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A Latent Class Analysis of Maternal Responsiveness and Autonomy-Granting in Early Adolescence: Prediction to Later Adolescent Sexual Risk-Taking

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Abstract

The present study sought to extend empirical inquiry related to the role of parenting on adolescent sexual risk-taking by using latent class analysis (LCA) to identify patterns of adolescent-reported mother responsiveness and autonomy-granting in early adolescence and examine associations with sexual risk-taking in mid- and late-adolescence. Utilizing a sample of 12- to 14-year-old adolescents ($N = 4,743$) from the 1997 National Longitudinal Survey of Youth (NLSY97), results identified a four-class model of maternal responsiveness and autonomy-granting: low responsiveness/high autonomy-granting, moderate responsiveness/moderate autonomy-granting, high responsiveness/low autonomy-granting, high responsiveness/moderate autonomy-granting. Membership in the low responsiveness/high autonomy-granting class predicted greater sexual risk-taking in mid- and late-adolescence compared to all other classes, and membership in the high responsiveness/moderate autonomy-granting class predicted lower sexual risk-taking. Gender and ethnic differences in responsiveness and autonomy-granting class membership were also found, potentially informing gender and ethnic disparities of adolescent sexual risk-taking.

Keywords

autonomy-granting; latent class analysis; responsiveness; sexual risk-taking

As children transition into adolescence, parents are faced with critical choices that will have significant effects on their child's development, including likelihood of engaging in risk-taking behaviors. Autonomy-granting is a key parenting dimension marking this transition period, as adolescents begin to seek out more responsibility and self-sufficiency (Steinberg, 2001; Zimmer-Gembeck & Collins, 2006). The amount of choice parents give children in setting limits on daily activities is commonly used as a behavioral proxy of autonomy-granting (Silk, Morris, Kanaya, & Steinberg, 2003; Spear & Kulbok, 2004), and the level of autonomy-granting given to adolescents in their daily activities is associated with various developmental outcomes, including academic functioning, self-esteem, and risk of delinquency and substance use (Bámaca-Colbert, Gay-les, & Lara, 2011; Dobkin et al., 1997; Kurdek, Fine, & Sinclair, 1995; Mounts, 2004). In conjunction with autonomy-granting, parental responsiveness is vital for positive development, with an abundance of literature linking responsiveness with lower levels of internalizing symptoms and risk

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behaviors, and better school functioning (Bogenschneider & Pollack, 2008; Bradley, Corwyn, Burchinal, McAdoo, & Coll, 2003; Rothbaum & Weisz, 1994). Although commonly examined as a component of parenting style (Baumrind, 1991; Darling & Steinberg, 1993), an evaluation of responsiveness with autonomy-granting during the developmental period when autonomy-granting emerges is likely to identify underlying patterns of responsiveness and autonomy-granting linked to positive or negative developmental outcomes, such as sexual risk-taking. Specifically, assessing combinations of responsiveness and autonomy-granting in early adolescence prior to mid- and late-adolescence, when risk-taking becomes more prominent, may inform which adolescents and families should be targeted for risk prevention and intervention efforts.

Parental responsiveness in conjunction with autonomy-granting in early adolescence may be vital to prevention of future risk-taking behavior, as this developmental period is marked by increased autonomy seeking and time spent with peers; consequently, caregivers likely need to adjust their limit setting to enable appropriate development of adolescent autonomy but also maintain a sense of support and restrictiveness to mitigate deviant behaviors with peers that may persist and exacerbate into adolescence. Although significant research has linked responsiveness and autonomy-granting to adolescent health-risk behaviors outcomes (e.g., Bogenschneider & Pallock, 2006; Cleveland, Gibbons, Gerrard, Pomery, & Brody, 2005; Estrada-Martinez, Padilla, Caldwell, & Schulz, 2011; Mounts, 2004), relatively less has been done to examine relations between these parenting dimensions and adolescent sexual risk-taking. Potentially, adolescents who engage in sexual-risk-taking may be less influenced by parenting practices aimed at reducing risky sexual behaviors (e.g., monitoring) if caregivers discourage adaptive sociocognitive development or decision-making skills through developmentally appropriate responsiveness and autonomy-granting. Indeed, studies have shown greater parental responsiveness is related to delay of sexual activity or sexual risk-taking behavior among adolescents (Fasula & Miller, 2006; Trejos-Castillo & Vazsonyi, 2009; Velez-Pastrana, Gonzalez-Rodriguez, & Borges-Hernandez, 2005). Additionally, higher levels of autonomy-granting from parents have been linked to lower likelihood of sexual intercourse initiation among early adolescents (Turner, Irwin, Tschann, & Millstein, 1993). These findings suggest that adolescents lacking a supportive familial context and/or with limited autonomy may be more vulnerable to sexual risk-taking in adolescence as expectations and/or reinforcement of behavior is not developmentally appropriate. Adolescents receiving lower levels of responsiveness from mothers may seek out other sources of emotional support, such as romantic partners (Freeman & Brown, 2001) and are more able to involve themselves in sexually risky behavior with romantic partners as a result of poor parental limit setting (Sneed, Stachman, Nguyen, & Morisky, 2009). Conversely, parents encouraging developmentally appropriate autonomy and providing a responsive environment are likely to have adaptive communication with their children, which may encourage development of social and cognitive maturity in adolescents leading to lower sexual risk-taking (Rodgers, 1999). Developing adaptive decision-making skills earlier in adolescence may mitigate sexual risk-taking later in adolescence, when the influence of peers on risk-taking behaviors is heightened (Steinberg, 2008).

Moreover, although there is a growing literature and interest in identifying whether relations between parental dimensions of responsiveness and autonomy-granting and risk-taking behaviors differ by ethnicity (e.g., Cox, 2006; Estrada-Martinez et al., 2011; Kapungu, Holmbeck, & Paikoff, 2006; Mounts, 2004), there is currently a dearth of studies that have examined whether parental responsiveness and autonomy-granting levels differs by child ethnicity or gender. Some researchers have posited that ethnic minority adolescents are exposed to less behavioral autonomy-granting as a result of parenting being heavily influenced by the context a family resides in, which for ethnic minorities may include heightened exposure to violence, discrimination, and deviant peers (Brody et al., 2001;

Julian, McKenry, & McKelvey, 1994; Sampson, Morenoff, & Raudenbusch, 2005). Consequently, caregivers may feel the need to limit adolescent's autonomy to prevent exposure to an environment that can influence engagement in risky behavior. However, Mounts (2004) found that the level of autonomy-granting across African American, Latino, and White adolescents did not significantly differ. Available studies have also reported greater parental responsiveness among White and Latino adolescents compared to African American adolescents (Fagan, 2000; Freeman & Newland, 2002). In terms of gender, females may receive less autonomy-granting than males, especially when residing in homes with traditional gender role attitudes (Bumpus, Crouter, & McHale, 2001). Potentially mothers may be more inclined to limit daughters' autonomy as socialization processes identify females as more vulnerable and needing protection from dangerous or risky situations (Li, Feigelman, & Stanton, 2000; Rodgers, 1999). Given the lack of empirical work examining ethnic and gender differences of parental responsiveness and autonomy-granting, evaluating whether certain ethnic or gender groups are more likely to endorse patterns of mother responsiveness and autonomy-granting that predict greater risk of sexual risk-taking may inform efforts aimed at decreasing ethnic and gender disparities in adolescent sexual risk-taking, which indicate that African Americans and females begin an earlier onset of risky sexual behavior compared to Whites, Latinos, and males, respectively (Centers for Disease Control and Prevention [CDC], 2006, 2008; Johnson & Tyler, 2007; Moore et al., 2000; Weinstock, Berman, & Cates, 2004).

In order to gain a better understanding of whether responsiveness, in conjunction with autonomy-granting, in early adolescence is a predictor of future adolescent sexual risk-taking, a person-centered approach was utilized. Specifically, latent class analysis (LCA) was used over traditional classification methods, as these methods may be limiting our ability to understand relations between parenting dimensions and child developmental outcomes. Past work has commonly classified individuals into subgroups marked by differing levels of parenting dimensions by using cutoff points based typically on midpoint split, tertile split, or endorsement of one-item measures (e.g., Berge, Wall, Bauer, & Neumark-Sztainer, 2010; Bronte-Tinkew, Moore, & Carrano, 2006; Huebner & Howell, 2003; Jackson, Henriksen, & Foshee, 1998). Imposing arbitrary cutoff points makes it difficult to compare across samples and generalize findings; additionally, some participants may be excluded from analyses if they do not meet criteria for predetermined typologies. This decreases researchers' ability to accurately predict outcomes or identify individuals who could benefit most from prevention or intervention efforts (Lamborn et al., 1991; Nylund, Bellmore, Nishina, & Graham, 2007b). To account for the limitations of the traditional identification methods, person-centered approaches, such as LCA, may prove useful for identifying classes based on parenting dimensions. LCA has been used to inform a variety of topics in the social, health, and behavioral sciences, including defining groups based on levels of peer victimization and/or aggression (Giang & Graham, 2008; Nylund et al. 2007b); substance use (Carlson, Wang, Falck, & Siegal, 2005; Chen et al., 2004); and depression (Lanza, Flaherty, & Collins, 2003). The objective of person-centered analyses is to identify subtypes of individuals that exhibit similar patterns of response, unlike variable-centered approaches that attempt to identify relations between variables and apply these relations across the entire sample (Bergman & Magnusson, 1997; Bergman, Magnusson, & El-Khouri, 2003). Although a few studies examining parenting practices or behaviors have used LCA (e.g., Berge et al., 2010; Guttentag, Pedrosa-Josic, Landry, Smith, & Swank, 2006), no studies to date have used the LCA approach to identify latent classes of parenting dimensions of responsiveness and autonomy-granting.

The current study used a LCA approach to ascertain the underlying patterns of mother responsiveness and autonomy-granting reported in a national sample of early adolescents. As autonomy-granting becomes an increasingly important parenting dimension during the

transition from childhood to adolescence, and parental responsiveness is seen as a vital dimension across child and adolescent development, we were interested in evaluating the underlying patterns of responsiveness and autonomy-granting during this unique developmental period. We hypothesized that the class characterized by the lowest level of mother responsiveness and highest level of autonomy-granting would be associated with the greatest likelihood of adolescent sexual risk-taking at mid- and late-adolescence, and those reporting exposure to a developmentally appropriate level of autonomy-granting (moderate) with high levels of responsiveness would be associated with lowest likelihood of sexual risk-taking. In terms of gender differences, males were expected to endorse classes characterized by higher mother autonomy-granting. As for ethnic differences, we hypothesized that African Americans and Latinos would have a greater likelihood of belonging to classes characterized by lower mother autonomy-granting.

Method

Participants

Participants were recruited from the 1997 National Longitudinal Survey of Youth (NLSY97), an ongoing longitudinal study sponsored by the Bureau of Labor Statistics, U.S. *Department of Labor* that has followed American youth born between 1980 and 1984 from 1997 (Round 1) to the present (most current data available is from 2008, Round 12). The survey includes extensive data on education, employment, family, physical and mental health, sexual activity, and substance use. At Round 1, 8,984 individuals (51% males; 12–18 years) were interviewed. The current study used data from 1997 through 2003, when all adolescents had turned 18 years old.

In order to ensure sufficient data to examine patterns of maternal responsiveness and autonomy-granting in early adolescence, the study included 4,743 adolescents who were 12 to 14 years old at the Round 1 interview and responded to questions about parents' behaviors before or at age 14. Initially 4,833 adolescents were interviewed at 12 to 14 years at Round 1, but 90 did not provide information on maternal responsiveness or autonomy-granting. No demographic differences were found between these 90 adolescents and the 4,743 adolescents used in the analyses. Of the 4,743 participants, 51.2% were male; 25.7% were 12-year-olds, 36.3% 13-year-olds, and 38.0% 14-year-olds; and 49.9% were White, 25.3% African American, 21.0% Latino, and 3.9% of "other" ethnicity.

Also, attrition resulted in some missingness of sexual risk-taking in mid- and late-adolescence. At age 16, 12.2% ($n = 579$) of adolescents did not have sexual risk-taking data and at age 18, 13.7% ($n = 651$) did not have sexual risk-taking data. Although missingness analyses indicated that adolescents with or without sexual risk-taking data did not differ in terms of age, gender, ethnicity, or endorsement of responsiveness and autonomy-granting items, it is unknown if they differed in degree of sexual risk-taking.

Procedure

Both the adolescent and primary maternal caregiver (most often biological mother) participated separately in an hour-long interview at Round 1. Adolescents were then interviewed annually. Informed consent was obtained from caregivers and assent from adolescents. Caregivers provided demographic information during the initial interview (Round 1). Maternal responsiveness and autonomy-granting were assessed with adolescent report during the initial interview, when adolescents were between 12 and 14 years. Adolescent sexual risk-taking was then assessed with adolescent report at 16 and 18 years. Measures of sexual behavior were taken from the round of interviews corresponding to each adolescent's age.

Measures

Mother responsiveness—Adolescents reported on their mother’s level of responsiveness with an adapted version of the Parent-Youth Relationship Scale (Conger & Elder, 1994). Five items ($\alpha = .99$) reflecting mother responsiveness were used (“How often does she praise you for doing well?”; “How often does she criticize you or your ideas?”; “How often does she help you do things that are important to you?”; “How often does she blame you for her problems?”; “How often does she make plans with you and cancel for no good reason?”). Adolescents responded on a scale ranging from 1 (*never*) to 5 (*always*); direction of responsiveness varied by item.

Mother autonomy-granting—Adolescents reported on their mother’s level of autonomy-granting with a three-item Control/Autonomy Scale (U.S. Department of Labor, 1999): “Who sets the limits on how late you stay out at night?”; “Who sets the limits on who you can hang out with?”; “Who sets the limits on what kinds of TV shows or movies you can watch?” ($\alpha = .98$). Adolescents endorsed a response category (0 = *parent*, 1 = *youth*, 2 = *parent and youth*) for each item.

Sexual risk-taking—A sexual risk-taking behavior score was computed from adolescent report of three items for each corresponding year (ages 16 and 18): number of sexual partners, number of incidents of sexual intercourse, and percentage of condom use (computed as times of condom use divided by times of sexual intercourse). Applying the approach demonstrated by Coley, Votruba-Drzal, and Schindler (2009), each item was first standardized as a 0-to-10 scale based on decile distribution of the measure. A response of “none” was indicated with a value of zero; otherwise, a value of 1 to 10 for each item based on the corresponding location of each response on a decile distribution. The sexual risk score was the sum of the assigned values across the three measures, with percentage of condom use reversed before summation. The score ranged from 0 to 30, with higher scores indicating higher sexual risk-taking.

Analysis—LCA derives latent classes of individuals by examining patterns among the observed categorical indicators (e.g., level of mother responsiveness and autonomy-granting) and classifies individuals who respond similarly into latent classes (Hagenaars & McCutcheon, 2002; Lanza, Collins, Lemmon, & Schafer, 2007; Nylund et al., 2007b). LCA is an iterative process using full information maximum likelihood estimation, which uses data from individuals with information on at least one indicator variable. Statistical analysis consisted of three LCA modeling approaches. First, model-building steps were taken to select the best fitting class model of responsiveness and autonomy-granting. Second, child ethnicity and gender were introduced as covariates to the best fitting class model. Third, prediction from the best fitting model with distal outcomes of sexual risk-taking was assessed. Mplus version 6 (Muthén & Muthén, 1998–2010) was utilized.

To identify the best fitting latent class model for the data, statistical indices, parameter estimates, and conceptual/practical implications are considered (Collins & Lanza, 2009; Lanza et al., 2007; Nylund et al., 2007b). The unconditional model is first specified (i.e., one-class model), which is then used as a comparison for an increasing number of classes until the models specified no longer converge or the results are no longer useful for application and/or interpretation. In terms of statistical indices, commonly used indicators of model fit are the Bayesian Information Criterion (BIC; Schwartz, 1978), the Sample-Size Adjusted Bayesian Information Criterion (ABIC; Sclove, 1987), the Akaike Information Criterion (AIC; Akaike, 1974), and the Lo-Mendell-Rubin likelihood ratio test (LMR LRT; Lo, Mendell, & Rubin, 2001). Although there is no “gold standard” or definitive indicator(s) for deciding on the number of classes, the BIC is viewed as the most consistent indicator for

determining the best fitting model (Collins, Fidler, Wugalter, & Long, 1993; Hagenaars & McCutcheon, 2002; Magidson & Vermunt, 2004; Nylund, Asparouhov, & Muthén, 2007a). Interpretability of classes is also a key factor in determining model selection. Class probabilities are used to assess if class sizes are meaningful for conceptualization and represent a significant proportion of the sample. Item-response probabilities refer to the likelihood that an individual in a given latent class will endorse an item. They are used to determine if individuals in each latent class are generally characterized by similar response patterns to the observed indicators. Also, parsimony is preferred in deciding the number of classes that best fit the data.

Associations among mother responsiveness and autonomy-granting class membership and both child ethnicity and gender were assessed using LCA with covariates. This procedure considers predictors of class membership by estimating logistic regression coefficients. The beta parameter is set to 0 for the reference class; setting the parameter thusly allows for estimation of log-odds that indicate an endorsement of a covariate for a certain class relative to the reference class. To determine whether certain patterns of responsiveness and autonomy-granting in early adolescence predicted sexual risk-taking in mid- or late-adolescence, sexual risk-taking at 16 and 18 years were treated as distal outcomes in the LCA model with covariates. The mean of sexual risk-taking at each time point was examined to identify significant differences across responsiveness and autonomy-granting classes.

Results

Descriptive Statistics

Response categories for each mother responsiveness and autonomy-granting item, along with the numbers and percentage of adolescents for whom each category was endorsed are presented in Table 1. A response rate of at least 1% was given for each type of response across each indicator. Across responsiveness items, adolescent endorsement of mother's responsiveness was positively skewed toward greater responsiveness. Most adolescents endorsed the praise (94.6%) and help (93.9%) indicators with the "sometimes" to "always" response categories, and the criticize (90.1%), blame (95.6%), and cancels plans (95.8%) indicators with the "never" to "sometimes" response categories. As for mothers' autonomy-granting levels, most adolescents (66.6%) reported that their mother decided curfew and only 3.0% stated they had sole control over curfew. Compared to the curfew indicator, limits on TV and "who [they could] hang out with" were more evenly distributed among response categories.

In terms of sexual risk-taking at age 16, African American and Latino adolescents did not differ from non-African American ($M = 140.56$ African American vs. $M = 122.94$ non-African American; $t(4741) = 1.62, p > .05$) and non-Latino ($M = 139.96$ Latino vs. $M = 124.05$ non-Latino; $t(4741) = 1.37, p > .05$) adolescents, respectively. However, a marginally significant trend indicated that White adolescents had a lower sexual risk-taking score than non-White adolescents ($M = 119.04$ White vs. $M = 135.71$ non-White; $t(4741) = -1.77, p < .10$). At age 18, no differences were found among African American and non-African American ($M = 140.39$ African American vs. $M = 148.38$ non-African American; $t(4741) = -.70, p > .05$), Latino and non-Latino ($M = 158.59$ Latino vs. $M = 143.11$ non-Latino; $t(4741) = 1.37, p > .05$), and White and non-White ($M = 149.24$ White vs. $M = 144.49$ non-White; $t(4741) = .38, p > .05$) adolescents. There were no differences in sexual risk-taking at age 16 among females and males ($M = 128.03$ male vs. $M = 126.72$ female; $t(4741) = .14, p > .05$), but at age 18 males engaged in higher sexual risk-taking than females ($M = 160.50$ male vs. $M = 131.51$ female; $t(4741) = 2.94, p < .01$). Sexual risk-taking at age 16 and 18 were positively correlated ($r = .33, p < .01$).

Latent Class Analysis

Model selection—Latent classes were identified based on responses to items measuring mother responsiveness and autonomy-granting. Table 2 presents the statistical fit indices for five-class models (the six-class model did not converge). Model selection is generally based on a scree-like test, in which better fitting models are represented where the indices begin to level off (Giang & Graham, 2008). The four-class model had the lowest BIC (71244.22) and the greatest decrease in BIC value from the one-class unconditional model ($\Delta\text{BIC} = -2796.78$). Although the AIC was smaller in the five-class model (70404.67) compared to the four-class model (70552.52), the AIC and BIC often do not identify the same model as optimal (Collins & Lanza, 2009) and it is typical for the BIC to favor a more parsimonious model than the AIC (e.g., Strauss, Rindskopf, Astone-Twerell, Des Jarlais, & Hagan, 2006). The LMR LRT p values in the last column of Table 2 show that the addition of further classes improved model fit up to the three-class model. Because different indicators pointed to different models as best fitting, the three-, four-, and five-class models were further explored before deciding on the best fitting model.

Examination of parameter estimates supported the four-class model as best fitting the data. Evaluation of item-response probabilities involve an assessment of both separation, or distinctiveness, across classes, as well as homogeneity within classes to assign a meaningful label to each class that accurately reflects the item-response patterns (Collins & Lanza, 2009; Lanza et al., 2007). Table 3 presents item-response probabilities of each class for the four-class model. The columns represent the identified classes and their underlying patterns of responsiveness and autonomy-granting. The rows include each mother responsiveness and autonomy-granting item and the frequency of endorsement of each response category for each identified class. The four-class model was found to be most interpretable, with classes that appeared fairly homogenous within classes and distinct across classes. All class sizes were found to be substantial as well. The four-class model was also conceptually meaningful, as this model distinguished adolescents with low to high levels of mother responsiveness and low to high levels of mother autonomy-granting. Additionally, the BIC value, widely regarded as the most reliable index of class fit (Collins et al. 1993; Hageaars & McCutcheon, 2002; Magidson & Vermunt, 2004; Nylund et al., 2007a), was lowest in the four-class model, and indices began to level off significantly after the four-class model as well.

Identified classes—Classes were labeled based on the pattern of mother responsiveness and autonomy-granting reported by adolescents. Twelve percent of adolescents belonged to a class characterized by low levels of responsiveness and high levels of autonomy-granting (low responsiveness/ high autonomy-granting); 13% were categorized into a class with high levels of responsiveness and low levels of autonomy-granting (high responsiveness/ low autonomy-granting); 34% were identified in a class with moderate levels of responsiveness and autonomy-granting (moderate responsiveness/ moderate autonomy-granting); and the remaining 41% belonged to a class characterized by high levels of responsiveness and moderate levels of autonomy-granting (high responsiveness/moderate autonomy-granting).

Adolescents in the low responsiveness/high autonomy-granting class reported the lowest levels of mother responsiveness compared to the other classes, as well as high levels of autonomy-granting. The majority of adolescents reported they had control over activities, particularly whom they interacted with and amount of TV time allotted. Those in the high responsiveness/ low autonomy-granting class endorsed generally high levels of mother responsiveness and also reported that their mothers largely solely set limits on activities. Adolescents in the moderate responsiveness/moderate autonomy-granting class endorsed item responses reflecting moderate to high levels of responsiveness, and a wider range of

responses in terms of autonomy-granting compared to other classes. The majority of adolescents stated they set limits, or to a lesser extent, shared limit setting with their mother, regarding whom they interacted with and TV time allotted. However, most reported having mothers who solely set limits on curfew. Last, adolescents in the high responsiveness/moderate autonomy-granting class endorsed high levels of responsiveness similar to the responsiveness levels in the high responsiveness/low autonomy-granting class. In terms of autonomy-granting, the majority of adolescents stated they had sole responsibility or shared responsibility regarding with whom they interacted and TV time allotted. They also reported that they either shared limit setting with their mother or their mother solely set limits on curfew. Thus, mothers' autonomy-granting levels were more moderate compared to the high responsiveness/low autonomy-granting class.

LCA with covariates—Child ethnicity and gender were added as covariates to the four-class model to determine whether ethnicity and/or gender were associated with particular responsiveness and autonomy-granting class memberships. Because introduction of covariates may change the underlying latent structure of classes and model fit, covariates were also added to the three- and five-class models to assess model fit and class structure. The four-class model remained the best fitting, and latent class structure remained intact. Each class was used as a reference group in a series of logistic regressions, in which the latent responsiveness and autonomy-granting class variable was regressed on binary ethnicity variables (African American vs. non-African American, Latino vs. non-Latino, White vs. non-White) and a binary child gender variable. Covariate comparisons were made between the specified reference class and the other classes (e.g., low responsiveness/high autonomy-granting vs. high responsiveness/low autonomy-granting; low responsiveness/high autonomy-granting vs. moderate responsiveness/moderate autonomy-granting; low responsiveness/high autonomy-granting vs. high responsiveness/moderate autonomy-granting). Table 4 highlights significant associations among child ethnicity and gender with responsiveness and autonomy-granting classes using the low responsiveness/high autonomy-granting class as a reference group.

In terms of ethnicity, African American and Latino adolescents had a greater likelihood of having a mother in the low responsiveness/high autonomy-granting class compared to the high responsiveness/low autonomy-granting ($\beta = 2.02, p < .001, OR = 7.54$ for African American; $\beta = 1.38, p < .01, OR = 3.97$, for Latino), moderate responsiveness/moderate autonomy-granting ($\beta = 1.62, p < .001, OR = 5.05$ for African American; $\beta = 1.43, p < .01, OR = 4.18$ for Latino), and high responsiveness/moderate autonomy-granting ($\beta = 1.54, p < .001, OR = 4.68$ for African American; $\beta = 1.51, p < .01, OR = 4.52$ for Latino) classes compared to non-African American and non-Latino adolescents, respectively. On the other hand, White adolescents had a greater likelihood of having mothers in the high responsiveness/low autonomy-granting class than the high responsiveness/moderate autonomy-granting class ($\beta = .76, p < .05, OR = 2.15$), and also had a greater likelihood of having mothers in the moderate responsiveness/moderate autonomy-granting class than the high responsiveness/moderate autonomy-granting class ($\beta = 1.08, p < .001, OR = 2.94$).

In terms of gender, males had a greater likelihood of having a mother who was in the low responsiveness/high autonomy-granting class than the high responsiveness/low autonomy-granting ($\beta = .68, p < .001, OR = 1.97$), moderate responsiveness/moderate autonomy-granting ($\beta = 1.04, p < .001, OR = 2.83$), and high responsiveness/moderate autonomy-granting ($\beta = .84, p < .001, OR = 2.32$) classes compared to females. Males also had a greater likelihood of having mothers in the high responsiveness/low autonomy-granting class than the moderate responsiveness/moderate autonomy-granting class ($\beta = .36, p < .01, OR = 1.43$) compared to females.

Distal outcomes—The predictive validity of the four-class model with covariates was tested by examining whether later adolescent sexual risk-taking differed across responsiveness and autonomy-granting classes in early adolescence. Sexual risk-taking at mid-adolescence (age 16) and late-adolescence (18) was separately analyzed as distal outcomes. Mean scores of sexual risk-taking differed significantly for several of the pairwise class comparisons.

A comparison of mean sexual risk-taking across classes at age 16 and 18 is presented in Table 5. Results indicated that at age 16, mean sexual risk-taking was greater among adolescents in the low responsiveness/high autonomy-granting class compared to the high responsiveness/low autonomy-granting ($\chi^2 = 3.98, p < .05$), moderate responsiveness/moderate autonomy-granting ($\chi^2 = 7.56, p < .01$), and high responsiveness/moderate autonomy-granting ($\chi^2 = 19.59, p < .001$) classes. Conversely, mean sexual risk-taking was lower for adolescents in the high responsiveness/moderate autonomy-granting class compared to the low responsiveness/high autonomy-granting ($\chi^2 = 19.59, p < .001$), high responsiveness/low autonomy-granting ($\chi^2 = 10.19, p < .01$), and moderate responsiveness/moderate autonomy-granting ($\chi^2 = 5.40, p < .05$) classes. At 18 years, mean sexual risk-taking was greater in the low responsiveness/high autonomy-granting class than the high responsiveness/moderate autonomy-granting class ($\chi^2 = 5.73, p < .05$). Sexual risk-taking was lower in the high responsiveness/low autonomy-granting class compared to the moderate responsiveness/moderate autonomy-granting class ($\chi^2 = 4.57, p < .05$), and lower in the high responsiveness/moderate autonomy-granting class than the low responsiveness/high autonomy-granting ($\chi^2 = 5.73, p < .05$), and moderate responsiveness/moderate autonomy-granting ($\chi^2 = 7.23, p < .01$) classes.

Discussion

The purpose of this study was to (a) identify underlying patterns of mother responsiveness and autonomy-granting in early adolescence; (b) determine whether certain patterns of mother responsiveness and autonomy-granting in early adolescence predict lower or higher risk for sexual risk-taking in mid- and late-adolescence; and (c) evaluate ethnic and gender differences among adolescents' endorsement of mother responsiveness and autonomy-granting. The majority of adolescents reported that their mothers exhibited high levels of responsiveness but differed in level of autonomy-granting (low vs. moderate). Membership in the low responsiveness/high autonomy-granting class predicted higher levels of sexual risk-taking, and membership in the high responsiveness/moderate autonomy-granting class predicted lower levels of sexual risk-taking, particularly in mid-adolescence. Male adolescents had a greater likelihood of belonging to the low responsiveness/high autonomy-granting class. African American and Latino adolescents also had a greater likelihood of belonging to the low responsiveness/high autonomy-granting class, raising questions of whether previously reported disparities in sexual risk behavior among these groups may be explained by a higher likelihood of exposure to less adaptive parenting during early adolescence.

Consideration of both responsiveness and autonomy-granting levels in early adolescence underscores the utility of examining these parenting dimensions jointly for identifying future adolescent sexual risk-taking. As expected, the class with the lowest levels of responsiveness and highest levels of autonomy-granting predicted greater sexual risk-taking at age 16 compared to all other classes. At age 18, sexual risk-taking was greater in the low responsiveness/high autonomy-granting class than the high responsiveness/moderate autonomy-granting class. A possible explanation is that adolescents may respond to this lack of responsiveness by seeking out romantic partners as sources of support, warmth, and responsiveness (Freeman & Brown, 2001). Those adolescents seeking out support from

romantic partners who are also given more opportunity to set their own limits on behaviors like who they hang out with and curfew may be more likely to engage in deviant peer behavior, including sexual risk-taking with romantic partners (Sneed et al., 2009). Earlier formed romantic relationships in the context of higher autonomy may increase the likelihood of engaging in sexual behaviors, which may escalate in risk over time. Low responsiveness and high autonomy-granting by mothers in early adolescence seems particularly problematic as it predicts an earlier risk of sexual risk-taking compared to all other classes. As adolescence progresses, it does not appear to have as much of an influence, although the increased rate of sexual behavior in late adolescence/young adulthood may have potentially reduced the influence of low responsiveness and high autonomy-granting on these types of risk behaviors as sexual behaviors in general become developmentally appropriate.

Additionally, examining the level of mother responsiveness and autonomy-granting across classes, differences distinguishing these groups do not appear large in magnitude, suggesting that parenting prevention/intervention efforts may only need to encourage slight modifications in parenting style to achieve a lower risk of problem behavior in adolescence. Indeed, the prediction of lower sexual risk-taking by the high responsiveness/moderate autonomy-granting class supports the idea that minor changes in parenting may lead to significant reduction in adolescent sexual risk behavior. Findings suggest that high levels of responsiveness with moderate levels of autonomy-granting is an adaptive pattern for parents to endorse as children transition into adolescence, as it appears to be in line with developmental changes involving increased autonomy during adolescence (Zimmer-Gembeck & Collins, 2006), which may explain the lower risk of sexual risk-taking. Moderate levels of autonomy-granting may provide adolescents with necessary limits and restrictions to mitigate negative developmental outcomes (e.g., delinquency, antisocial behavior), but are not extreme enough to restrict adolescents' desire to be more self-reliant and responsible in their behavior (Eccles, Buchanan, Flanagan, & Fuligni, 1991; Mason, Cauce, Gonzales, & Hiraga, 1996; Steinberg, Elmen, & Mounts, 1989). Furthermore, continuing to provide high levels of responsiveness may thwart adolescents from meeting needs for emotional support from romantic partners, which may encourage riskier sexual behavior earlier in adolescence. Parents who aim to sustain their governance but also modify it to allow adolescents more autonomy in daily activities as they seek to establish an individual identity may prevent adolescents from engaging in unwanted risky sexual behavior in adolescence.

The current study also sought to identify child ethnic and gender differences in patterns of mother responsiveness and autonomy-granting to potentially form a better understanding of how ethnic and gender disparities in adolescent sexual risk-taking emerge. African American and Latino adolescents had a greater likelihood of belonging to the low responsiveness/ high autonomy-granting class compared to other classes, and White adolescents had a greater likelihood of belonging to the high responsiveness/ low autonomy-granting or moderate responsiveness/moderate autonomy-granting classes than the high responsiveness/moderate autonomy-granting class. Although it may appear that the high levels of autonomy-granting given to ethnic minority adolescents in this study contrasts somewhat with past studies indicating that ethnic minorities generally report higher levels of limit setting by mothers (Freeman & Newland, 2002; Kelley, Power, & Wimbush, 1992), it is important to note that autonomy-granting items asked were limited to daily activities and not indicative of behavioral control, a separate parenting dimension. Potentially ethnic minorities are more likely to be given autonomy in daily activities like TV watching but are also more likely to be controlled in terms of family responsibilities. Moreover, although ethnic minority adolescents in the sample were more likely to belong to the low responsiveness/ high autonomy-granting class than other classes, and this class predicted greater sexual risk-taking, sexual risk-taking did not differ by ethnicity. Thus, the

implications of ethnic differences in mother responsiveness and autonomy-granting for explaining disparities in sexual risk-taking should be taken with caution. As for child gender, males were more likely to belong to the low responsiveness/high autonomy-granting, and males did report greater sexual risk-taking at age 18 (but not 16) than females, suggesting that males with greater sexual risk-taking in late adolescence may be at least partially explained by the tendency for mothers to give males less responsiveness and more autonomy compared to females. This was expected as mothers may be less concerned about sons' exposure to risky situations than daughters (Li et al., 2000; Rodgers, 1999), which may encourage males to seek out these experiences at a higher rate than females. Future work should examine ethnicity by gender interactions to address whether more specificity among groups can be identified in exposure to mother responsiveness and autonomy-granting, which may further inform previously reported sexual risk-taking disparities.

Several limitations of the study need to be considered. First, a proportion of adolescents (12% at age 16; 14% at age 18) did not have data on sexual risk-taking; consequently, it is unknown whether these individuals sexual risk-taking was significantly different and whether this could have impacted findings. Second, additional sensitivity analysis using multiple informants of mother responsiveness and autonomy-granting as well as sexual risk-taking may be needed to mitigate potential biases due to adolescents reporting both parenting dimensions and sexual risk-taking. Third, although LCA revealed that mothers' level of responsiveness and autonomy-granting was best presented as four different response patterns, adolescents' report of mother responsiveness was highly positively skewed. Whether the high levels of mother responsiveness reported are generalizable remain to be seen. Fourth, because the majority of adolescents reported that mothers had sole control over their curfew, homogeneity of the autonomy-granting dimension was not as high as desired and made interpretability of autonomy-granting level for each class somewhat difficult. However, adolescents' responses about their mothers limiting their curfew is developmentally appropriate, as these adolescents were 12 to 14 years old and therefore less likely to be going out without their parents than older adolescents. Fifth, although the relationship between mother responsiveness and autonomy-granting in early adolescence and sexual risk-taking in mid- and late-adolescence was assessed, prior sexual risk-taking in early adolescence was not controlled for; thus, the potential effect of early sexual risk-taking on mother responsiveness and autonomy-granting is not known. Last, it is unknown how contextual influences, particularly socioeconomic status (SES), affected findings related to ethnic differences, as ethnicity and SES is strongly confounded, and whether changes in adolescent's family context (e.g., structure, SES) influenced findings between early adolescent mother responsiveness and autonomy-granting and later sexual risk-taking.

Despite these limitations, application of the study's findings may enhance current research strategies as well as prevention and intervention efforts to mitigate adolescent sexual risk-taking behavior. Adopting moderate levels of autonomy-granting in conjunction with high levels of responsiveness may be especially beneficial for reducing the likelihood of sexual risk-taking in adolescence. Interventions aimed at encouraging high responsiveness alongside moderate autonomy-granting are likely to help parents interact with their youth in ways that are developmentally appropriate for adolescents seeking self-sufficiency and responsibility but still needing guidance, support, and supervision by parents (DiClemente et al., 2008; Kirby, 2001). Furthermore, adolescents identified in the low responsiveness/high autonomy-granting class represent a small, but significant proportion of adolescents (12%) who should be targeted for high-risk prevention and intervention efforts to mitigate sexual risk-taking in adolescence. This can ultimately have a highly beneficial effect on adolescent's developmental outcomes, as past evidence has shown that sexual risk-taking in adolescence is related to numerous negative correlates and sequelae, such as sexually transmitted diseases, antisocial behavior, and substance use (Aalsma, Tong, Wiehe, & Tu,

2010; Tapert, Aarons, Sedlar, & Brown, 2001; Weinstock et al., 2004). Although ethnic and gender differences in mother responsiveness and autonomy-granting patterns may inform gender and ethnic disparities of sexual risk-taking in adolescence, the lack of sexual-risk-taking disparities among ethnicity in the sample limits the implications of these findings. Future work should continue to assess parenting dimensions underlying responsiveness and autonomy-granting in adolescence to inform which underlying patterns more accurately predict positive and negative physical, behavioral, and socioemotional outcomes across adolescence.

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Table 1

Item Response Frequencies ($N = 4,743$)

Item response	Mother responsiveness				
	Never	Rarely	Sometimes	Usually	Always
Item	n (%)				
Praise	72 (1.5)	181 (3.9)	892 (19.2)	1,528 (32.9)	1,976 (42.5)
Criticize	1,673 (36.0)	1,416 (30.5)	1,097 (23.6)	303 (6.5)	159 (3.4)
Help	97 (2.1)	186 (4.0)	712 (15.3)	1,520 (32.7)	2,135 (45.9)
Blame	3,231 (69.5)	837 (18.0)	378 (8.1)	120 (2.6)	83 (1.8)
Cancel plans	2,935 (63.2)	999 (21.5)	517 (11.1)	134 (2.9)	62 (1.3)
Mother autonomy-granting					
Item response	Parent	Adolescent	Parent and adolescent		
Item	n (%)				
Curfew	2,326 (66.6)	103 (3.0)	1,062 (30.4)		
TV	1,135 (32.5)	1,267 (36.3)	1,093 (31.3)		
Hangout	769 (22.0)	1,689 (48.4)	1,034 (29.6)		

Table 2

Latent Class Model Fit Indices ($N = 4,743$)

Classes	Log likelihood	Free parameters	BIC	Adjusted BIC	AIC	LMR LRT p value for $k-1$
1	-36910.57	26	74041.22	73958.60	73873.14	N/A
2	-35765.86	53	719,80.34	71811.93	71637.73	.001
3	-35363.35	80	71403.86	711149.65	70886.70	.001
4	-35169.26	107	71244.22	70904.21	70552.52	.77
5	-35066.84	134	71267.91	70842.10	70404.67	.76

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; LMR LRT = Lo-Mendell-Rubin likelihood ratio test. Class 4 values are in bold because Class 4 was ultimately selected as the best-fitting model.

Table 3

4-Class Item-response Probabilities

	Responsiveness and autonomy-granting classes																			
	Low responsiveness/ high autonomy-granting (Class 1)					High responsiveness/ low autonomy-granting (Class 2)					Moderate responsiveness/ moderate autonomy-granting (Class 3)					High responsiveness/ moderate autonomy-granting (Class 4)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Item response																				
Mother responsiveness																				
Praise	.09	.20	.44	.12	.15	.01	.02	.15	.22	.61	.00	.02	.30	.54	.14	.00	.01	.04	.27	.69
Criticize	.10	.15	.38	.23	.13	.48	.14	.25	.09	.05	.21	.46	.30	.03	.00	.53	.30	.12	.03	.02
Help	.12	.21	.33	.15	.19	.02	.00	.10	.18	.71	.00	.04	.27	.55	.14	.00	.00	.01	.27	.72
Blame	.29	.18	.27	.16	.10	.81	.09	.07	.01	.02	.57	.34	.08	.01	.00	.89	.08	.03	.00	.00
Cancel	.33	.18	.29	.15	.06	.69	.14	.14	.01	.02	.51	.38	.10	.01	.00	.82	.12	.05	.01	.01
Mother autonomy-granting																				
Curfew	.60	.09	.31	—	—	.92	.01	.07	—	—	.66	.03	.31	—	—	.58	.02	.40	—	—
TV	.17	.65	.18	—	—	.76	.07	.16	—	—	.22	.44	.34	—	—	.27	.33	.40	—	—
Hangout	.19	.65	.16	—	—	.70	.09	.21	—	—	.12	.58	.29	—	—	.10	.52	.38	—	—

Note: Item response for mother responsiveness items: 1 = *Never*, 2 = *Hardly ever*, 3 = *Sometimes*, 4 = *Most of the time*, 5 = *Always*. Item response for mother autonomy-granting items: 1 = *parent*, 2 = *youth*, 3 = *parent and youth*.

Table 4

Estimated Odds Ratios (OR) of Class Membership in Relation to Gender and Ethnicity Indices Based on a Multinomial Latent Class Regression Model

	Reference class: Low responsiveness/high autonomy-granting (Class 1)					
	vs. High responsiveness/low autonomy-granting (Class 2)		vs. Moderate responsiveness/ moderate autonomy-granting (Class 3)		vs. High responsiveness/ moderate autonomy-granting (Class 4)	
	β (SE)	OR (95%CI)	β (SE)	OR (95%CI)	β (SE)	OR (95%CI)
Covariates						
Male vs. female	-.68 (.16)***	.51 [1.37, .70]	-1.04 (.17)***	.35 [1.25, .49]	-.84 (.20)***	.43 [1.29, .64]
African American vs. non-African ZAmerican	-2.02 (.41)***	.13 [1.06, .29]	-1.62 (.43)***	.20 [1.08, .45]	-1.54 (.44)***	.21 [1.14, .32]
Latino vs. non-Latino	-1.38 (.41)**	.25 [1.11, .56]	-1.43 (.44)**	.24 [1.10, .56]	-1.51 (.45)**	.22 [1.14, .34]
White vs. non-White	.45 (.42)	1.57 [1.69, 3.57]	.78 (.48)	2.18 [1.85, 5.58]	-.30 (.48)	.74 [1.29, 1.90]

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5

Comparison of Subsequent Sexual Risk-Taking Means Based on Class Membership

	Mean sexual risk-taking at age 16	Mean sexual risk-taking at age 18
Responsiveness and autonomy-granting classes		
Low responsiveness/high autonomy-granting (Class 1)	7.75	11.48
High responsiveness/low autonomy-granting (Class 2)	6.63	10.38
Moderate responsiveness/moderate autonomy-granting (Class 3)	6.23	11.31
High responsiveness/moderate autonomy-granting (Class 4)	5.38	10.16