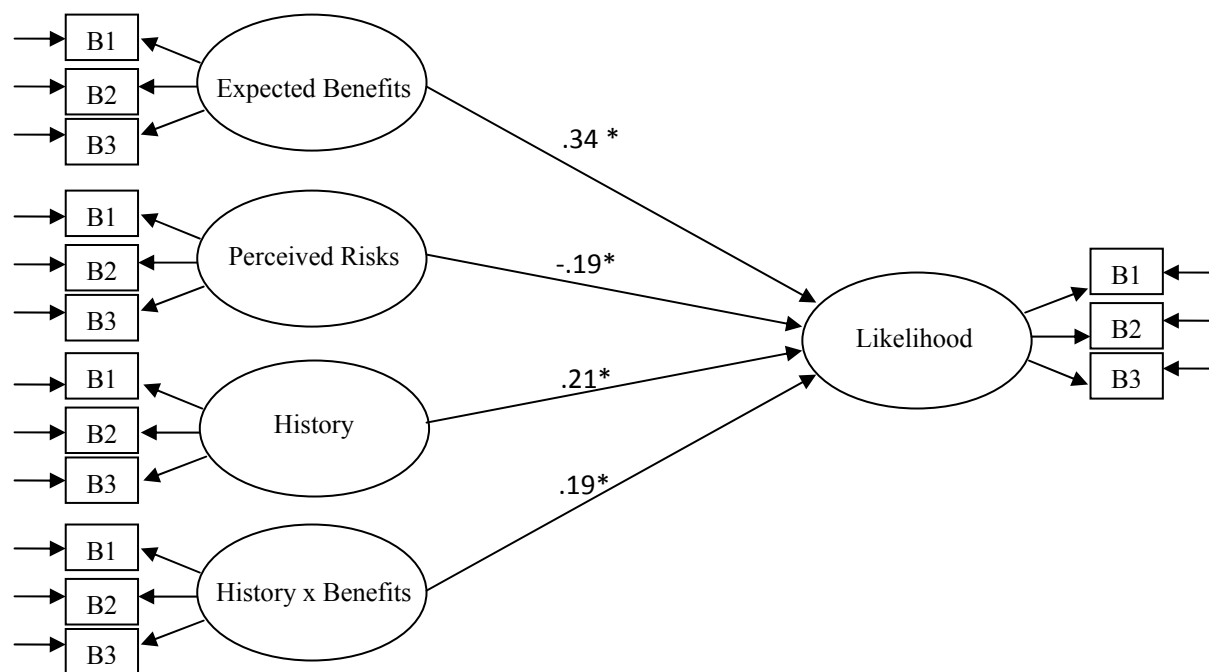Figure 3. Estimated structural model for Advanced sexual behaviors.

Figure 4. Estimated structural model for Naïve sexual behaviors.