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Future Expectations Among Adolescents: A Latent Class Analysis

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Abstract

Future expectations have been important predictors of adolescent development and behavior. Its measurement, however, has largely focused on single dimensions and misses potentially important components. This analysis investigates whether an empirically-driven, multidimensional approach to conceptualizing future expectations can substantively contribute to our understanding of adolescent risk behavior. We use data from the National Longitudinal Survey of Youth 1997 to derive subpopulations of adolescents based on their future expectations with latent class analysis. Multinomial regression then determines which covariates from Bronfenbrenner's ecological systems theory are associated with class membership. After modeling these covariates, we examine whether future expectations is associated with delinquency, substance use, and sexual experience. Our analysis suggests the emergence of four distinct classes labeled the Student Expectations, Student/Drinking Expectations, Victim Expectations, and Drinking/Arrest Expectations classes according to their indicator profiles. These classes differ with respect to covariates associated with membership; furthermore, they are all statistically and differentially associated with at least one adolescent risk behavior. This analysis demonstrates the additional benefit derived from using this multidimensional approach for studying future expectations. Further research is needed to investigate its stability and role in predicting adolescent risk behavior over time.

Keywords

Adolescent; Future expectations; Delinquency; Substance use; Sexual experience

Introduction

Future expectations—the extent to which one expects an event to actually occur—influence goal setting and planning, thereby guiding behavior and development (Bandura 2001; Nurmi 1991; Seginer 2008). They are particularly pertinent for individuals during times of developmental transitions as a way to prepare for the future, and are thus highly relevant to the period of adolescence (Seginer 2008). It is during this time that young men and women strive to establish more adult roles and responsibilities, through a variety of experiences, including exploring romantic relationships, participating in social networks, pursuing employment opportunities, and renegotiating boundaries at home (McCabe and Barnett 2000a).

For the purposes of this study, the construct future expectations is defined as beliefs or expectancies about the likelihood of a specific event occurring in the future (Oettingen and Mayer 2002; Wyman et al. 1993) and is considered influenced by an individual's assessment of contextual factors (Sirin et al. 2004). Because the literature is somewhat inconsistent in its terminology, further detail is provided here. "Future expectations" is considered synonymous with the "prospective life course" perspective of future orientation, which tends to be task-oriented (e.g., family, education, career) and has been shown to help regulate behavior and emotional well-being (Seginer 2008). The "exist" category of future orientation, however, pertains to non-specific experiences (e.g., being happy) and relates more to self-concept than behavior (Bandura 2001; Seginer 2008). Similarly, time perspective or the "cognitive temporal 'bias' toward being past, future, or present oriented" (Zimbardo and Boyd 1999) is conceptually distinct from expectations in that it describes a personality trait as opposed to an attribute derived from contextual or external characteristics. "Density" or "number of events a person expects to experience over future years" (Mindick et al. 1977), however, is relevant here. Furthermore, expectations has been shown to be empirically different from aspirations (Constantine et al. 1998; Simmons 1979), fantasies (Oettingen and Mayer 2002), or wishes (Sagy and Adwan 2006). These constructs tend to overestimate or embellish actual expectancies and are therefore considered to be weaker foundations for behavior (Oettingen and Mayer 2002).

Future expectations have been linked to psychosocial outcomes, resiliency, and risky behaviors among adolescents. Several studies have found positive future expectations linked to improved social and emotional development, particularly among minority and low-income youth (Werner and Smith 1982, 1992; Wyman et al. 1993). Research has also shown links between lower levels or more negative future expectations and greater delinquency (Nurmi 1991; Quinton et al. 1993; Raffaelli and Koller 2005). Understanding subpopulations with future expectations that may lead to risky behavior could assist interventionists in appropriately targeting efforts among youth.

Measurement of future expectations among adolescents is widely inconsistent. Many studies assess single dimensions of future expectations and can refer to several different domains, including education, career, and family. The most common of these tend to focus on educational attainment and occupational outcomes (McCabe and Barnett 2000a). Some examples include expectations of being at university, of attaining a bachelor's degree, and of securing a skilled/professional job (Guijarro et al. 1999; Heinrich 1993; Vernon et al. 1983; McLoyd and Hernandez-Jozefowicz 1996). Other studies have also considered expecting to

live a long life (Bolland et al. 2007; Resnick et al. 1997). Another approach to measuring future expectations is assessing the number of expected positive and/or negative life outcomes with scales such as a Future Events Test (Mindick et al. 1977; Sandler et al. 1992) or the Expectations for Success Scale (Tevendale et al. 2009). It is also not unusual for this measurement approach to be conceptualized as “optimism” (Broaddus and Bryan 2008) or “hopelessness” (Bolland et al. 2007).

Each of these approaches, however, remains limited as they attempt to summarize future expectations without addressing the inherent multidimensional nature of the construct (Nurmi 1991; McCabe and Barnett 2000b). Furthermore, single dimensions or domains of future expectations rely on apriori hypotheses and are not consistently represented throughout the literature, resulting in poor comparability among studies. Additionally, scales or indices that measure only one aspect of future expectations are likely missing important information. For example, high expectations for one event and lower expectations for another event, in sum, can lead to the same score as the opposite responses. These approaches can lead to narrowly-defined and potentially ineffective intervention strategies (McCabe and Barnett 2000b; Murray 1996).

The measurement of future expectations, therefore, should reflect its multidimensional nature and rely on empirical evidence. A latent variable approach, in which participants are grouped into unobservable latent classes defined by clustering of directly observable indicators of interest, may be a good approach for improving our understanding of this construct. This strategy has offered valuable results in adolescent research, such as in the areas of substance use (Chung et al. 2008; Coffman et al. 2007) and disruptive behaviors (de Nijs et al. 2007; Storr et al. 2007). We hypothesized that expectations in these different domains are important in predicting behaviors, although they may not be equally informative; therefore, we supposed that patterns of expectations for multiple domains may be most valuable in identifying specific subpopulations to target for decreasing risky behaviors.

Several factors have been associated with future expectations among adolescents. For example, older adolescents focus more on careers and family than younger adolescents, and girls generally emphasize family more than boys (Raffaelli and Koller 2005). Parents affect an adolescent's future expectations (Dubow et al. 2001; McCabe and Barnett 2000b; McWhirter and McWhirter 2008) by establishing standards, functioning as role models, and propagating belief systems (McCabe and Barnett 2000a; Nurmi 1991). Peer relationships may also influence how an adolescent perceives the future and provide pressure for conforming to their behavior (McCabe and Barnett 2000a; McWhirter and McWhirter 2008; Nurmi 1991). Differences have also emerged by socioeconomic status (Lamm et al. 1976; McCabe and Barnett 2000a) and poverty (Freire et al. 1980; Nurmi 1991; Voydanoff and Donnelly 1990). Lower class adolescents seem to focus more on their career than their education when compared to middle class adolescents (Poole and Cooney 1987).

For this study, Bronfenbrenner's ecological systems theory of development (Bronfenbrenner 1989) was used to guide the investigation of future expectations and its link with adolescent behavior. This model posits the confluence of factors from multiple levels or “spheres of influence” act bidirectionally to prospectively affect behavior (Bronfenbrenner 1989). Common domains include levels of the individual, family, social relationships (peers), and the context or environment. Based on this model, we hypothesize that these concentric domains interrelate to influence an individual's development and future expectations. It is then expected that these expectations in turn, influence behavior. Several scientists have adapted this model to specifically address sexual risk, suggesting its utility for understanding this and other risk behaviors among adolescents (Meade and Ickovics 2005; Aronowitz et al.

2006; DiClemente et al. 2007). As more and more research calls for an integrated and multidimensional approach to understanding health behavior (Malow et al. 2007; DiClemente et al. 2007; Kotchick et al. 2001), it is critical to be guided by such a framework.

This analysis aims to (1) identify subclasses of future expectations using latent class analysis, (2) test associations between these classes and characteristics derived from the ecological systems model in order to more fully describe the classes, and (3) examine the association between latent class and risk behaviors (delinquency, substance use, sexual experience), after controlling for potential confounders. We expected to find multiple classes of future expectations, although the nature and number of the classes were not hypothesized due to the lack of multidimensional approaches used in studying future expectations and the large number of possible combinations of our indicators.

Methods

Participants and Procedures

This analysis used existing data from the National Longitudinal Study of Youth 1997 (NLSY97) which consists of 8,984 respondents born between 1980 and 1984 (response rate = 91.6% at baseline). The NLSY97 oversampled non-Hispanic black and Hispanic youth to ensure more valid statistical analyses of these subpopulations. Approximately half (51.2%) of the participants were male. The mean age on December 31, 1996 was 14.0 years. About one-fourth of the total sample was non-Hispanic black, 21.2% were Hispanic, and 51.9% were non-black/non-Hispanic (U.S. Bureau of Labor Statistics 2009a). Data for this analysis are derived from the 1997/1998 baseline interviews and household screenings. The youth and his/her parent each completed hour long personal interviews. Computer-assisted personal interviews (CAPI), which leads respondents to questions based on their age and prior responses were used.

Data on future expectations were collected only among participants age 15 years or older (U.S. Bureau of Labor Statistics 2009b). Our sample, therefore, was limited to participants age 15 or older at the first interview ($n = 4,231$). This sample was further restricted to those with valid data on at least one of the expectation measures, thereby excluding 698 (16.5%) participants. Additionally, those classified as 'mixed race' ($n = 31$; 0.9%) were excluded because they could not be appropriately reclassified into the existing race/ethnicity categories created by the NLSY97. And lastly, the sample was restricted to the first youth participant in each household excluding 241 (6.9%) for a total sample size of 3,261 for analysis.

Participants included in our analysis were approximately 16 years old on average ($M = 15.9$, $SD = .72$, Range 15–18). Half of the sample (50.3%) was male. Twenty-six percent of the sample was non-Hispanic black, 21% was Hispanic, and 53% was non-black/non-Hispanic. Twenty-one percent of participants lived below the poverty threshold.

An attrition analysis indicated significant differences between participants included and excluded from our analytic sample ($p < 0.1$ adjusted for multiple comparisons, $k = 22$; $p < 0.0045$). Included participants were older on average and had also completed more years of education, were more likely to be employed, had greater peer deviancy and were more likely to have used substances and be sexually experienced compared to excluded participants. Furthermore, compared to excluded participants, included participants also had fewer children in the home on average and were more likely to be non-Hispanic Black, have smaller income to poverty ratios, and have low maternal education. Included participants

were also more likely to be non-Hispanic/non-Black than participants excluded from our analytic sample.

Measures

Future Expectations—Participants were asked at baseline to respond to 8 items asking the percent chance an event would occur in the next year (e.g., “...be a student in a regular school” and “...drink enough to get seriously drunk, at least once”; Table 1). Two items were combined to reduce conditional dependence between items, resulting in 7 indicators used for analysis. All responses ranged from 0 to 100% and were categorized into <25, 25–49, 50–74, and 75% to ensure meaningful categories. This classification system was used consistently to improve and facilitate interpretation.

Sociodemographic Characteristics—Sociodemographic characteristics were selected from the available baseline data based on ecological systems model and previous literature suggesting associations with future expectations and/or adolescent risk behavior (McWhirter and McWhirter 2008; Meade et al. 2008; Nurmi 1991; Raffaelli and Koller 2005; Sipsma et al. 2010). The sociodemographic variables represent levels of the individual, family, peer or environment.

Individual—Age was derived by calculating the difference in years between the interview date and the participant date of birth. Participant sex was self-reported if not obvious to the interviewer. Employment status was created from a detailed self-reported employment history and was dichotomized; employed included those who were currently in the Armed Forces ($n = 4$). Highest grade completed was self-reported by the youth participant; it was retained as continuous for the analysis. Race/ethnicity was created by the NLSY97 to reflect self-reported answers to two questions—one asking participants if they were Hispanic and the other asking them to indicate their race (White; Black or African American; American Indian, Eskimo or Aleut; Asian or Pacific Islander; or other). Categories of this created variable included Black, Hispanic, and non-Black/non-Hispanic. Lastly, youth reported their general health on a scale ranging from excellent (1) to poor (5); the median response was used to dichotomize this variable into good health or better (0) and worse than good health (1).

Family—At baseline, the participant’s parent reported the number of years of education completed by the subject’s biological mother; if unavailable, the residential mother’s education could be substituted. Maternal education was dichotomized into <12 or 12 years. A series of questions asked if the participant currently lived with a “mother/father-figure” and if so, the nature of the relationship (biological, other). From these questions, two dichotomous variables lived with both biological parents and single parent home were derived. Single parent home included homes in which the adolescent lived with one non-biological parent. From the household screening, number of children in home was created to capture the number of people under 18 years old who shared the home with the participant. Maternal age at first birth was also calculated from this roster. Maternal teen birth was a binary variable created to indicate mothers who had their first baby when they were less than 20 years old. Lastly, each parent reported their general health on a 5-point scale ranging from excellent (1) to poor (5); this variable was dichotomized in the same way as the youth’s health to account for its non-normal distribution.

Peer—Youth indicated the percentage of peers who engaged in certain behaviors using a 5-point scale. Deviant peer norms was derived from 5 items asking the percentage of peers who smoke cigarettes, get drunk, belong to gangs, use drugs, and skip school. Enriching peer norms was created from 4 items asking the percentage of peers who participate in

organized activities, plan to go to college, do volunteer work, and go to religious services regularly. Mean scores were computed for each index (Meade et al. 2008; Sipsma et al. 2010).

Environment—Parents reported the gross family income for the past year. Income to poverty ratio was created by the NLSY97 based on the standards set by U.S. Census Bureau from 1996 which accounts for a family's annual income, size, and number of children less than 18 years of age. For our study, this variable was classified into three categories: <1.00, 1.00–1.99, and 2.00. Number of rooms in the home (excluding bathrooms, closets, storage areas and garages) was reported. Lastly, variables indicated census region (northeast, north central, south, or west) and urban area ('yes' or 'no'/'not clear') based on the location of the residence.

Risk Behaviors—These behaviors, measured at baseline, were chosen primarily because they represent the most commonly studied risk behaviors among adolescents.

Delinquency was measured with 10 yes/no items asking participants about their involvement in deviant behaviors. Specifically, questions asked whether a participant had ever run away, carried a gun, belonged to a gang, purposely damaged or destroyed property, stolen something worth less than \$50, stolen something worth more than \$50, committed property crimes, attacked someone to hurt them, sold drugs and been arrested by the police (Child Trends Inc. 1999). Substance use was derived from 3 yes/no questions asking if youth had ever used cigarettes, alcohol, and marijuana (Child Trends Inc. 1999). For both indices, responses were summed for participants; higher scores indicated higher levels of delinquency and substance use, respectively. And lastly, ever had sex was a single dichotomous question (yes/no) asking participants if they had ever had sexual intercourse.

Statistical Analysis

To identify classes of future expectations, we used latent class analysis (LCA) with maximum likelihood estimation with standard errors robust to non-normal data. LCA allows similar participants to be classified into groups (latent classes) based on observed indicators without making traditional modeling assumptions (normality, homogeneity of error terms, etc.; McCutcheon 1987; Muthén and Muthén 2000; Hagenaars and McCutcheon 2002). Future expectations items were used as indicators of class membership. The most appropriate number of classes was determined by using four criteria recommended by Muthén and Muthén (2000): the Bayesian Information Criteria (BIC), Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT), entropy (a measure of the appropriateness of classification), and the usefulness and interpretability of the latent classes. We also examined three additional criteria commonly used in the literature (Shelvin et al. 2007; Kohl and Macy 2008) since a combination of statistical indicators may be most useful in determining the optimal model. These statistics included the Akaike Information Criteria (AIC), the sample-size adjusted BIC (SSABIC), and the likelihood ratio Chi-squared (LRX²). The AIC, BIC, and SSABIC are information statistics that indicate goodness of fit; lower values represent better fitting models. The LRX² is a measure of model fit, where non-significant *p*-values suggest acceptable fit, and higher entropy values suggest better classification. Last, the LMR-LRT can be used to compare models with different numbers of classes; a non-significant *p*-value indicates that the model with one fewer classes is acceptable. The optimal model was the one with the fewest number of distinct classes to offer meaningful results (Connell and Frye 2006; Muthén and Muthén 2000). Because LCA assumes that within each latent class observations are conditionally independent (not related), the log-odds ratio check (LORC) (Garrett and Zeger 2000) was used to investigate dependence. Final classes exhibited minimal dependence between indicators.

After latent classes were determined, multinomial regression tested associations between these classes and sociodemographic characteristics. We used the actual classification (i.e., the class to which participants most likely belong) instead of classification probability, because we wanted the results to have the most clinical and practical relevance by making the results more translatable for evidence-based interventions (Hagenaars and McCutcheon 2002). Backwards elimination was used to derive the final multinomial regression model by removing non-significant parameters individually until all remaining covariates significantly contributed to the model ($p < 0.05$).

Lastly, we explored the relationships between latent class membership and reported risk behaviors. Linear regression was used to model delinquency; ordinal regression was used to model the four discrete categories of substance use (0–3) and binary logistic regression was used to model sexual experience (ever had sex). All sociodemographic characteristics that were significantly associated with class membership in the multinomial regression model were entered into each model. A second model including class membership as dummy variables was run to determine changes in model fit. This second model demonstrated the independent associations between class and risk behaviors, after controlling for potential confounders.

In each multivariate modeling approach, approximately 10% of responses were missing. Because a complete case analysis could potentially bias results (Little and Rubin 1987), we used multiple imputation to handle missing data. Multiple imputation has been shown to produce valid parameter inferences among large samples, assuming the data are missing at random (Little and Rubin 1989; Schafer 1997). In this analysis we imputed 5 sets of data for each of our models (Rubin 1987) using SAS 9.1.3 (SAS Institute Inc., Cary, NC 2008). Lastly, because we are not interested in extrapolating our results to the population level but rather are strictly interested in exploring relationships among variables of interest, we did not use sampling weights. This decision follows NLSY97 recommendations (Moore et al. 2000) and other literature suggesting that use of sampling weights in this case could produce biased estimates with overly large standard errors (Winship and Radbill 1994). Analyses were conducted with SPSS 16.0 for Windows (SPSS Inc., Chicago, IL 2007) and MPLus Version 4.21 (Muthén & Muthén, Los Angeles, CA 1998–2007).

Results

Overall results are displayed in Table 1. The vast majority of participants believed it was highly likely (75%) that they would be in school the following year. Most youth also believed they were more likely than not to be working more than 20 h a week. The majority believed they had less than a 25% chance of getting (someone) pregnant, getting drunk, being the victim of a violent crime, being arrested, or dying in the next year.

The optimal number of classes was based on the statistics presented in Table 2. Statistics were inconsistent across models. The LRX² suggested all models had acceptable model fit, and the LMR-LRT supported the 2-class model. Furthermore, the AIC and BIC supported 6 classes and 3 classes, respectively; however, both the SSABIC and entropy measures supported the 4-class model. Additionally, the interpretability of the models (not shown) also suggested the presence of four distinct latent classes.

These four classes are described in both Table 1 and Fig. 1 and were labeled according to their most unique characteristic(s). The most populous class ($n = 2,292$; 70.2%) was characterized by a high certainty of being enrolled in school and low certainty of working in the next year. This class has very low expectations of becoming (or getting someone) pregnant, getting drunk, being arrested, being a victim of a violent crime, and dying in the

next year. This class was labeled the 'Student Expectations' class. The second largest class ($n = 513$; 15.7%) reported high chances of being enrolled in school; relatively low likelihoods of working more than 20 h, becoming (getting someone) pregnant, getting arrested, being a victim, and dying; and moderately high chances of getting drunk in the next year. This class was therefore named the 'Student/Drinking Expectations' class. The third latent class ($n = 256$; 7.9%), was labeled the 'Victim Expectations' class because it had the largest percentage of participants expecting victimization in the next year. Over 78% of participants thought it was likely (50% chance) they would be a victim of a violent crime, and approximately 94% of participants thought it was likely they would die in the following year. Most of this class reported high chances of being in school and moderate chances of working more than 20 h a week. The fourth and final latent class ($n = 200$; 6.1%) perceived the lowest chances of being enrolled in school and the highest chances of working in the next year. This class also reported the highest expectations of becoming (getting someone) pregnant, getting drunk and being arrested in the next year and moderately high chances of victimization. This class was called the 'Drinking/Arrest Expectations' class.

Table 3 displays the bivariate associations between latent class and sociodemographic predictors across levels derived from the ecological model. The majority of these factors were significantly different by class and all levels of the model demonstrated importance by contributing constructs to the multivariate analysis. Variables selected for building the multinomial regression model were those that were significant at $p < 0.2$, after adjusting for multiple comparisons using a Bonferroni correction ($k = 19$, excluding risk behaviors; $p = 0.01$). Sixteen variables, therefore, were eligible for entry in the final model.

The final multinomial regression model suggested several differences between classes (Table 4). On the individual level, older participants had greater odds of being members of the Drinking/Arrest Expectations class and male participants had greater odds of being members of the Victim and Drinking/Arrest Expectations classes compared to the Student Expectations class. Non-Hispanic black and Hispanic participants had greater odds of being members of the Victim Expectations class than the Student Expectations class, and non-Hispanic black participants had lower odds of being members of the Drinking/Arrest Expectations class compared to the Student Expectations class. Participants with worse health had greater odds of being members of the Student/Drinking, Victim, and Drinking/Arrest Expectations classes compared to the Student Expectations class. On the family level, participants who lived with both biological parents had lower odds and participants who had a mother who gave birth as a teen had greater odds of being members of the Drinking/Arrest Expectations class compared to the Student Expectations class. No other differences between classes emerged on this level. On the peer level, participants with higher enriching peer norms had lower odds of being members of the Drinking/Arrest Expectations class compared to the Student Expectations class; and participants with increased peer deviancy had greater odds of being members of the Student/Drinking, Victim, and Drinking/Arrest Expectations classes relative to the Student Expectations class. Last, on the environment level, participants living in an urban area had greater odds and participants living below the poverty threshold had lower odds of being members of the Student/Drinking Expectations class compared to the Student Expectations class.

Overall, participants reported a mean of 1.6 ($SD = 2.05$) delinquent acts committed and a mean of 1.4 ($SD = 1.18$) substances used. Approximately 38% of participants reported ever having had sex. In the bivariate analysis, these risk behaviors were all significantly associated with class (all $p < 0.01$; Table 3). Multivariate regression models indicated that class was significantly associated with these risk behaviors, after controlling for potential confounders (Table 5). Membership in the Student/Drinking, Victim, and Drinking/Arrest Expectations classes was associated higher delinquency scores than the Student

Expectations class; on average, participants in these classes had mean delinquency scores 0.70, 0.33, and 2.04 units, respectively, higher than the Student Expectations class. Membership in the Student/Drinking Expectations class and the Drinking/Arrest Expectations class was also significantly associated with increased odds of substance use compared to the Student Expectations class. Membership in these classes was associated with two-fold and almost five-fold greater odds of substance use, respectively, compared to the Student Expectations class. And lastly, compared to the Student Expectations class, membership in these classes was also statistically related to increased odds of ever having sex. Membership in the Student/Drinking Expectations class was associated with a 1.5 times greater odds of ever having sex than membership in the Student Expectations class and membership in the Drinking/Arrest class suggested almost a 3.5 times greater odds of ever having sex compared to the Student Expectations class. Compared to the Student Expectations class, membership in the Victim Expectations class did not confer significantly different odds of substance abuse or ever having sex.

Discussion

Our findings support the conceptualization of future expectations as a multidimensional construct that may be poorly represented by a single item. Many of the indicators used to construct the classes were meaningfully different across most classes. For instance, expectations of getting drunk in the next year were low (12%) for the Student and Victim Expectations classes, higher (36%) among the Student/Drinking Expectations class and highest (75%) among the Drinking/Arrest Expectations class. Expectations of dying in the next year also demonstrated meaningful differences, with the Student Expectations class reporting the lowest expectations on average (11%), followed by the Student/Drinking Expectations class (26%), the Drinking/Arrest Expectations class (39%) and the Victim Expectations class (52%).

Multiple indicators are therefore necessary to differentiate between subpopulations of adolescents. None of the individual items used in our analysis sufficiently represents the classes and their corresponding associations with risk behavior. In fact, the items pertaining to school, employment and family perform the worst at differentiating sub-populations. These indicators alone suggest evidence for only two classes, which would overlook groups associated with more moderate risk behaviors, such as the Student/Drinking and the Victim Expectations classes. Furthermore, although the expectation of dying depicts differences across the four classes, our evidence suggests that it may not correctly describe the risk associated with membership in each class. Based on this single indicator, membership in the Victim Expectations class would be associated with the greatest propensity for adolescent risk behaviors; however, our results suggest that this assumption may not be true.

Thus, LCA was effective at differentiating subpopulations of adolescents according to their expectations and should be considered in future research. For adolescent interventions, it may be often assumed that there are two subpopulations of adolescents—the lower risk and the higher risk groups. Our LCA partially supports these contentions in the emergence of both the Student Expectations and the Drinking/Arrest Expectations classes. The Student Expectations class seems to reasonably represent many of high school students who have the lowest likelihoods of being involved in risk behaviors. Conversely, the Drinking/Arrest Expectations class seems to reasonably represent many of the adolescents who have the greatest likelihoods of being involved in risk behaviors; as membership in this class is strongly related to behavior, above and beyond traditional risk factors, it warrants additional attention by intervention strategists.

LCA, however, supported the emergence of two additional classes not commonly discussed in the literature. The Student/Drinking Expectations class was the second largest class that emerged from the analysis. Membership in this class was strongly related to engaging in delinquency, substance use and sexual activity. Members' increased likelihood for risk behaviors may be derived from greater household incomes by which they can obtain access to substances. Furthermore, this economic standard also may afford these students more time to become involved in these behaviors by not needing to work, and living in a more urban or economically developed context may suggest that both parents are employed, which could result in more unsupervised time. This class may suggest a sub-population for intervention that is conceptually different from those commonly targeted.

The Victim Expectations class was composed of participants expecting fairly high likelihoods of victimization or dying in the next year. Membership in this class could represent those who have experienced trauma. Symptoms of post-traumatic stress may include vulnerability (Davidson et al. 1991) and could explain the expectations espoused by this class. Alternatively, membership could have been driven by minority status, with expectations derived from experiences of those with the same race/ethnicity. Membership in the Victim Expectations class was associated with delinquency, although it was not related to substance use or sexual experience. The association with delinquency may be due the perceived need to protect oneself. The delinquency items that were endorsed disproportionately more often by members of the Victims Expectations class included having ever carried a gun, ever belonged to a gang, and ever attacked to hurt or fight. Their endorsement may also indicate that these behaviors resulted in expectations of victimization. If this is the case, however, it seems that these participants would have also engaged disproportionately more in sexual intercourse and substance use than the Student Expectations class. More research is needed to more fully understand this class and its potential for risk behaviors.

Our study has several strengths, including the use of a large, racially and ethnically diverse sample to explore the role of future expectations in adolescent risk behavior. This study also used a novel analytic approach to empirically derive classes of future expectations based on multiple indicators. In light of persistent unexplained risk behavior, novel approaches are important for determining new areas for intervention. The associations between these classes and risk behaviors validate this approach and offers evidence for its use in future research.

Lastly, this research was theoretically grounded, using the ecological model to account for characteristics from multiple domains of influence. Constructs from each level of the model (individual, family, peer and environment) significantly contributed to the understanding of our classes. Furthermore, the significant associations between the variables from each domain and the risk behaviors under study reinforce the benefit of using such a model to gain a greater understanding of future expectations and control for potential confounding. We therefore maintain that our theoretical approach provided a solid foundation from which to examine future expectations and risk behaviors among adolescents.

There are, however, several limitations to this analysis. For instance, the cross-sectional design prevents conclusions about causality. More prospective research is needed to determine how future expectations might predict behavior throughout adolescence. Secondly, the analytic sample was substantively different from the population sampled by the NLSY97. An attrition analysis suggested differences largely based on age and household size such that included participants were significantly older and from homes with fewer children. Although these differences were primarily derived from the criteria used to select the analytic sample, they limit the generalizability of the results accordingly. Third, we were limited to variables collected by the NLSY97 for our analytic sample. For instance, no data

was collected on parental relationship quality among this subgroup of participants and therefore could not be studied in this analysis. And last, all measures were self-reported; however, the use of CAPI reduces the likelihood of nondifferential and differential misclassification.

Our research confirms the importance of future expectations in understanding adolescent risk behaviors. It also demonstrates the multidimensional nature of the construct and confirms a latent class approach as an effective technique for studying this construct. These results are both relevant and important for studies looking to further explore motivations for adolescent behavior. As the field of adolescent research moves beyond traditional educational approaches to incorporate multidimensional psychosocial constructs and multidimensional guiding frameworks, future expectations may continue to emerge as important drivers of behavior. Future research should examine precursors of expectations, such as familial and environmental influences. Parental expectations may be particularly relevant in setting youth expectations as has been suggested by work on the intergenerational cycle of teenage motherhood and fatherhood (Meade et al. 2008; Sipsma et al. 2010). Furthermore, future research should examine its stability and role in predicting adolescent risk behavior over time.

Interventions should target risk behaviors along the levels of the ecological model (individual, family, peer, and environment) that address making positive and realistic future expectations for adolescents. Incorporating ideals from the positive youth development movement and the possible selves theory (Oyserman et al. 2002) may be particularly important in shaping youth expectations which then in turn will influence behaviors. Our results suggest that interventions need to be tailored to distinct subpopulations and to address disparate future expectations. Continuing to invest in our youth will empower them to achieve more positive futures and build healthier homes and safer communities.

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Fig. 1.
Future expectations profile by latent class

Table 1

Participant future expectations, overall and by latent class

What is the percent chance that you will...one year from now/in the next year?	Overall*	Latent class		Student/drinking expectations (<i>n</i> = 513, 15.7%)	Victim expectations (<i>n</i> = 256, 7.9%)	Drinking/arrest expectations (<i>n</i> = 200, 6.1%)	<i>p</i> -value*
		Student expectations (<i>n</i> = 2,292, 70.2%)					
Be a student in a regular school?							
0–24%	156 (4.8%)	89 (3.9%)	10 (1.9%)	18 (7.0%)	39 (19.5%)		<0.001
25–49%	21 (0.6%)	11 (0.5%)	10 (1.9%)	0 (0.0%)	0 (0.0%)		
50–74%	183 (5.6%)	82 (3.6%)	38 (7.4%)	22 (8.6%)	41 (20.5%)		
75–100%	2,897 (88.8%)	2,107 (91.9%)	455 (88.7%)	215 (84.0%)	120 (60.0%)		
Missing	4 (0.1%)	3 (0.1%)	0 (0.0%)	1 (0.4%)	0 (0.0%)		
Be working for pay more than 20 h per week? ^a							
0–24%	519 (15.9%)	448 (19.5%)	42 (8.2%)	29 (11.3%)	0 (0.0%)		<0.001
25–49%	290 (8.9%)	202 (8.8%)	65 (12.7%)	7 (2.7%)	16 (8.8%)		
50–74%	1223 (37.5%)	814 (35.5%)	234 (45.6%)	109 (42.6%)	66 (33.0%)		
75–100%	1,176 (36.1%)	780 (34.0%)	171 (33.3%)	107 (41.8%)	118 (59.0%)		
Missing	53 (1.6%)	48 (2.1%)	1 (0.2%)	4 (1.6%)	0 (0.0%)		
Become pregnant/get someone pregnant?							
0–24%	2,803 (86.0%)	2,173 (94.8%)	367 (71.5%)	182 (71.1%)	81 (40.5%)		<0.001
25–49%	173 (5.3%)	51 (2.2%)	97 (18.9%)	9 (3.5%)	16 (8.0%)		
50–74%	218 (6.7%)	35 (1.5%)	41 (8.0%)	61 (23.8%)	81 (40.5%)		
75–100%	37 (1.1%)	13 (0.6%)	3 (0.6%)	1 (0.4%)	20 (10.0%)		
Missing	30 (0.9%)	20 (0.9%)	5 (1.0%)	3 (1.2%)	2 (1.0%)		
Drink enough to get seriously drunk, at least once?							
0–24%	2,311 (70.9%)	1,899 (82.9%)	194 (37.8%)	213 (83.2%)	5 (2.5%)		<0.001
25–49%	227 (7.0%)	95 (4.1%)	109 (21.2%)	18 (7.0%)	5 (2.5%)		
50–74%	402 (12.3%)	157 (6.8%)	145 (28.3%)	12 (4.7%)	88 (44.0%)		
75–100%	305 (9.4%)	127 (5.5%)	63 (12.3%)	13 (5.1%)	102 (51.0%)		
Missing	16 (0.5%)	14 (0.6%)	2 (0.4%)	0 (0.0%)	0 (0.0%)		
Be the victim of a violent crime at least once?							
0–24%	2,410 (73.9%)	2,151 (93.8%)	154 (30.0%)	47 (18.4%)	58 (29.0%)		<0.001

What is the percent chance that you will...one year from now/in the next year?	Overall*	Latent class		* p-value		
		Student expectations (n = 2,292, 70.2%)	Student/drinking expectations (n = 513, 15.7%)	Victim expectations (n = 256, 7.9%)	Drinking/arrest expectations (n = 200, 6.1%)	
25–49%	336 (10.3%)	59 (2.6%)	247 (48.1%)	7 (2.7%)	23 (11.5%)	
50–74%	427 (13.1%)	41 (1.8%)	106 (20.7%)	188 (73.4%)	92 (46.0%)	
75–100%	46 (1.4%)	2 (0.1%)	4 (0.8%)	13 (5.1%)	27 (13.5%)	
Missing	42 (1.3%)	39 (1.7%)	2 (0.4%)	1 (0.4%)	0 (0.0%)	
Be arrested, rightly or wrongly, at least once?						<0.001
0–24%	2,683 (82.3%)	2,235 (97.5%)	270 (52.6%)	130 (50.8%)	48 (24.0%)	
25–49%	247 (7.6%)	14 (0.6%)	210 (40.9%)	23 (9.0%)	0 (0.0%)	
50–74%	272 (8.3%)	21 (0.9%)	30 (5.8%)	99 (38.7%)	122 (61.0%)	
75–100%	37 (1.1%)	3 (0.1%)	0 (0.0%)	4 (1.6%)	30 (15.0%)	
Missing	22 (0.7%)	19 (0.8%)	3 (0.6%)	0 (0.0%)	0 (0.0%)	
Die from any cause—crime, illness, accident, and so on?						<0.001
0–24%	2,148 (65.9%)	1,853 (80.8%)	226 (44.1%)	14 (5.5%)	55 (27.5%)	
25–49%	292 (9.0%)	105 (4.6%)	157 (30.6%)	0 (0.0%)	30 (15.0%)	
50–74%	686 (21.0%)	242 (10.6%)	123 (24.0%)	224 (87.5%)	97 (48.5%)	
75–100%	46 (1.4%)	14 (0.6%)	0 (0.0%)	16 (6.2%)	16 (8.0%)	
Missing	89 (2.7%)	78 (3.4%)	7 (1.4%)	2 (0.8%)	2 (1.0%)	

* p-values from Pearson Chi-square tests

^aItem was derived from two separate indicators to reduce conditional dependence within classes. One item asked about working if the participant was in school a year from now and the other asked about working if the participant was not in school a year from now. The equation used to combine these items weighted the likelihood of each response and was as follows: (% chance in school * % chance working if in school) + [(1 – % chance in school) * % chance working if not in school]

Table 2

Fit indices for latent class models with 2–6 classes

Model	LRV ² (df)	p	AIC	BIC	SSABIC	LRT	p	Entropy
2 classes	2,500.039 (16,289)	1.000	33,057.943	33,319.804	33,183.178	1,676.590	<.001	0.718
3 classes	2,241.928 (16,266)	1.000	32,863.199	33,259.035 ^a	33,052.502	237.410	0.7898	0.690
4 classes	2,197.079 (16,250)	1.000	32,781.684	33,311.496	33,035.059 ^a	124.814	1.000	0.729 ^a
5 classes	2,104.486 (16,230)	1.000	32,722.570	33,386.358	33,040.016	102.538	1.000	0.678
6 classes	2,101.307 (16,212)	1.000	32,706.134 ^a	33,503.896	33,087.652	60.099	1.000	0.687

^aBest-fitting model according to that statistic

Table 3

Participant characteristics and risk behaviors by latent class

	Latent class			<i>p</i> -value [*]
	Student expectations	Student/drinking expectations	Victim expectations	Drinking/arrest expectations
<i>Individual</i>				
Age at baseline	15.8 ± 0.72	15.9 ± 0.70	15.9 ± 0.71	16.0 ± 0.74
Male	1,117 (48.7%)	257 (50.1%)	132 (51.6%)	134 (67.0%)
Employed	775 (34.0%)	200 (39.3%)	78 (30.5%)	75 (37.9%)
Highest grade completed	9.2 ± 0.97	9.2 ± 0.94	9.1 ± 0.97	9.0 ± 1.11
Race/ethnicity				
Non-Black/Non-Hisp	1278 (55.8%)	272 (53.0%)	95 (37.1%)	97 (48.5%)
Black	572 (25.0%)	125 (24.4%)	102 (39.8%)	51 (25.5%)
Hispanic	442 (19.3%)	116 (22.6%)	59 (23.0%)	52 (26.0%)
Worse youth health	567 (24.7%)	159 (31.0%)	103 (40.2%)	86 (43.0%)
<i>Family</i>				
Low maternal education	475 (22.0%)	105 (21.6%)	67 (27.6%)	60 (31.1%)
Low paternal education	397 (20.7%)	102 (22.9%)	68 (32.9%)	45 (28.7%)
Single parent home	686 (29.9%)	162 (31.6%)	105 (41.0%)	89 (44.7%)
Live with both bio parents	1,216 (53.1%)	247 (48.1%)	98 (38.3%)	71 (35.5%)
No. children in home	2.2 ± 1.27	2.2 ± 1.20	2.3 ± 1.24	2.2 ± 1.27
Maternal teen birth	529 (25.1%)	139 (28.7%)	79 (34.6%)	72 (38.7%)
Worse parental health	826 (40.7%)	183 (40.0%)	104 (44.3%)	99 (56.2%)
<i>Peer</i>				
Enriching peer norms	3.0 ± 0.70	2.9 ± 0.69	2.8 ± 0.74	2.6 ± 0.70
Deviant peer norms	2.6 ± 0.87	2.8 ± 0.81	3.0 ± 0.96	3.3 ± 0.81
<i>Environment</i>				
Income: poverty				
<1.00	332 (20.2%)	68 (18.3%)	50 (25.9%)	52 (34.0%)
1.00–1.99	318 (19.4%)	68 (18.3%)	45 (23.3%)	34 (22.2%)
2.00	993 (60.4%)	235 (63.3%)	98 (50.8%)	67 (43.8%)
Census region				
Northeast	419 (18.3%)	88 (17.2%)	37 (14.5%)	24 (12.0%)

	Latent class				<i>p</i> -value [*]
	Student expectations	Student/drinking expectations	Victim expectations	Drinking/arrest expectations	
North central	552 (24.1%)	117 (22.8%)	64 (25.0%)	45 (22.5%)	
South	857 (37.4%)	196 (38.2%)	103 (40.2%)	73 (36.5%)	
West	464 (20.2%)	112 (21.8%)	52 (20.3%)	58 (29.0%)	
Urban area	1625 (70.9%)	403 (78.6%)	195 (76.2%)	150 (75.0%)	0.002
Number of rooms in home	6.4 ± 2.02	6.3 ± 2.04	5.9 ± 1.90	6.0 ± 1.79	<0.001
<i>Risk behaviors</i>					
Delinquency	1.3 ± 1.73	2.2 ± 2.19	1.9 ± 2.22	4.1 ± 2.76	<0.001
Substance use	1.3 ± 1.15	1.8 ± 1.14	1.5 ± 1.16	2.4 ± 0.87	<0.001
Ever had sex	735 (32.5%)	224 (44.2%)	119 (47.0%)	146 (74.5%)	<0.001

Values presented are mean ± SD for continuous variables and *N*(%) for categorical variables

* *p*-values derived from *F* statistics for continuous covariates and χ^2 statistics for categorical

Table 4

Multinomial regression model using sociodemographic characteristics derived from the ecological model to predict class membership (imputed)

	Latent class [OR (95% CI)]			
	Student expectations	Student/drinking expectations	Victim expectations	Drinking/arrest expectations
<i>Individual</i>				
Age at baseline	1.00	1.02 (0.89, 1.17)	1.06 (0.88, 1.27)	1.35 (1.09, 1.67) **
Male	1.00	1.15 (0.95, 1.40)	1.35 (1.03, 1.77) *	2.96 (2.13, 4.12) **
Race/ethnicity				
Non-Black/Non-Hispanic	1.00	1.00	1.00	1.00
Black	1.00	0.90 (0.69, 1.18)	1.84 (1.30, 2.60) **	0.60 (0.39, 0.91) *
Hispanic	1.00	1.20 (0.91, 1.58)	1.64 (1.12, 2.40) *	1.10 (0.71, 1.69)
Worse youth health	1.00	1.32 (1.06, 1.64) *	1.76 (1.33, 2.33) **	2.00 (1.45, 2.75) **
<i>Family</i>				
Live with both bio parents	1.00	0.88 (0.71, 1.09)	0.77 (0.58, 1.04)	0.67 (0.48, 0.94) *
Maternal teen birth	1.00	1.20 (0.95, 1.53)	1.18 (0.88, 1.60)	1.54 (1.08, 2.20) *
<i>Peer</i>				
Enriching peer norms	1.00	0.95 (0.82, 1.09)	0.93 (0.76, 1.13)	0.77 (0.61, 0.97) *
Deviant peer norms	1.00	1.33 (1.19, 1.49) **	1.55 (1.31, 1.83) **	2.61 (2.17, 3.14) **
<i>Environment</i>				
Income: poverty				
< 1.00	1.00	0.73 (0.54, 0.99) *	0.92 (0.63, 1.35)	1.27 (0.82, 1.95)
1.00–1.99	1.00	0.82 (0.63, 1.07)	1.01 (0.69, 1.47)	1.05 (0.69, 1.60)
2.00	1.00	1.00	1.00	1.00
Urban area	1.00	1.40 (1.10, 1.77) **	1.02 (0.75, 1.39)	0.98 (0.69, 1.40)

* $p < 0.05$;

** $p < 0.01$

Table 5

Regression models examining the association between latent class and risk behaviors, controlling for potential confounders (imputed)^a

	Delinquency ^b B (SE)	Substance use OR (95% CI)	Ever had sex OR (95% CI)
<i>Sociodemographic factors</i>			
Age	−0.12 (0.04) **	1.15 (1.05, 1.26) **	1.46 (1.31, 1.63) **
Male	1.01 (0.06) **	1.23 (1.08, 1.41) **	1.47 (1.25, 1.73) **
Race/ethnicity			
Non-Black/Non-Hispanic	Ref	Ref	Ref
Black	−0.44 (0.08) **	0.36 (0.30, 0.43) **	1.76 (1.44, 2.17) **
Hispanic	−0.21 (0.09) *	0.67 (0.56, 0.81) **	1.03 (0.82, 1.29)
Worse youth health	0.37 (0.08) **	1.46 (1.25, 1.70) **	1.41 (1.18, 1.68) **
Live with both biological parents	−0.42 (0.07) **	0.62 (0.54, 0.72) **	0.60 (0.51, 0.71) **
Maternal teen birth	−0.11 (0.08)	0.95 (0.81, 1.11)	1.29 (1.06, 1.56) **
Enriching peer norms	−0.27 (0.05) **	0.81 (0.73, 0.89) **	0.73 (0.65, 0.82) **
Deviant peer norms	0.55 (0.04) **	1.78 (1.65, 1.92) **	1.67 (1.51, 1.84) **
Income: poverty			
<1.00	−0.20 (0.10) *	0.59 (0.48, 0.72) **	1.11 (0.87, 1.41)
1.00–1.99	0.01 (0.10)	0.82 (0.68, 0.99) *	1.08 (0.84, 1.39)
2.00	Ref	Ref	Ref
Urban area	0.10 (0.07)	1.05 (0.91, 1.21)	0.83 (0.69, 0.99) *
<i>Latent classes</i>			
Class			
Student expectations	Ref	Ref	Ref
Student/drinking expectations	0.70 (0.09) **	2.19 (1.83, 2.62) **	1.47 (1.19, 1.82) **
Victim expectations	0.33 (0.13) *	1.17 (0.90, 1.51)	1.19 (0.89, 1.60)
Drinking/arrest expectations	2.04 (0.19) **	4.75 (3.49, 6.48) **	3.45 (2.38, 5.00) **

*
p<0.05;

**
p<0.01

^a Delinquency was modeled using linear regression; substance use was modeled using ordinal logistic regression; and ever had sex was modeled using binary logistic regression

^b Although theoretically an ordinal variable, delinquency had more than 10 categories (scores ranged 0–10) and thus could be reasonably considered a continuous variable for analytic purposes (Torra et al. 2006)