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Running Head: Future Expectations and Adolescent Sexual Risk

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ABSTRACT

Rates of STIs, HIV, and pregnancy remain high among adolescents in the US, and recent approaches to reducing sexual risk have shown limited success. Future expectations, or the extent to which one expects an event to actually occur, may influence sexual risk behavior. This prospective study uses longitudinal data from the National Longitudinal Survey of Youth 1997 (N=3,205 adolescents: 49.8% female) to examine the impact of previously-derived latent classes of future expectations on sexual risk behavior. Cox regression and latent growth models were used to determine the effect of future expectations on age at first biological child, number of sexual partners, and inconsistent contraception use. The results indicate that classes of future expectations were uniquely associated with each outcome. The latent class reporting expectations of drinking and being arrested was consistently associated with the greatest risks of engaging in sexual risk behavior compared with the referent class, which reported expectations of attending school and little engagement in delinquent behaviors. The class reporting expectations of attending school and drinking was associated with having greater numbers of sexual partners and inconsistent contraception use but not with age at first biological child. The third class, defined by expectations of victimization, was not associated with any outcome in adjusted models, despite being associated with being younger at the birth of their first child in the unadjusted analysis. Gender moderated specific associations between latent classes and sexual risk outcomes. Future expectations, conceptualized as a multidimensional construct, may have a unique ability to explain sexual risk behaviors over time. Future strategies should target multiple levels of influence to improve individual future expectations prior to high school and throughout the adolescent period.

Key Words: adolescent, future expectations, sexual risk, behavior

Introduction

Despite representing only 25% of the population, adolescents are responsible for nearly half of all STI diagnoses and new HIV infections in the US (Guttmacher Institute 2006; Guttmacher Institute 2006). This country also has one of the highest teenage pregnancy and childbirth rates among developed nations, with over 370,000 teenagers giving birth every year (The National Campaign to Prevent Teen Pregnancy ; Martin et al. 2012). Although many educational interventions have effectively reduced sexual risk behaviors, these approaches often result in only small to moderate effects and lack long-term durability (Mullen et al. 2002; Johnson et al. 2011). These high rates of risk and limited successes provide the rationale to investigate additional approaches to reducing sexual risk behaviors among adolescents.

It may be reasonable to theorize that future expectations (i.e., the extent to which one expects an event to actually occur) could influence sexual risk behavior. Future expectations, such as expectations of graduating from high school or living to age 35, facilitate goal setting, planning, and making commitments and thus direct behavior and development (Nurmi 1991; Bandura 2001; Seginer 2008). They are particularly relevant during transitions and are thus highly pertinent to adolescence (Seginer 2008). Expectations are also distinct from aspirations and fantasies or wishes (Simmons 1979; Constantine et al. 1998; Oettingen and Mayer 2002; Sagy and Adwan 2006), which tend to overestimate actual expectancies and thus may be weaker foundations for behavior (Oettingen and Mayer 2002). Theoretical models, such as the social cognitive theory, posit that standards or expectations for behavior are personal factors that help regulate dispositional traits and manage their feelings, impulses, and behaviors (Bandura 1991). Future expectations, thus, may reasonably influence adolescent sexual risk behaviors.

A limited body of research, however, has examined future expectations and its association with sexual risk behavior. Tevendale and colleagues discovered that positive future

expectations among homeless youth were inversely related to the number of partners but not to the percentage of unprotected sex acts (Tevendale et al. 2009). Another study, however, reports that, in interviews with African American adolescents, positive life expectations were not associated with sexual experience in either the unadjusted or adjusted analysis (Fisher et al. 2008). A longitudinal study using a national sample reported that individual expectations of graduating from college were associated with age of onset of sexual activity in multivariate analysis among boys, but not among girls, ages 13 to 15. Furthermore, expectations of living to age 35 were not significantly associated with age of onset of sexual activity for either gender (Harris et al. 2002). Additionally, data from the National Longitudinal Study of Adolescent Health suggest that only peers' anticipation – and not an individual's anticipation – of college completion is associated with sexual risk behaviors (Soller and Haynie 2013). The empirical evidence for the association between future expectations and sexual risk behavior therefore is currently weak and suggests the need for additional research.

A small subset of studies has examined the association of future expectations with teenage pregnancy. Among 135 female adolescents (47 pregnant and 88 non-pregnant) in Quito, Ecuador, being non-pregnant was associated with higher levels of expectations for the future (Guijarro et al. 1999). Allen et al. determined that lack of future expectations predicted pregnancy in an analysis of a longitudinal study of teenagers in the United Kingdom (Allen et al. 2007). Data from the US did not suggest a significant relationship between future expectations and pregnancy among teenage girls who had been referred to child welfare services (James et al. 2009), but data from the National Education Longitudinal Study suggest that lower educational expectations (although not occupational expectations) were significantly associated with incidence of teenage pregnancy (Young et al. 2004). The evidence of the association between expectations and teenage pregnancy is thus limited and inconsistent.

To date, there is weak evidence to support the association between future expectations and sexual risk behavior and teenage pregnancy among adolescents in the US. Much of the current research has employed cross-sectional designs, which obscure temporality, and has used homogenous samples, including minority race/ethnicities and low-income subpopulations, that potentially have low external validity. Furthermore, future expectations is inherently multidimensional (Nurmi 1991; McCabe and Barnett 2000), but many of these studies rely only on one dimension of expectations, such as educational expectations (Harris et al. 2002; Soller and Haynie 2013), or measure expectations to reflect the extent to which they are positive or negative (Fisher et al. 2008; Tevendale et al. 2009). More rigorous longitudinal research using general adolescent population and a multidimensional construct of future expectations is needed to better understand this relationship further between future expectations and sexual risk behavior among adolescents.

The Current Study

This study investigates the impact of future expectations on sexual risk behavior with a national longitudinal cohort of youth ages 15 through 19. To guide this investigation, we use Bandura's social cognitive theory, which suggests that the environment and personal factors interact with one another to influence behavioral patterns (Bandura 1991). Personal factors, such as cognitive and affective factors, including expectations, are thought to interact with both the environment and behavior (Glanz et al. 2002). In this context, we focus on future expectations as our personal factor of interest and expect this theory to be an appropriate conceptual model for investigating the relationship between future expectations and sexual risk behavior.

We also use Bronfenbrenner's ecological systems theory (Bronfenbrenner 1989) to guide our exploration of the environment construct from Bandura's social cognitive theory and to understand the context of the individual. The ecological systems theory posits that common spheres of influence from multiple levels bidirectionally influence one another to affect behavior. Bronfenbrenner's ecological systems theory has been associated with sexual risk behaviors (Small and Luster 1994; DiClemente et al. 2007) and teenage pregnancy (Meade and Ickovics 2005; Meade et al. 2008; Sipsma et al. 2010). The ecological systems theory thus aligns with the social cognitive theory, which indicates that the context or environment is associated with behavior. We believe integrating Bronfenbrenner's ecological systems theory into our framework provides a comprehensive approach to examining the impact of future expectations on sexual risk behavior (**Figure 1**).

Research has demonstrated associations between future expectations and each level of the ecological systems theory, including levels of the individual, family, peer, and environment. For example, individual characteristics, such as age and gender, may significantly influence future expectations. For instance, younger adolescents seem to concentrate less on career and family than older adolescents, and females put emphasis on family more than males (Raffaelli and Koller 2005). Evidence also suggests that parents affect an adolescent's future expectations (McCabe and Barnett 2000; Dubow et al. 2001; McWhirter and McWhirter 2008) by setting standards, acting as role models, and perpetuating belief systems (Nurmi 1991; McCabe and Barnett 2000). Pressure from peers to conform to certain behaviors may also influence an adolescent's expectations for the future (Nurmi 1991; McCabe and Barnett 2000; McWhirter and McWhirter 2008). On the environmental level, disparities by socioeconomic status (Lamm et al. 1976; McCabe and Barnett 2000) and poverty level (Freire et al. 1980; Voydanoff and Donnelly 1990; Nurmi 1991) are also highly relevant to future expectations. Middle class adolescents often focus more on their education compared with careers than lower class adolescents (Poole and Cooney 1987). There is thus evidence for all levels to be independently and simultaneously associated with future expectations among adolescents

(Sipsma et al. 2012). The use of these two frameworks, therefore, allows for the direct examination of future expectations and sexual risk behavior, while adjusting for potential confounders from multiple levels.

Accordingly, we aim to examine the associations between future expectations and sexual risk behaviors, including age at first child, number of sexual partners, and inconsistent contraception use, among adolescents. We also examine whether these associations differ for males and females, as previous literature suggests possible differential effects. Our study uses latent classes of future expectations, derived in an earlier article (Sipsma et al. 2012), as our exposure of interest. Latent classes were used to measure future expectations in order to reflect the multidimensional nature of the construct (Nurmi 1991; McCabe and Barnett 2000). These classes have been shown to be valid and robust correlates of behavior (Sipsma et al. 2012).

Specifically, we ask two research questions and make several related hypotheses. Research Question 1 asks: Are multidimensional classes of future expectations predictive of sexual risk behaviors, including age at first biological child, number of sexual partners, and contraception use? Based on prior literature, we hypothesized that participants with high expectations of being in school would be less likely to engage in sexually risky behavior compared with participants with low expectations of being in school. Additionally, we believed that participants with high expectations of engaging in delinquent behavior would be more likely to engage in sexually risky behavior compared with participants with low expectations of engaging in delinquent behavior. We also hypothesized that participants with high expectations of victimization would also engage in more sexually risky behavior compared with participants with low expectations of victimization. We expect these relationships to exist at baseline and to persist over time. Research Question 2 asks: Does gender moderate associations between future expectations and sexual risk behaviors? We believed that, because previous literature has demonstrated gender differences in future expectations (Raffaelli and Koller 2005; Sipsma

et al. 2012) and in sexual risk behaviors (Byrnes et al. 1999), the associations between future expectations and our outcomes may significantly vary by gender. We expect stronger associations between delinquent expectations and our outcomes among males than among females and between student expectations and our outcomes among females than among males.

Method

Study Sample and Design

This study uses data from the National Longitudinal Study of Youth 1997 (NLSY97), which was originally designed to examine the transition from school to work as adolescents enter adulthood (U.S. Bureau of Labor Statistics). The NLSY97 sample consists of 8,984 respondents who were born between 1980 and 1984. The response rate was 91.6% at baseline (U.S. Bureau of Labor Statistics). Approximately one-half (51.2%) of the participants were male. Mean age at baseline was 14.9 years. Non-Hispanic black and Hispanic youth were oversampled to allow more valid statistical analyses of these subpopulations. About one-fourth of the total sample was non-Hispanic black, 21.2% were Hispanic, and 51.9% was nonblack/non-Hispanic.

Baseline interviews were completed as part of round 1 in 1997/1998. One member of each household also provided demographic information on family members living inside and outside the home. Additionally, each youth and his/her parent each completed personal interviews lasting approximately one hour. Study participants completed computer-assisted personal interviews (CAPI), which automatically leads respondents to particular questions based on their age and prior responses. Youth interviews are repeated annually. Retention rates for follow-up interviews have exceeded 85% (U.S. Bureau of Labor Statistics).

Because data on future expectations were collected only among participants age 15 or older, our analytic sample was limited accordingly based on the age at first interview (n=4,231). This sample was further limited to those who had at least one valid future expectations indicator (n=3,533) and who were not of 'mixed race' (n=3,502) as these participants could not be appropriately reclassified. Lastly, the sample was limited to the first youth interviewed within each household (n=3,261) and those with at least one valid follow-up between ages 15 and 19 for a final sample size of 3,205 participants.

Participants ranged in age from 15 to 18 (M=15.9 SD=0.71) at baseline. One-half of the sample was male. Fifty-three percent was non-Hispanic/non-Black, 26.2% was non-Hispanic Black, and 20.6% was Hispanic. Fifty percent of participants lived with both biological parents, and approximately one-fourth had mothers who became mothers as teenagers. Approximately 22% lived below the poverty threshold and over 70% lived in urban areas. Compared with Hispanic participants, Non-Hispanic Black participants were more likely to have a mother who became a mother as a teenager (X² = 18.30, p < 0.001) and were less likely to live with both biological parents (X² = 117.34, p < 0.001) and live in urban areas (X² = 18.71, p < 0.001). Compared with non-Hispanic White participants, Non-Hispanic Black and Hispanic participants were more likely to live below the poverty threshold (X² = 268.15, p < 0.001 and X² = 276.36, p < 0.001, respectively), to live in urban areas (X² = 72.34, p < 0.001 and X² = 142.02, p < 0.001, respectively), and to have a mother who became a mother as a teenager (X² = 49.77, p < 0.001, respectively). Non-Hispanic Black participants were also less likely than non-Hispanic White participants to live with both biological parents (X² = 224.65, p < 0.001).

Measures

Future Expectations. At baseline, participants responded to eight total items created by the NLSY97 study team; of these, five items asked the percent chance a particular event would occur in the next year (e.g., become pregnant/get someone pregnant, get seriously drunk, be the victim of a violent crime, be arrested rightly or wrongly, and die from any cause) and three items asked the percent chance of being engaged in a particular activity one year from now (e.g., be a student in a regular school, be working more than 20 hours/week if in school, and be working more than 20 hours/week if not in school). The two questions regarding working were combined to reduce conditional dependence between items, resulting in a total of seven indicators of future expectations. The continuous responses were collapsed into four categories (0-24%, 25-49%, 50-74% and 75-100%) based on apriori hypotheses about the meaning of each category. All seven items were entered into a latent class analysis with maximum likelihood estimation and robust standard errors to derive the most parsimonious and meaningful model. Four latent classes of future expectations were derived. More details can be found elsewhere (Sipsma et al. 2012).

Seventy percent of participants fell into the *Student Expectations* class, defined as perceiving high chances of being in school and low chances of engaging in delinquent behavior or being victimized. Approximately 16% fell into the *Student/Drinking Expectations* class. These participants endorsed high chances of being in school in the next year but also moderate chances of engaging in delinquent behavior. The third class, called the *Victim Expectations* class (7.9%) perceived the highest chances of being victimized in the coming year; over 90% of this class believed they had 50% or greater chance of dying in the next year. Six percent of participants fell into the *Drinking/Arrest Expectations* class and were characterized by perceiving the lowest chances of being in school and the highest chances of working and engaging in delinquent behavior in the coming year (Sipsma et al. 2012).

All youth in our sample responded to questions about sexual risk behavior at baseline and at each annual follow-up.

Number of sexual partners. Participants who reported being sexually experienced were asked to report the number of sexual partners they had had since the last interview. At baseline, participants were asked to report the numbers of sexual partners they had in the last 12 months.

Inconsistent contraception use. Participants were also asked to report the number of times they had had sex and the number of times they had used birth control (including a condom) in the last 12 months at baseline and since the date of last interview at each annual follow-up. The number of unprotected sex acts was calculated by computing the difference between these two responses. Participants who reported not being sexually active since date of last interview were considered to have had 0 unprotected sex acts. Based on its distribution, this construct was dichotomized into inconsistent contraception use (≥1 unprotected sex acts vs. 0 unprotected sex acts).

Age at first child. Participants reported the birth dates of any biological children. Age at first child was calculated using the date of birth for the participant and his/her first biological child.

The covariates used in this analysis were derived from Bronfenbrenner's ecological systems theory (Bronfenbrenner 1989) and represent each of the following levels of influence: individual, family, peer, and environment. These covariates were previously shown to be associated with class membership (Sipsma et al. 2012). All covariates were measured at baseline.

Age at baseline. Age at baseline was self-reported at the first interview.

Gender. Gender was self-reported at baseline.

Race/ethnicity. Race/ethnicity was self-reported and categorized into non-Hispanic black, Hispanic or non-Hispanic/non-black (white).

General health. Health was measured on a 5-point Likert scale ranging from 'excellent' to 'poor'. This variable was collapsed into two categories (excellent/very good vs. good/fair/poor) based on its distribution.

Living with both biological parents. Participants reported if they lived with a "mother figure" or "father figure" and indicated the relationship (biological, etc.) which were used to derive living with both biological parents (yes/no).

Maternal teen birth. Maternal age at first birth was derived from the household screening and was dichotomized to indicate whether or not the participant's mother gave birth as a teenager (<19 years old).

Deviant peer norms. Participants were asked to indicate the percentage of their peers who smoked cigarettes, got drunk, belonged to gangs, used drugs, and skipped school. Deviant peer norms was the arithmetic mean of the five items.

Enriching peer norms. Enriching peer norms was the calculated mean of 4 items asking participants to report the percentage of their peers who participated in organized activities, planned to go to college, did volunteer work, and went to religious services regularly.

Income to poverty ratio. Parents reported the gross family income for the past year. Income to poverty ratio was created based on standards set by US Census Bureau which accounts for a family's annual income, size, and number of children under 18 years old. For analysis this variable was categorized into < 1.00, 1.00-1.99, and \geq 2.00.

Urban area. Living in an urban area (yes vs. no/not clear) was based on the location of the youth's residence.

Statistical Analysis

Cox proportional hazard regression was used to assess the impact of future expectations classes on age at first biological child. This analysis excluded participants who were parents at baseline (n=68) to ensure examination of the prospective relationship between expectations and outcome. Additionally, 55 participants were excluded because their calculated age at first birth was either younger than or the same as their age at baseline. This exclusion removed those who or whose partner may have been pregnant at baseline and prevents pregnancy from influencing responses. Because participants were followed through age 19, follow-up time was either the age at first biological child if 19 years or younger (status=1) or set equal the age at last available interview and considered censored (status=0).

Latent growth curve modeling was used to model number of sexual partners and inconsistent contraception use repeated over time. First, unconditional growth models were explored by using the likelihood ratio test (LRT), AIC, and BIC to determine if the linear or quadratic model better fit the data. Next, the conditional model was used to investigate the covariates and class membership. Number of sexual partners was treated as a count variable for analysis because it had a Poisson distribution. Extreme numbers of sexual partners were winsorized and set equal to the value of the approximate 97.5 percentile to reduce the impact of outliers. This percentile was approximately equal for all time points, leading to all values beyond the 97.5 percentile set equal to 10 sexual partners. Inconsistent contraception use was modeled as a dichotomous variable (Muthen and Asparouhov 2002).

In each analysis, backwards elimination based on the statistical relationship between the covariate and outcome was done by hand to determine the covariates for the final multivariate model. In latent growth curve modeling analyses, backwards elimination is particularly important as it minimizes potential problems with multicollinearity which can distort estimates and interpretability (Pedhazur 1997; Duncan et al. 2006). Class membership was then entered to determine the additive explanatory effect of expectations classes on the outcome of interest, after controlling for other predictors. All outcomes were limited to those occurring before age 20

because ages 15 to 19 was our age range of interest. Our modeling therefore uses baseline and the first three annual follow-ups.

Moderation by gender was examined by testing interaction terms created by multiplying the class dummy variables by gender in our final models for each outcome. When interaction terms were significant (p < 0.10), we examined simple effects by stratifying our sample by gender and exploring the associations between future expectations and sexual risk behaviors among each gender.

Missing data on each covariate ranged from 0 to 27% (income to poverty ratio) with the majority of covariates missing less than 5% of data. Because a complete case analysis could potentially bias results in the multivariate models (Little and Rubin 1987), we used multiple imputation to handle the missing data. Assuming the data are missing at random, this technique is widely recommended to produce valid estimates because it uses the information contained in the other variables to estimate the sets of possible values (Schafer 1997). SAS 9.1.3 (SAS Institute Inc., Cary, NC 2008) was used to generate imputed datasets with the PROC MI procedure.

SPSS 16.0 for Windows (SPSS Inc., Chicago, IL 2007) was used for data management. MPlus Version 4.21 (Muthén & Muthén, Los Angles, CA 1998-2007) was used to conduct latent variable modeling and to handle imputed data. Sampling weights were not used per the recommendations of NLSY97 (Moore et al. 2000) as the objective of these analyses is to examine the relationship of future expectations on sexual risk outcomes not to describe estimates for the national population.

Results

Age at First Biological Child

Four hundred fifteen participants (13.5%) became a parent between the ages 15 and 19. Of these participants, the mean age at first child was 18.1 (SD = 0.88). Class membership was significantly associated with age at first biological child in the unadjusted analysis (**Table 1**). Specifically, the *Drinking/Arrest Expectations* class had almost double the likelihood of becoming a teenage parent compared with the *Student Expectations* class. The *Victim Expectations* class had a 55% greater likelihood and the *Student/drinking Expectations* class 33% greater likelihood of having a biological child before age 20 when compared to the *Student Expectations* class.

Results from the multivariate model are presented in **Table 1** and in **Figure 2**. Class membership marginally improved the overall model fit (LRT, p = 0.096). Specifically, compared to membership in the *Student Expectations* class, membership in the *Drinking/Arrest Expectations* class increased the risk of a younger age at first birth by more than 50% after controlling for all other associated covariates (p < 0.05). Neither membership in the *Victim Expectations* nor the *Student/Drinking Expectations* class conferred additional significant risk compared to the referent class. Gender did not moderate associations between classes of future expectations and age at first child.

Number of Sexual Partners

Mean number of partners since last interview ranged from 0.77 to 1.58. Number of partners increased steeply between year 1 and year 2 (0.77 to 1.46 partners) and increased only slightly between years 2 and 4 (1.46 to 1.58 partners). The unadjusted association between numbers of sexual partners and class membership was explored graphically and can be found in **Figure 3**.

The unconditional growth model suggested that the quadratic trend explained the data better than the linear trend alone. Results from this model indicated that the initial level (intercept) and growth over time were significantly different from 0 (data not shown). Variances suggested significant variation across individuals in the initial number of sexual partners (intercept) (Est = 3.017, SE = 0.152, p < 0.01), the slope (Est = 0.857, SE = 0.103, p < 0.01), and the quadratic trend (Est = 0.065, SE = 0.010, p < 0.01).

Next, a conditional model was explored by entering time invariant covariates. Class membership significantly improved the model fit (LRT, p < 0.01). Results are presented in **Table 2**. Specifically, membership in both the *Student/Drinking Expectations* class and the *Drinking/Arrest Expectations* class were significantly associated with the initial number of sexual partners in the last 12 months. Membership in the *Student/Drinking Expectations* class was associated with 1.8 times the initial number of sexual partners of the *Student Expectations* class (p < 0.01). On average, membership in the *Drinking/Arrest Expectations* class was associated with 3.3 times the number of sexual partners as the *Student Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class (p < 0.01). Membership in the *Drinking/Arrest Expectations* class did not differentially affect number of sexual partners when compared with the *Student Expectations* class.

Furthermore, older age, male gender, non-Hispanic black race/ethnicity, worse health, maternal teen birth, and greater deviant peer norms were significantly associated with risk for greater numbers of sexual partners at year 1. Higher enriching peer norms and living with both biological parents were significantly associated with fewer numbers of sexual partners. Age, non-Hispanic black race/ethnicity, health, living with both biological parents, maternal teen birth, and peer deviancy were additionally associated with changes in numbers of sexual partners over time (**Table 2**).

The association between classes of future expectations and numbers of sexual partners differed by gender over time for participants in the *Student/Drinking Expectations* class (p-

values for interactions = 0.005 (linear slope) and = 0.003 (quadratic slope)). Among males, participants in the *Student/Drinking Expectations* class did not exhibit significant changes in numbers of sexual partners over time (p > 0.05). Among females, however, participants in the *Student/Drinking Expectations* class demonstrated significant negative linear effect (RR = 0.62; 95% CI = 0.46, 0.83) and a positive quadratic effect over time (RR = 1.13; 95% CI = 1.03, 1.24), indicating an initial decreasing risk and a then a slight increase in risk over time compared with the *Student Expectations* class.

Inconsistent Contraception Use

Percentages of inconsistent contraception use increased fairly consistently over time, ranging from 13.7% in year 1 to 27% in year 4. Percentages of inconsistent contraception use by latent class membership can be found displayed in **Figure 4**.

The model fit indices were inconsistent when exploring the unconditional growth model; we chose the linear slope model to select the most parsimonious model that adequately described the data. The positive slope was significantly different from 0 (p < 0.01). Significant variation across individuals was seen at baseline (Est = 3.378, SE = 0.596, p < 0.01) and over time (Est = 0.259, SE = 0.112, p < 0.05).

In the multivariate model, class membership significantly improved the overall model fit (LRT, p < 0.01). Results for the final multivariate model are presented in **Table 2**. Membership in the *Student/Drinking Expectations* and the *Drinking/Arrest Expectations* classes were significantly associated with higher initial levels of inconsistent contraception use compared to membership in the *Student Expectations* class. Specifically, membership in the *Student/Drinking Expectations* class was associated with 0.8 greater odds of inconsistent contraception use compared to the *Student Expectations* class. Furthermore, the *Drinking/Arrest Expectations* class was associated with almost 4.5 greater odds of inconsistent contraception use after

controlling for potential confounders. Membership in the *Victim Expectations* class was not significantly associated with higher levels of inconsistent contraception use. Class membership was not associated with changes in contraception use over time.

Older age, Hispanic race/ethnicity, worse health, maternal teen birth, and greater deviant peer norms were associated with increased odds of inconsistent contraception use at year 1 (all p < 0.05). Living with both biological parents, higher enriching peer norms, and living in an urban area were significantly associated with lower odds of inconsistent contraception use. Worse health was associated with a reduced slope of inconsistent contraception use over time. No other variables were associated with changes in contraception use over time.

The associations between classes of future expectations and inconsistent contraception use differed by gender at baseline for participants in the *Student/Drinking Expectations* class (p for interaction = 0.066) and for participants in the *Victim Expectations* class (p for interaction = 0.009). Membership in the *Student/Drinking Expectations* and the *Victim Expectations* classes was not associated with inconsistent contraception use among males (P-values > 0.05). Among females, however, participants in the *Student/Drinking Expectations* class and in the *Victim Expectations* class had significantly greater odds of inconsistent contraception use compared with participants in the *Students Expectations* class (OR = 2.55; 95% CI = 1.53, 4.23 and OR = 2.58; 95% CI = 1.37, 4.87; respectively).

Discussion

Rates of sexual risk behaviors continue to be high among adolescents. Future expectations may influence these behaviors, however, previous literature had been limited, demonstrated inconsistent results, and neglected the inherent multidimensional nature of future expectations. More research using a general adolescent population and a longitudinal approach

was necessary for a greater understanding of how future expectations may influence adolescent sexual risk behavior and how these associations may differ by gender.

Our analysis fills these gaps in the literature by using a cohort study of adolescents from across the United States to examine relationships between multidimensional classes of future expectations and sexual risk behaviors. Our results suggest that future expectations may have a unique ability to explain sexual risk behaviors over time and that these associations may be stronger for young women than young men. Additionally, our results suggest that the multidimensional conceptualization of future expectations, derived with latent class analysis, offers a strong approach for understanding adolescent sexual risk behaviors. These associations support the social cognitive theory, which posits that cognitive or personal factors (here, future expectations) influence behavioral patterns, even after accounting for multiple variables commonly associated with sexual risk behaviors. Our findings may have several implications for future research and interventions aiming to reduce sexually risky behavior among adolescents.

Our study's sexual risk outcomes are similar to what would be expected in the general population. Approximately 14% of our sample became parents before age 19, which is consistent with national teenage rates over this four-year period, when participants were between ages 15 and 19 (Guttmacher Institute 2010). We also observed increases in inconsistent contraception use over time. This pattern may be reasonable to expect given that adolescents tend to engage in longer-term relationships as they age, which have been associated with less consistent contraception use (Manlove et al. 2003). Our sample, therefore, reasonably may represent a national sample of adolescents during this period.

The *Drinking/Arrest Expectations* class repeatedly conferred the greatest risk. Members of this class had the lowest expectations of being in school and the highest expectations of working and engaging in delinquent behavior, such as getting drunk, being arrested, and getting

(someone) pregnant (Sipsma et al. 2012). They engaged in the most risk at baseline, even after adjusting for covariates, suggesting that the traditional risk factors – such as family structure, peer norms, and race/ethnicity – did not explain the additional risk associated with this class membership. The *Drinking/Arrest Expectations* class also generally maintained this high level of risk over time. These findings suggest that members in the *Drinking/Arrest Expectations* class may have increased their risk behaviors earlier than members of other classes and thus require interventions for reducing sexual risk behaviors earlier in adolescence than participants in the *Student Expectations* class. These results, however, also indicate that strategies are warranted throughout this developmental period.

Membership in the *Student/Drinking Expectations* class was generally associated with higher sexual risk behavior at baseline than the *Student Expectations* class. This class was composed of participants who were committed to school, but still expected moderately high likelihoods of engaging in delinquent behavior (Sipsma et al. 2012). This class, however, did not exhibit trends over time that differed significantly from the *Student Expectations* class, suggesting that despite increased sexual risk behaviors at baseline, their engagement in risky behaviors demonstrated increasing trends similar to those who engaged in less risk behaviors at baseline. Interestingly, the association between this class and age at first biological child was not statistically significant. Because our approach excluded those who were already parents at baseline, these results could be biased towards the null. Our results suggest that the commitment to school may be protective from engaging in greater frequencies of risk behaviors but also that commitment to school may not be sufficient to protect against engaging in heightened risk behaviors.

Significant gender differences were noted among the *Student/Drinking Expectations* class such that females had a stronger association between future expectations and sexual risk behavior than males. There may be several explanations for this difference. First, this

association among females may be due to better precision in measurement of inconsistent contraception use for females. Males, for instance, may or may not know if their female partner is taking a contraceptive pill whereas females generally know whether their partner is using a condom. The measurement of inconsistent contraception use among males may be more likely to be subject to measurement error. Second, because females tended to exhibit fewer numbers of sexual partners over time than males, females in this class may have engaged in high levels of risk behaviors earlier than males in this class, possibly because they are often younger than their male partners. Thus, their increase in risk could have occurred prior to baseline. Last, females could have exhibited stronger associations between future expectations and these sexual risk behaviors as females tend to be more conscientious than males (Gullone and Moore 2000), a trait that has been shown to be inversely associated with engaging in risk behaviors (Bogg and Roberts 2004). These findings may suggest that strategies aiming to future expectations in order to reduce sexual risk behaviors may find greater effectiveness among females, particularly among females who resemble those in this class.

Overall, membership in the *Victims Expectations* class was not statistically associated with any behaviors in multivariate models, suggesting no additional risk for those who expect to experience victimization. Associations between membership in the *Victims Expectations* class and sexual risk behaviors, therefore, may be explained by one or more sociodemographic characteristics, such as race/ethnicity (Sipsma et al. 2012). Notably, however, females who were members of the *Victims Expectations* class had greater odds of inconsistent contraception use at baseline, whereas there was no association among males. This association among females may be the result of the "weathering hypothesis" where girls who are disadvantaged and face chronic stressors may feel the need to reproduce earlier than girls not facing these same circumstances (Geronimus 1991). This hypothesis could also support the association between *Victim Expectations* class and age at first birth in the unadjusted analysis.

These results support an array of previous research. Our findings are consistent with studies suggesting that more negative expectations are associated with greater sexual risk behaviors (Seal et al. 2003; Fisher et al. 2008) and that more academically-oriented adolescents may be at lower risk for teenage pregnancy (Young et al. 2004). Our results, however, extend these findings by describing the multidimensional nature of future expectations and their associations with various sexual risk behaviors.

We extend these findings by establishing profiles of adolescents that may be identifiable in both educational and clinical settings and targeted on multiple levels to effectively reduce sexual risk behavior. Interventions may be most effective by targeting higher risk groups (e.g., the Drinking/Arrest Expectations class) and by potentially using different and multiple approaches for each group. For instance, expectations for getting seriously drunk in the next year were highest for both the Drinking/Arrest Expectations class and the Student/Drinking Expectations class. Therefore, interventions on multiple levels (e.g., community watch groups and family efforts) may effectively reduce engagement in sexual risk behavior by focusing on reducing tolerance for drinking. Structural interventions may be particularly important as neighborhood and community-level factors have been shown to be associated with these classes of future expectations (Sipsma et al. 2012), and it may be difficult to positively influence expectations if improved expectations do not seem realistic in a given environment. Additionally, the Drinking/Arrest Expectations class reported the highest expectations for getting someone pregnant in the next year. Because our findings suggest this class had the greatest likelihood of becoming an adolescent parent and because strong evidence exists for the intergenerational cycle of adolescent parenthood (Meade et al. 2008; Sipsma et al. 2010), eliminating expectations among parents of their adolescent son or daughter following their behavioral pattern could be critical for reducing sexual risky behaviors. Third, because expectations of being in school appeared to be protective (e.g., Student Expectations class vs. Student/Drinking

Expectations class), even when accompanied by expectations of engaging in delinquent behaviors (*Student/Drinking Expectations* class vs. *Drinking/Arrest Expectations* class), raising expectations for academic engagement could be strongly protective against sexual risk behaviors and should be targeted and perpetuated several levels, including school administrators and staff and parents. Last, the *Victim Expectations* class demonstrated very little heightened risk, except for the relationship identified among females and inconsistent contraception use. Despite this lack of associations, clinicians and policy-level factors, such as access to healthcare, may play a unique and important role here ensuring youth are in optimal health and reassuring youth of their health and of the expectation that they will live a long life. Several strategies on multiple levels therefore may effectively improve future expectations among adolescents and reduce their sexual risk behaviors.

Our findings lend further empirical support to aspects of the positive youth development (PYD) approach (Catalano et al. 2004). The PYD approach aims to foster healthy youth development by capitalizing on several levels of influence, including family members, peers, and community organizations, and emphasizing mentoring and supportive relationships with adults. This preventive approach contrasts other interventions that tend to focus on problems after they have occurred. PYD programs have been shown to be significantly more effective promoting adolescent sexual and reproductive health when positive expectations are clearly articulated to youth participants (Gavin et al. 2010). Thus, the PYD approach aligns well with these findings and appears to be an important step for reducing adolescent sexual risk behavior.

Several studies have suggested that a sizable proportion of adolescents in the US express some desire for pregnancy, which may reasonably be associated with future expectations (Hellerstedt et al. 2001). Pregnancy desire may be derived from an adolescent's future expectations. Both pregnancy desire and future expectations have been shown to be prospectively linked with contraception use and incident pregnancies (Sipsma et al. 2011), but

future research is needed to explore this potential association further. An understanding of this relationship may be another tool to strengthen strategies for preventing adolescent pregnancy.

This study has many strengths, including a large, racially and ethnically diverse sample of adolescents followed prospectively over time, making the NLSY97 an ideal cohort to examine the relationship between future expectations and subsequent sexual risk behavior among adolescents. Furthermore, this theoretically-based analysis used empirically driven and validated latent classes to measure a multidimensional construct of future expectations. The results of this analysis are consistent with previous results (Sipsma et al. 2012), providing further evidence to support this latent class approach. Additionally, we use many covariates from multiple levels of influence derived from Bronfenbrenner's ecological systems theory to control for additional potential effects. This study provides strong evidence for understanding this relationship.

There are, however, limitations to this analysis. First, all measures were self-reported and therefore subject to misclassification. However, audio computer-assisted self-interview (ACASI) technology was used for questions on sexual risk behavior. This approach allowed respondents either to read the questions themselves or to hear them read through headphones and answer privately, improving the validity of responses. Additionally, it is possible that future expectations were shaped by behaviors at baseline, and these classes predicted a trajectory of behavior already in progress. We also found few longitudinal results; the majority of the significant associations are cross-sectional. We believe, however, that these results do not detract from our findings but suggest that these trajectories may be fairly stable throughout the adolescent period. Our findings thus reinforce the importance for developing positive or healthy expectations before the age of 15. As a result, future research should explore expectations earlier in adolescence, and intervention strategies should aim to influence future expectations prior to age 15. Furthermore, it is unknown how consistently adolescents conceptualized the

likelihood of a future event; did they conceptualize likelihood as a probability of future occurrence for themselves or the proportion of older individuals who had engaged in a particular behavior? Future research may qualitatively explore adolescents' conception of future expectations as well as probability of occurrence. Additionally, our analysis was limited to measures collected by the NLSY97, making it impossible to incorporate other factors, such as parental relationship quality and pregnancy desire, that were not part of the dataset. Data on number of pregnancies would have been useful but were not available for most of our analytic sample; therefore, this variable was excluded from our analysis. Missing data is also a limitation. Multiple imputation, however, has been widely recommended and shown to produce more valid estimates over other approaches, such as single imputation and complete case analysis (Little and Rubin 1987; Schafer 1997). Lastly, baseline data were collected in 1997 and thus are more than 15 years old, potentially limiting the generalizability of our findings to more contemporary behavior. We believe, however, that, despite possible changes in the frequencies of sexually risky behaviors during this time period, the associations between expectations and sexual risk behavior are likely to have remained relatively constant.

Conclusion

Future expectations may have a unique ability to explain sexual risk behaviors over time. Our findings demonstrate that associations between future expectations and sexual risk behavior may be stronger for young women than young men. Additionally, our results suggest that a multidimensional conceptualization of future expectations, derived with latent class analysis, offers a strong approach for understanding adolescent sexual risk behaviors. Future strategies should target multiple expectations and use multiple levels of influence (i.e., individual, family, peer, and environmental) to improve individual future expectations. These efforts should begin prior to high school and should continue throughout the adolescent period. Promoting healthy

future expectations demonstrates promise for reducing sexual risk behaviors among adolescents.

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	Age at First Biological Child					
	Unadjusted	Adjusted ¹				
	[HR (95%CI)]	[HR (95%CI)]				
Individual						
Age	0.79 (0.69, 0.91)**	0.74 (0.64, 0.84)**				
	0.57 (0.47, 0.69)**	0.56 (0.46, 0.68)^^				
Race/ethnicity	DEE	DEE				
Non-Black/Non-Hispanic						
Black	2.24 (1.80, 2.79)**	1.48 (1.16, 1.90)^^				
Hispanic	1.91 (1.50, 2.43)**	1.47 (1.14, 1.91)^^				
Worse health	1.62 (1.33, 1.97)**					
Family						
Live w both bio parents	0.52 (0.43, 0.63)**	0.81 (0.65, 1.01)				
Maternal teen birth	2.37 (1.95, 2.88)**	1.73 (1.39, 2.14)**				
Peer						
Enriching peer norms	0.57 (0.50, 0.65)**	0.69 (0.60, 0.79)**				
Deviant peer norms	1.59 (1.43, 1.78)**	1.33 (1.19, 1.49)**				
Environment						
Income: Poverty						
< 1.00	2.21 (1.37, 3.56)**	1.42 (1.06, 1.90)*				
1.00-1.99	1.87 (1.23, 2.87)**	1.42 (1.01, 2.00)*				
≥ 2.00	REF	REF				
Urban area	1.12 (0.90, 1.38)**					
Future Expectations						
Latent class						
Student Expectations	REF	REF				
Student/Drinking Expectations	1.33 (1.04, 1.71)*	1.20 (0.93, 1.55)				
Victim Expectations	1.55 (1.13, 2.12)**	1.18 (0.85, 1.65)				
Drinking/Arrest Expectations	1.95 (1.41, 2.69)**	1.51 (1.09, 2.11)*				
*p≤0.05, **p≤0.01						
¹ AIC = 3332.1, BIC = 3410.5, Sample-size adjusted BIC = 3369.2						

Table 1. Cox proportional hazards model examining future expectations and age at first biological child (n=3,082)

	Number of Sexual Partners (n=3,056) ¹			Inconsistent Contraception Use (n=2,968) ²	
	Intercept	Slope	Quadratic Trend	Intercept	Slope
	[RR (95%CI)]	[RR (95%CI)]	[RR (95%CI)]	[OR (95%CI)]	[OR (95%Cl)]
Individual					
Age	1.29 (1.16, 1.43)**	1.00 (0.89, 1.12)	0.96 (0.92, 1.00)*	1.34 (1.12, 1.60)**	0.93 (0.84, 1.04)
Male	1.64 (1.41, 1.92)**	0.92 (0.78, 1.08)	1.01 (0.96, 1.06)	1.19 (0.92, 1.54)	0.99 (0.86, 1.15)
Race/ethnicity					
Non-Black/Non-Hispanic	REF	REF	REF	REF	REF
Black	1.75 (1.47, 2.09)**	0.66 (0.55, 0.80)	1.11 (1.04, 1.18)**	1.30 (0.95, 1.79)	0.88 (0.73, 1.06)
Hispanic	1.00 (0.81, 1.23)	0.95 (0.77, 1.17)	1.02 (0.95, 1.09)	1.62 (1.16, 2.26)**	1.05 (0.87, 1.27)
Worse health	1.33 (1.13, 1.57)**	0.81 (0.68, 0.96)*	1.04 (0.98, 1.10)	1.77 (1.34, 2.33)**	0.84 (0.72, 0.99)*
Family					
Live with both biological parents	0.55 (0.47, 0.65)**	1.35 (1.15, 1.60)**	0.95 (0.90, 1.00)*	0.55 (0.42, 0.72)**	1.12 (0.96, 1.31)
Maternal teen birth	1.38 (1.17, 1.64)**	0.96 (0.80, 1.14)	0.98 (0.93, 1.04)	1.54 (1.14, 2.07)**	0.95 (0.81, 1.13)
Peers					
Enriching peer norms	0.78 (0.70, 0.87)**	1.00 (0.89, 1.12)	1.03 (0.99, 1.07)	0.64 (0.52, 0.77)**	1.10 (0.99, 1.23)
Deviant peer norms	1.77 (1.61, 1.95)**	0.78 (0.70, 0.86)	1.04 (1.01, 1.08)	1.71 (1.47, 2.00)**	0.98 (0.90, 1.07)
Environment					
Income: Poverty					
< 1.00					
1.00-1.99					
≥ 2.00					
Urban area				0.73 (0.54, 0.98)*	1.09 (0.92, 1.29)
Future Expectations					
Latent class					
Student Expectations	REF	REF	REF	REF	REF
Student/Drinking Expectations	1.80 (1.47, 2.20)**	0.82 (0.67, 1.00)	1.02 (0.96, 1.09)	1.82 (1.30, 2.56)**	0.96 (0.79, 1.17)
Victim Expectations	1.13 (0.87, 1.45)	1.13 (0.86, 1.47)	1.07 (0.97, 1.18)	1.38 (0.88, 2.15)	1.09 (0.85, 1.41)
Drinking/Arrest Expectations	3.25 (2.54, 4.15)**	0.61 (0.47, 0.80)**	0.95 (0.87, 1.04)	4.48 (2.74, 7.33)**	0.85 (0.63, 1.15)

Table 2. Latent growth models examining future expectations and sexual risk outcomes

* $p \le 0.05$, ** $p \le 0.01$; ¹AIC = 26063.1; BIC = 26334.3; Sample-size adjusted BIC = 26191.3

²AIC = 7862.1, BIC = 8048.0, Sample-size adjusted BIC = 8047.4

Figure 1. Conceptual model describing the role of future expectations in behavior among adolescents









Figure 3. Mean number of sexual partners over time by latent class membership



Figure 4. Percentage of inconsistent contraception use over time by latent class membership