

Patterns of Middle School Adjustment and Ninth Grade Adaptation of Rural African American Youth: Grades and Substance Use

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Abstract The transition to high school has been identified as a potentially difficult time in adolescents' lives. Reductions in both academic and social functioning often accompany this transition. While these effects have been documented in urban youth, the move to high school has not been extensively studied in rural minority youth. Toward that end, the academic grades and substance use in ninth grade of 447 (184 male and 263 female) African-American adolescents from two rural counties in a state in the deep South were examined in relation to configurations of adaptation from sixth through eighth grade. Results indicate that individual with consistently positive patterns across middle school had higher grades and lower rates of substance use compared to individuals with persistent difficulties or those that transitioned to problem behavior. Many individuals who improved in their patterns of adaptation had relatively high grades, but also rather high rates of substance use in the ninth grade.

Keywords High school transition · African American · Grades · Substance use

Early adolescence is a time of developmental opportunity and vulnerability (Lerner et al., 1999). New academic, behavioral, and social demands during middle school may exacerbate difficulties for some students while providing others with experiences and activities that allow them to recreate themselves in a more positive light (Eccles, 1999). The developmental importance of this period comes into focus when considered in relation to later indices of adjustment. Youth who experience multiple correlated risks such as

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academic struggles, aggressive behavior, and poor peer relations in early adolescence tend to have elevated levels of negative educational outcomes (i.e., low grades, school failure, school dropout) and significant problems with employment, substance use, and arrest in early adulthood (Bergman and Magnusson, 1997; Cairns and Cairns, 1994; Farmer, 1995; Gutman et al., 2003). Although research in this area has established that constellations of early adolescent risk are associated with later adjustment problems, there has been relatively little work that has examined how patterns of social and academic functioning across the middle school years are related to students' academic achievement and substance use during the first year of high school.

While some youth are likely to have sustained levels of positive or negative adjustment across the middle school years, others may experience patterns of significant improvement or decline (Roeser et al., 1999). In turn, patterns of middle school academic and emotional functioning have been differentially associated with postsecondary educational attainment (Roeser and Peck, 2003). Moving beyond middle school and focusing on adjustment during the first year of high school, recent investigations have shown that higher levels of academic achievement and interpersonal adjustment in ninth grade are related to completing high school for inner-city early adolescents (Ripple and Luthar, 2000) and suburban and non-metropolitan youth (Cadwallader et al., 2002). Collectively, these studies suggest that both middle school adjustment and negotiation of the transition to high school contribute to students' eventual educational attainment. However, there is a need for additional work that focuses on the linkages between middle school adjustment and students' adaptation during the first year of high school. Information along these lines may be particularly important in schools that serve high concentrations of youth who are at increased risk for academic failure and school dropout. By clarifying linkages between middle school functioning and early high school academics and substance use, it may be possible to establish intervention supports that are responsive to the distinct needs of students with different patterns of adaptation.

A holistic-developmental perspective views individual development as a result of the interaction among cognitive, social and emotional levels of functioning (Magnusson and Cairns, 1996). No single variable or even level of analysis is the driving force in development. Rather, the significance of each factor arises from its role in this interactive totality. The resulting functional whole "has an information value beyond what is contained in the separate parts," (Magnusson, 2003, p. 11). This systemic nature of development leads to highly inter-correlated levels of functioning across multiple domains, and the partialled variances resulting from traditional statistical procedures can be extremely low due to this entirely expected collinearity among variables

(Magnusson, 1998). Both for theoretical and methodological reasons, then, this perspective would argue that patterns of functioning across multiple domains—a "person-oriented analyses" (Magnusson and Cairns, 1996, p. 25) as it does not assume universality of process—would serve as better predictors of later adjustment than trajectories of single variables (Bergman and Magnusson, 1997; Magnusson and Bergman 1988; Magnusson and Cairns, 1996).

Consistent with this view, Cairns and colleagues found that combinations of social (aggression, popularity) and academic factors in seventh graders better predicted school drop out than any single variable taken in isolation (Cairns et al., 1989). While participants who were just aggressive, unpopular, or struggling academically did not drop out at higher than baseline levels, 82% of peers who struggled in all three areas dropped out—nearly 6 times the baseline rate. Similar configurations have also been shown to be highly predictive of teen parenthood (Gest et al., 1999; Xie et al., 2001).

The transition to high school has also been examined using these person-oriented approaches. Roeser and colleagues (1999) used configurations of academic competence, academic values, and mental health to predict a variety of indices of adaptation in ninth grade. These outcomes included emotional functioning (self-esteem, mental health, suicide ideation), grade point average, and behavioral problems in school, among peers, and in the community. Individuals with high levels of academic competence, academic values, and positive mental health fared the best across these domains. Those with multiple problems (low academic competence and values, and poor mental health) struggled the most in ninth grade. Successful adaptation following the transition to high school may therefore be better predicted by configurations of functioning across multiple domains in middle school rather than trajectories of single variables. The extant research has not, however, examined such relationships in one of the potentially most vulnerable populations of middle-school students: rural African American youth.

As educational and policy leaders work to establish reforms to improve the outcomes of high school students, there is a need for more information about patterns of resilience and risk for students from backgrounds that have been linked to low academic achievement. In particular, there is a critical need to focus on the adjustment of African American adolescents from low resource communities (Cooper and Jordan, 2003) and to clarify developmental patterns and factors that contribute to their high school success (Gutman, 2006; Ripple and Luthar, 2000; Seidman et al., 1996). Although most studies on adolescent risk and resilience have focused on urban and suburban populations, there is a significant need for developmental and prevention research that examines the adaptation of rural youth, particularly youth from ethnic minorities (Brody et al., 2002; Farmer et al., 2005; Spoth, 1997).

Over 30% of public schools are located, and 27% of students in the United States are educated, in rural districts (National Center for Education Statistics, 2006). While there is considerable variability in rural economies, many youth growing up in these communities are at risk for encountering challenges including low school preparedness and poor academic functioning that are often associated with poverty (Rural School and Community Trust, 2005). In fact, contrary to popular opinion, the intensity of child poverty is greater in rural America than in urban communities: 195 of the 200 persistently poorest counties in the United States are in rural areas. Child poverty rates in these counties often exceed 35% (Save the Children, 2002). Child poverty is concentrated in three rural regions of the United States (i.e., Appalachia, the Deep South, and the lower Rio Grande Valley) where the poverty rate is double that of the national average (Friedman and Lichter, 1998) and is particularly high for African American youth in the rural South (Brody et al., 2002). Nearly 1.5 million African American youth live in rural areas, mostly in the South, where most are poor and live in communities with few resources to support their productive school engagement (Duncan, 2001; Rural School and Community Trust, 2005).

Reflecting the challenges of poverty, many youth from impoverished rural areas are at-risk for problematic adolescent outcomes including low academic achievement, school failure, and school dropout (Farmer et al., 2004; Roscigno and Crowley, 2001). In fact, rural students are more likely to drop out of school than are urban students, and public high school graduates who attend rural schools are less likely to attend college than are graduates from metropolitan communities (Lichter et al., 1993; Save the Children, 2002). In addition, rural youth are at risk for substance use including tobacco, alcohol, and drugs (Epstein et al., 2003a, 2003b). In comparison to urban youth, rural adolescents appear to have higher levels of use for many substances and also have higher levels of cumulative risk factors for involvement in substance use (Spoth et al., 2001).

The present study

The goal of the present study was to extend current information about the linkages between patterns of middle school adjustment and the adaptation of rural African American adolescents following the transition to high school. This study was guided by a holistic approach, and utilized configurations based on three variables—aggression, popularity, and academic achievement—shown by Cairns and colleagues to be highly predictive of social and academic outcomes in adolescents (Cairns et al., 1989; Gest et al., 1999; Xie et al., 2001). These configurations were analyzed across middle school in early adolescents from two impoverished communities in the Deep South, and examined in relation to

academic grades and self-reported substance use in the ninth grade.

Two research questions guided this work. (1) Are patterns of adjustment across the middle school years related to grade point average in the 9th grade? (2) Are patterns of adjustment across the middle school years related to self-report substance use? We hypothesized that individuals who showed consistent patterns of low popularity, high aggression, and low academic achievement in both sixth and eighth grade would have the lowest grades in ninth grade and the highest rates of substance use. In contrast, those with consistent patterns of high popularity, low aggression, and high academic achievement would have the highest grades and lowest rates of substance use. Configurations marked by one or two risk factors (low popularity, high aggression, low academics) would have average grades and moderate to low rates of substance use.

Method

This study was part of a longitudinal investigation of the developmental pathways of rural African American adolescents. For the current report, annual teacher-assessments, school grades, and participant self-report data were used to examine patterns of middle school adjustment from sixth to eighth grade in relation to early high school (ninth grade) academic grades and substance use.

Participants

This work took place in two rural counties routinely identified in annual state reports as among the poorest in the Deep South. About half of the children who attend public school in these counties live in households that are below the national poverty level, as compared to 12.7% of all persons in the U.S. (National Poverty Center, 2006). High crime rates and widespread substance use in the adolescent and young adult population are pressing concerns for local leadership. Although 20–30% of the population in these counties is European American, due to age-related demographic trends and private school enrollments, the student population in the public schools is over 99% African American.

The sample consisted of two adjacent grade level cohorts (i.e., when the first cohort was in seventh grade the second was in sixth). Since no significant differences were found between the two cohorts at any given grade level, they were combined into a single group within each grade level (for this study, the sixth, eighth, and ninth grades) to increase the available sample size for analysis. This resulted in a total of 447 (184 boys, 263 girls) youth from 18 homeroom classrooms in two schools in the sixth grade. Participants were an average of 12.2 years old (range 11–13) in the sixth grade.

Consistent with public school attendance in these counties and reflecting the schools' populations, all of the participants in this study were African American. Girls made up 55% of the population in the two schools.

A total of 390 students (87.2%) participated from sixth through ninth grades across the two cohorts. There was a marginal difference between those who remained in the study ($m = 2.94$, $sd = 1.52$) and those who ceased to participate ($m = 3.36$, $sd = 1.77$) on sixth grade teacher-rated aggression ($F_{(1,445)} = 3.76$, $p = .053$). No such differences existed for teacher-rated popularity ($F_{(1,445)} = 0.02$, $p = .88$) or academics ($F_{(1,445)} = 2.02$, $p = .16$). There also was no difference across sixth grade clusters on rates of attrition ($\chi^2_{(3, n=447)} = 0.82$, $p = 0.85$).

Procedures

Data were collected in the Spring of each school year. All students were asked to participate. Those that agreed to participate and who returned consent forms signed by their parents were included in the study. Interpersonal Competence Scale rating forms were distributed to participants' home-room teachers. Teachers completed the rating forms at their own convenience and were told that they could decline participation at any point in the study. Students completed the substance use questionnaire in private individual interviews with trained research assistants as part of a broader survey pertaining to community support, school adjustment, and educational aspirations. Grades were obtained from school records. Both schools had similar grading systems, with grades ranging from 0–100 and in which 90–100 corresponded to the A range, 80–89 the B range, 70–79 the C range, 60–69 the D range, and below 60 to the F range.

Measures

Interpersonal competence scale—Teacher (ICS-T)

The ICS-T is an 18-item questionnaire consisting of seven-point Likert scales that teachers completed for each participant in their class. The ICS-T yields composite scores on three primary sub-scales: *aggression* (composed of “always argues,” “gets in trouble,” and “always fights,” α 's ranged from .79 to .82 in the present study), *popularity* (composed of “popular with boys,” “popular with girls,” and “lots of friends,” α 's ranged from .73 to .81), and *academics* (composed of “good at math” and “good at spelling,” α 's ranged from .71 to .79). Past research has shown that three-week test-retest reliability coefficients are moderately high (i.e., .80–.92), median test-retest r across the factors are .81 for girls and .87 for boys, and one-year coefficients are moderately strong (i.e., .40–.50; Cairns, Leung, Gest, and Cairns, 1995). The ICS-T has convergent validity with direct ob-

servations, student records (i.e., grades, discipline reports) and peer nomination measures (Cairns and Cairns, 1994; Cairns et al., 1995), and it has predictive validity over an eight-year period for adult adjustment (Cairns and Cairns, 1994).

Grades

Information about grades was obtained in the 9th grade from school records. Because students could vary widely in their schedules, grade average (as a percentage) was calculated across core-area courses only. These included math, language arts, science, and social studies. Though the content and difficulty of these classes vary across students, the use of grade averages offered the best solution for comparisons across students.

Substance use

This instrument was based on the standard Center for Substance Abuse Prevention questionnaire. This instrument has been successfully used in a number of populations, including African Americans (Chipungu et al., 2000; Sambrano et al., 2005). Participants were asked to report on whether they have ever tried cocaine, inhalants, crystal meth, heroin or opium, LSD or acid, oxycotin, speed or uppers, downers or tranquilizers, PCP or angel dust, or ecstasy. Due to low sample response numbers, these were collapsed into a single variable of “ever tried hard drugs,” in which a positive answer to any one of these substances was coded as having tried hard drugs. Participants were also asked to report the number of days in the last month in which they had consumed cigarettes and alcoholic beverages, and whether they had consumed marijuana in the last month.

Due to heavily skewed distributions, these variables were collapsed into a single indicator of substance use. Substance users reported any or all of the following: ever having used hard drugs ($n = 6$ yes, 382 no; 1.5%), having smoked in the last month (45 yes, 342 no; 11.6%), having consumed alcohol in the last month (112 yes, 275 no; 28.9%), and/or having consumed marijuana in the last month (33 yes, 355 no; 8.5%). Taken together, 134 (34.7%) participants were classified as substance users, and 252 (65.3%) were classified as non-users.

The fact that our measures were not anonymous raised concerns that participants may have under-reported to avoid getting in trouble. The rates reported above are in fact comparable to, though generally slightly higher than, rates derived from an anonymous national survey. On a 2005 nationwide survey of teens aged 12–17, 10.8% self-reported smoking in the past month, 16.5% reported drinking alcohol in the past month, and 6.8% reported having smoked marijuana in the last month (Substance Abuse and

Table 1 Sixth grade configurations

Configuration	N	Males	Females	ICS-T variable		
				AGG	POP	ACA
Model	115	46	69	−0.80*** (0.46)	0.52*** (0.82)	1.03*** (0.51)
Tough	114	47	67	0.23* (0.97)	1.00*** (0.54)	−0.12 (0.85)
Unengaged	62	30	32	−0.97*** (0.36)	−0.79*** (0.53)	−0.88*** (0.80)
Multi-risk	156	61	95	0.81*** (0.66)	−0.80*** (0.49)	−0.32*** (0.83)

Note. Standard deviations in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Mental Health Services Administration, 2005). While the generally parallel rates lends support to the veracity of our reporters, the elevated rates in the present study are consistent with the concerns about substance use voiced by community leaders.

Behavioral configurations

Consistent with the holistic perspective advocated by Magnusson and colleagues (Bergman and Magnusson, 1997; Magnusson and Bergman, 1988; Magnusson and Cairns, 1996), behavioral configurations were derived to determine subtypes of students from the teacher ratings on the Interpersonal Competence Scale factors (aggressive, popular, academic). These variables were chosen due to past studies that found particular configurations of these factors to be highly related to school dropout and teen pregnancy (Cairns et al., 1989; Gest et al., 1999; Xie et al., 2001). Following the advice of Lars Bergman (L. R. Bergman, personal communication, May 30, 2006), males and females were combined in the analyses. This maximizes the sample size, while any gender differences would be evident in the proportion of males and females in the resulting clusters.

The factor scores from the ICS-T were standardized within sex and cluster analyzed using Ward's method for the cluster algorithm and the squared Euclidian distance as the distance measure. Ward's method has been shown in Monte Carlo studies of data with known cluster structures to be superior in structure recovery (for a review, see Milligan, 1981), and "Ward's method is most effective with a Euclidian distance measure" (Lorr, 1983, p. 118–119). The number of clusters to extract was determined from a consideration of multiple lines of evidence. The first of these was a dendrogram, which is a graphic display of the distances between each combining cluster in a hierarchical cluster analysis, from each individual being their own cluster to a single cluster comprising the whole sample (Blashfeld and Aldenderfer, 1988). By visually judging the distances between clusters in each solution, an idea of the number of clusters to extract is arrived at, in which the within-cluster distances are minimized and the between-cluster distances are maximized (Lorr, 1983). The second criteria used to determine number of clusters to extract was an examination of the explained Error Sum of Squares (ESS) of each cluster solution. Since one goal of cluster analysis is to find the fewest number of

clusters which adequately describe the data, the relative error in each nested solution of a hierarchical analysis can be examined. The change in ESS from solution to solution is often minor, and "a sharp increase in [unexplained] ESS indicates that much of the accuracy has been lost by reducing the number of groups" (Lorr, 1983, p. 90). Following this reasoning, the cluster solution preceding the jump is the appropriate number: the fewest number of clusters above which there is not a marked increase in explanatory power, but below which there is a large drop.

Results

Behavioral configurations

Analyses of the dendrograms and explained error sums of squares indicated that four cluster solutions were optimal for both sixth and eighth grade. The inclusion of more clusters did not increase explanatory power more than a minimal amount. Each cluster solution was tested via *t*-tests to establish whether the *z*-scores significantly differed from zero (i.e., whether the values were significantly above or below average). The clusters that emerged in sixth grade are shown in Table 1, and included one marked by generally positive functioning in terms of low aggression, above average popularity, and high academic achievement (Model), and a second cluster marked by above-average aggression and high popularity (Tough). The third was characterized by low levels of aggression, popularity, and academics (Unengaged), and the fourth had high levels of aggression coupled with low popularity and below-average academics (Multi-Risk). Gender differences were not evident in these clusters: though there were more females in several configurations, this was due to the higher number of females in the sample. An equal percentage of males in fact belonged to each cluster and as females ($\chi^2_{(3, n=447)} = 1.67, p = 0.64$).

In the eighth grade, clusters with the same basic patterns across the variables found in the Model, Tough, and Multi-Risk configurations described above emerged (see Table 2). The fourth cluster in this grade was marked by low aggression and popularity and above-average academics (Academic). There was a gender difference among these clusters ($\chi^2_{(3, n=447)} = 11.57, p < 0.01$). A smaller percentage of males (9.8%) than females (18.6%) were Model

Table 2 Eighth grade configurations

Configuration	N	Males	Females	ICS-T variable		
				AGG	POP	ACA
Model	67	18	49	-0.93***(0.29)	1.02***(0.45)	1.24***(0.29)
Tough	99	41	58	0.37***(0.97)	1.08***(0.55)	-0.01 (0.82)
Academic	158	80	78	-0.47***(0.64)	-0.44***(0.56)	0.28***(0.63)
Multi-risk	123	45	78	0.82***(0.89)	-0.87***(0.59)	-1.03***(0.74)

Note. Standard deviations in parentheses.

p* < .05; *p* < .01; ****p* < .001.

(Fisher’s exact probability < .01), while a higher proportion of males (43.5%) than females (29.7%) belonged to the Academic configuration (Fisher’s exact probability < .01).

A series of ANOVAs were run to examine differences across clusters on their constituent variables. The sixth grade clusters differed on all three variables: aggression ($F_{(3,443)} = 171.34, p < .001$), popularity ($F_{(3,443)} = 255.86, p < .001$), and academics ($F_{(3,443)} = 107.43, p < .001$). Post-hoc Tukey’s tests indicated that while the Model and Unengaged clusters had statistically similar levels of aggression, all other group differences were significant at the *p* < .001 level. Similarly, Unengaged and Troubled had similar levels of popularity, while all other group differences were significant. Finally, only the difference between Tough and Multi-Risk on academics was non-significant.

Significant differences were also found among the eighth grade clusters on aggression ($F_{(3,443)} = 108.11, p < .001$), popularity ($F_{(3,443)} = 337.69, p < .001$), and academics ($F_{(3,443)} = 179.96, p < .001$). Post-hoc Tukey’s tests indicated that all group differences on the aggression and academic variables were significant. Only the difference between Tough and Model on popularity was non-significant in this year.

Although many of the clusters—notably Model, Tough, and Multi-Risk—parallel one another across years, the means in Tables 1 and 2 show that there are differences between configurations that have the same label. Nonetheless, the patterns of the variables are similar, and these labels provide a helpful heuristic for understanding differences in the profiles relative to other configurations.

Configural pathways from 6th to 8th grade

As seen in Table 3, there was a significant relationship between 6th grade clusters and 8th grade clusters ($\chi^2_{(9, n=447)} = 79.11, p < .001$). Cell-wise exact tests indicated that individuals in the Model configuration in the sixth grade tended to either remain Model (Fisher’s exact probability < .001) or transition to the Academic configuration (Fisher’s exact probability < .001) in the eighth grade. Model individuals tended not to move into the Multi-Risk profile (Fisher’s exact probability < .001). Tough participants tended to remain Tough (Fisher’s exact probability < .001) and not move into the Academic configuration (Fisher’s exact probability < .01). Those in the Unengaged cluster in the sixth grade tended to move into the Academic cluster by 8th grade (Fisher’s exact probability < .05) and not transition into Tough individuals (Fisher’s exact probability < .05). Finally, Multi-Risk participants tended to remain in the Multi-Risk configuration (Fisher’s exact probability < .001) and did not transition to being either Model (Fisher’s exact probability < .01) or Academic (Fisher’s exact probability < .01).

There was a gender difference in the likelihood of belonging to a particular path ($\chi^2_{(15, n=447)} = 32.75, p < 0.01$). A higher proportion of females (18/263, or 6.8%) than males (1/184, or 0.5%) transitioned from Tough to Model (Fisher’s exact probability < .001), while a higher percentage of males (21/184, or 11.4%) than females (9/263, or 3.4%) transitioned from Unengaged to Academic (Fisher’s exact probability < .001). All other pathways had statistically equivalent percentages of males and females.

Table 3 Eighth grade configurations by sixth grade configuration

6th grade configuration	8th Grade Configuration			
	Model	Tough	Academic	Multi-risk
Model	29 ^a (25.2%)	22 (19.1%)	57 ^a (49.6%)	7 ^b (6.1%)
Tough	19 (16.7%)	40 ^a (35.1%)	28 ^b (24.6%)	27 (23.7%)
Unengaged	5 (8.1%)	7 ^b (11.3%)	30 ^a (48.4%)	20 (32.3%)
Multi-Risk	14 ^b (9.0%)	30 (19.2%)	43 ^b (27.6%)	69 ^a (44.2%)

Note. Row percentages in parentheses.

^aSignificantly more than expected by chance.

^bSignificantly fewer than expected by chance.

Table 4 Ninth grade grades by middle school pathway

Pathway	9th grade grades	
	Mean	Std. Dev.
Model to model	84.40	8.61
Model to tough	75.70	15.22
Model to academic	80.77	9.08
Model to multi-risk	76.26	5.63
Tough to model	84.72	6.47
Tough to tough	73.37 ^{ac}	10.38
Tough to academic	74.52	10.53
Tough to multi-risk	70.05 ^{abc}	7.77
Unengaged to model	74.06	10.88
Unengaged to tough	74.21	9.55
Unengaged to academic	72.57 ^{ac}	9.10
Unengaged to multi-risk	68.03 ^{abc}	10.41
Multi-risk to model	79.98	7.84
Multi-risk to tough	74.11 ^a	9.10
Multi-risk to academic	76.84	8.55
Multi-risk to multi-risk	67.08 ^{abcde}	11.31

^aSignificantly different from Model to Model.
^bSignificantly different from Model to Academic.
^cSignificantly different from Tough to Model.
^dSignificantly different from Multi-Risk to Model.
^eSignificantly different from Multi-Risk to Academic.

Cluster pathways and ninth-grade grades

Mean grades in ninth grade across the sixteen pathways are shown in Table 4. These pathways were significantly related to ninth grade grades ($F_{(15,340)} = 7.32, p < .001$). Post-hoc Tukey’s tests indicated that individuals who maintained the Model configuration had significantly higher ninth grade grades than individuals who were consistently Tough, those who transitioned from Tough to Multi-Risk, those who transitioned from Unengaged to Academic, those who transitioned from Unengaged to Multi-Risk, those who transitioned from Multi-Risk to Tough, and those who were consistently Multi-Risk across middle school.

Those who transitioned from Model to Academic had significantly higher ninth grade grades than those who transitioned from Tough to Multi-Risk, those who transitioned from Unengaged to Multi-Risk, and those who were consistently Multi-Risk. Individuals who transitioned from Tough to Model across middle school had significantly higher ninth grade grades than those who were consistently Tough, those who transitioned from Tough to Multi-Risk, those who transitioned from Unengaged to Academic, those who transitioned from Unengaged to Multi-Risk, and those who were consistently Multi-Risk. Finally, both those who transitioned from Multi-Risk to Model and those than transitioned from Multi-Risk to Academic had higher ninth grade grades than peers who were consistently Multi-Risk across middle school.

Table 5 Ninth grade substance use by middle school pathway

Pathway	9th grade substance use	
	Did not use substances	Used substances
Model to model	20 ^a (80.0%)	5 ^b (20.0%)
Model to tough	18 ^a (85.7%)	3 ^b (14.3%)
Model to academic	39 ^a (78.0%)	11 ^b (22.0%)
Model to multi-risk	5 ^a (83.3%)	1 ^b (16.7%)
Tough to model	15 ^a (78.9%)	4 ^b (21.1%)
Tough to tough	16 (59.3%)	11 (40.7%)
Tough to academic	14 (58.3%)	10 (41.7%)
Tough to multi-risk	13 (52.0%)	12 (48.0%)
Unengaged to model	1 (25.0%)	3 (75.0%)
Unengaged to tough	2 ^b (28.6%)	5 ^a (71.4%)
Unengaged to academic	15 (57.7%)	11 (42.3%)
Unengaged to multi-risk	12 (66.7%)	6 (33.3%)
Multi-Risk to model	10 (71.4%)	4 (28.6%)
Multi-Risk to tough	12 ^b (46.2%)	14 ^a (53.8%)
Multi-Risk to academic	24 (64.9%)	13 (35.1%)
Multi-Risk to multi-risk	36 (63.2%)	21 (36.8%)

Note. Row percentages in parentheses.
^aSignificantly more than expected by chance.
^bSignificantly fewer than expected by chance.

Cluster pathways and ninth-grade substance use

The number of individuals who did and did not report substance use across the sixteen pathways are given in Table 5. There was a significant overall relationship between pathway and substance use ($\chi^2_{(15, n=386)} = 27.39, p < .05$) Cell-specific exact tests indicated that three of the four pathways of students who were initially Model—those who remained Model (80.0% were not substance users) and those who moved to the Tough (85.7%) and Academic (78.0%) configurations—tended to be proportionally underrepresented among substance users (Fisher’s exact probability $< .05$ for all). Despite 83% being non-users, the low incidence rate of Model students moving to Multi-Risk (only six individuals followed that path) precluded this from being significant. Conversely, participants who transitioned from Unengaged to Tough (71.4%), and those who transitioned from Multi-Risk to Tough (53.8%) tended to be proportionally overrepresented among ninth grade substance users (Fisher’s exact probability $< .05$ for both). Again, despite 75% being substance users, the low incidence rate of moving from Unengaged to Model (only 4 followed that pathway) precluded this from being a significant relationship.

Discussion

The findings of this study show that pathways of academic and social functioning during middle school are related to

ninth grade academic grades and self-reported substance use in rural African American youth from impoverished communities. Individuals who transitioned to or maintained a configuration marked by low aggression, high popularity, and high academic functioning (Model) across middle school tended to have high grades in their freshman years in high school. Not only did the Model to Model and Tough to Model pathways evince the highest grades of any trajectories, Multi-Risk to Model had the highest grades among the subset of trajectories that began as Multi-Risk in sixth grade. But not all pathways were related to positive outcomes. Those who maintained or transitioned to the opposite pattern—high aggression, low popularity, and low academics (Multi-Risk) tended to have the lowest grades of all trajectory groups.

Interestingly, the pathways that predicted substance use did not mirror those that predicted grades. While the Multi-Risk cluster was related to lower grades in ninth grade, the popular-aggressive (Tough) profile was related to substance use. Those who moved from Unengaged and Multi-Risk to Tough tended to have the highest levels of ninth grade substance use, with over half of the individuals with these trajectories having used substances in ninth grade. Further, though not statistically higher than chance, three of the four trajectories that began as Tough had substance use rates in excess of 40%. Taken as a whole, social marginalization combined with disruptive behavior and academic problems was predictive of academic struggles, while high social status combined with aggressive behavior was related to substance use. Substance use among these youth may therefore be more the result of social influences on popular but deviant youth than a matter of self-medication among those who struggle in all areas of school functioning.

Despite these negative ninth grade outcomes for some students, the patterns of adjustment identified in this study are consistent with the viewpoint that early adolescence is a time of considerable developmental opportunity. Thirty five percent of rural African American students in this study had multi-risk profiles in sixth grade but by eighth grade this percentage had dropped to 28%. In addition, over half of kids with multiple risks in sixth grade improved, while only an average of about 21% of students in other configurations transitioned into the multi-risk configuration over time. Consistent with the work of Eccles and colleagues (e.g., Eccles, 1999; Gutman et al., 2002; Roeser et al., 2000), linkages between these patterns of positive adjustment in middle school and positive adaptation during the first year of high school strongly suggest that the transition years between elementary school and high school are a critical developmental period for youth.

This work has important implications for the establishment of programs aimed at improving the high school outcomes of at-risk youth. The current findings suggest that some subset of these adolescents have chronic problems that

are well-established prior to the high school years and that may extend back to elementary school (see Crum, et al., 1998; Gutman, et al., 2003). Therefore, efforts to improve the outcomes of such youth should begin early in students' school careers. Further, these results point to the importance of having programs aimed at promoting the adjustment of at-risk youth during the middle school years. The patterns of improving adjustment for some youth in this study suggest that this is a time of developmental opportunity. Schools may be able to take advantage of this important developmental period by establishing programs that focus on supporting at-risk youth during these pivotal years. Also, the current findings demonstrate the importance of focusing on multiple factors as "correlated constraints" that mutually interact to support positive adjustment or lead to negative outcomes (Cairns and Cairns, 1994). The present results suggest that multiple systems are likely to operate together and that intervention should therefore simultaneously address academic, behavioral, and social factors (Farmer and Farmer, 2001).

Limitations

Although the current investigation provides important insights into the linkages between patterns of middle school adjustment and adaptation during the first year of high school, there are several limitations that should be acknowledged. First, the schools and participants in this study are not representative of the universe of rural areas and the findings cannot be generalized to a broader population of rural students. Nonetheless, the findings reported here are relevant to many rural communities in the South and should help to inform practices and policies in schools that serve predominantly low-income African American youth.

Second, while the current study indicates that patterns of middle school functioning are related to students' subsequent adjustment in the first year of high school, it does not provide insight into the development processes or factors that contribute to this relationship. Therefore, it is not appropriate to infer that patterns of middle school adjustment are causally related to early high school adaptation; both could reflect ongoing processes in other realms (such as the family).

Third, academic achievement was measured with students' grades rather than standardized achievement scores. It was necessary to use grades because achievement scores were not available. It is possible that the grades reported here are not reliable because they reflect teachers' subjective judgments. However, the scores are averaged across several teachers for each student and similar approaches have been used in other studies that examine academic achievement in high school (e.g., Gutman, et al., 2003; Ripple and Luthar, 2000). In fact, grades are directly linked to students' academic development and subsequent educational

outcomes (Becker and Luthar, 2002; Roeser and Peck, 2003; Smokowski, et al., 2004; Zheng, et al., 2002). Also, recent studies suggest that school grades, as compared to standardized achievement scores, may yield a more complete picture of the academic performance of racial and ethnic minorities (Hoffman and Lowitzki, 2005; Kao and Thompson, 2003).

Finally, substance use was assessed using self-reports that were not completely anonymous to the researchers. As such, these may reflect participant bias toward reporting more socially-accepted behavior. While an important consideration, past studies have used similar measures (Estell, et al., 2003), and rates of substance use in the present work were higher than national rates derived from anonymous measures. As such, there is little evidence to suggest that substance use in the present study was significantly under-reported.

Future research directions

The current findings suggest that there is a need for additional exploration of the relationship between patterns of middle school adjustment and high school outcomes. Such work should focus on examining developmental processes and factors during middle school that may mediate or moderate later adjustment. This includes parental and community support (Duncan, 2001; Gutman and Midgely, 2000), peer-group orientation and socialization (Fuligni, et al., 2001; Kindermann, 1993), school bonding (Epstein, 1981), extracurricular involvement or out of school activities (Jordan and Nettles, 1999; Mahoney, et al., 2003), and achievement goals (Gutman, 2006). In addition, there is a need to examine how protective and risk factors operate in relation to each other to impact patterns of adjustment and to contribute to later adaptation (Gutman et al., 2003; Gutman et al., 2002). Further work is also needed that goes beyond the early high school years to examine the impact of patterns of middle school adjustment on educational attainment and adaptation through high school and into early adulthood (e.g., Roeser and Peck, 2003). Finally, studies along these lines are needed with diverse ethnic, socioeconomic, and cultural populations and should be conducted in suburban and metropolitan schools as well as in geographically diverse rural schools.

In addition to basic research that focuses on developmental processes, there is a need for applied experimental research to examine the impact of middle school interventions on students' patterns of adjustment. In particular, randomized control trials are needed to determine if at-risk students' academic, behavioral, and social adjustment can be improved across the middle years and, in turn, if such improvements result in adaptive patterns during the high school years. Such information would help to clarify the relationship between middle school adjustment and high school adaptation. But more importantly, such work could help to promote more

effective interventions to support the high school success of youth who are at risk for difficulties.

In conclusion, pathways of academic and social adjustment across middle school are related to both academic grades and substance use in the first year of high school for African American youth living in rural low-resource communities. The promise of this work is that it shows that youth who demonstrate multiple risks in the early years of middle school are more likely to experience success in ninth grade if they develop patterns of positive adjustment prior to the transition to high school. However, the current findings also suggest that students who show declining and consistently negative adjustment during middle school are at increased risk of low grades and substance use. These findings underscore the importance of developing interventions to support at-risk students during the middle school years. Such interventions may serve as important anchor for improving the high school outcomes of rural African American youth from impoverished communities.

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