Disparity in Glycemic Control and Adherence Between African-American and Caucasian Youths With Diabetes

Family and community contexts

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OBJECTIVE — To describe sociodemographic, family, and community factors that contribute to the glycemic control of African-American and Caucasian youths with diabetes, we investigated two questions: *1)* Is there a disparity in glycemic control between African-American and Caucasian youths with diabetes, and if so, what sociodemographic, family, and community factors explain the disparity? and *2)* Is there a difference in the adherence to treatment between African-American and Caucasian youths with diabetes, and if so, what sociodemographic, family, and community factors explain the difference?

RESEARCH DESIGN AND METHODS — This cross-sectional study included 146 youths with diabetes (95 Caucasians and 51 African-Americans) and their mothers. The youths were invited to participate if they had been diagnosed with diabetes at least 1 year before the study, did not have another chronic illness, and were <18 years of age.

RESULTS — The findings indicate that African-American youths with diabetes are in significantly poorer metabolic control than their Caucasian counterparts (1.5% difference in HbA_{1c} levels). Single-parent household status and lower levels of adherence partially account for the poorer glycemic control. Examination of the adherence subscales indicates that African-Americans report significantly lower adherence to diet and glucose testing than Caucasian youths.

CONCLUSIONS — This study suggests that African-American youths with diabetes may be at greater risk for poor glycemic control due to the higher prevalence of single parenting and lower levels of adherence found in this population.

The disparity in glycemic control between African-American and Caucasian populations has been noted in several reports (1,2). Complications due to diabetes are more frequent among African-American populations than among their Caucasian counterparts. The prevalence of macrovascular disease, such as heart disease and stroke, and microvascular disease, such as renal disease and blindness, is higher among African-Americans than Caucasians (1). An epidemiological study performed by LaPorte et al. (3) focused on racial differences in the incidence and mortality of all diagnoses of children with IDDM from 1950 to 1981. A 20-year follow-up of the health status of these children indicated significant differences between African-Americans and Caucasians in the percentage of individuals who had died. Of the African-Americans, 26% died after 20 years, compared with 11% of the Caucasians. This mortality rate was reported to be 9 times higher than the rate in the general African-American population (3).

Research has been consistent in showing that African-American youths are in significantly poorer metabolic control than Caucasian youths. For example, in a study by Auslander et al. (4) of recently diagnosed children and adolescents, youths from African-American and single-parent families were in significantly poorer metabolic control than children from Caucasian and two-parent families, while controlling for socioeconomic levels. This pattern persisted 4 years after diagnosis. In another study, Delamater et al. (5) reported that African-American children were in poorer metabolic control, hospitalized more frequently for diabetic ketoacidosis, and missed more clinic visits than their Caucasian counterparts. Hanson et al. (6) found that adolescent African-American girls were in poorer metabolic control than African-American boys and Caucasian boys and girls.

Research carried out largely with Caucasian and middle-class subjects has found that family factors influence management and adjustment to diabetes. However, few studies have examined the psychosocial factors that may explain the racial disparity in metabolic control among youths with diabetes. Although there is little reason to doubt that family factors influence diabetes among African-American children, the ecological surroundings of the family (i.e., culture, social interactions, and community) may also influence and shape the families and the children within them (7–10). Taking an ecological perspective helps broaden our scope to consider how ecological contexts shape the behaviors and health status of individuals. Although these social contexts are separated conceptually, the ongoing interaction among them may influence individual health status and behavior.

This study examines the societal and subcultural factors that may account for the poorer glycemic control of African-American youths with diabetes compared with that of Caucasian youths with diabetes. In this study, we seek to delineate and describe the multiple factors that contribute to the glycemic control of this population by

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Abbreviation: FILE, Family Inventory of Life Events and Changes.

Table 1—*Demographic characteristics of the sample* (n = *146*)

Characteristic	Total sample	African-Americans	Caucasians
Race			
African-American	51 (34.9)	—	—
Caucasian	95 (65.1)	—	—
Sex of child			
Female	74 (49.3)	23 (54.9)	51 (53.7)
Male	72 (50.7)	28 (45.1)	44 (46.3)
Marital status			
Married	95 (65.0)	17 (33.3)	78 (82.1)
Single	51 (35.0)	34 (66.7)	17 (17.9)
Receive Medicaid			
Yes	27 (18.5)	18 (35.3)	9 (9.5)
No	119 (81.5)	33 (64.7)	86 (90.5)
Educational levels of mothers			
High school or less	50 (34.2)	25 (49.0)	25 (26.3)
High school graduate or more	96 (65.8)	26 (51.0)	70 (73.7)
Age (years)			
Child	12.7 ± 3.5 (3–18)	13.3 ± 4.0 (3–18)	12.4 ± 3.2 (3–18)
Mothers or female caregiver	39.2 ± 6.5 (21–80)	40.0 ± 8.1 (23–80)	38.8 ± 5.4 (21–48)
Socioeconomic status	37.3 ± 14.2 (6–64)	29.7 ± 14.5 (6–61)	41.3 ± 12.3 (12–64)
Disease duration (years)	4.6 ± 3.2 (1–16)	4.0 ± 3.6 (1–16)	5.0 ± 2.9 (1–13)

Data are *n* (%) or means ± SD (range).

investigating the following research questions: *1*) Is there a disparity in glycemic control between African-American and Caucasian youths with diabetes, and if so, what demographic, family, and community factors explain the disparity? and *2*) Is there a difference in the adherence to treatment between African-American and Caucasian youths with diabetes, and if so, what demographic, family, and community factors explain the difference?

RESEARCH DESIGN AND METHODS

Patient population

The subjects were 146 children with diabetes (95 Caucasian and 51 African-American) and their mothers or female caregivers. The children were receiving medical treatment at the outpatient diabetes clinics of two university-affiliated pediatric hospitals in St. Louis and had been diagnosed with diabetes at least 1 year before the study. In the first hospital, 139 subjects were recruited. To obtain a larger number of African-American subjects, we recruited 7 subjects from the second pediatric hospital in St. Louis. There were no significant HbA_{1c} or sociodemographic differences (i.e., sex, socioeconomic status, marital status, Medicaid status, mother's educational level, disease duration), with the exception of age among the African-American children from the two sites: youths from the second site were slightly older (15.8 vs. 13.0 years). Table 1 displays the sociodemographic characteristics of the total sample by race. Socioeconomic levels of the sample were determined using the Hollingshead Four-Factor Index of Social Status (A.B. Hollingshead, Yale University, 1975), which takes into account education, occupation, marital status, and number of wage earners in the family.

Procedure

Children and adolescents who had been diagnosed with diabetes for at least 1 year and their mothers or female caregivers were invited to participate in this study. Children were excluded if they had any other chronic illness or were >18 years of age. Of those mothers who were contacted to be in the study, 85% consented to participate. The mothers completed interviews and questionnaires regarding family and community life and adherence to medical regimens. Blood samples were drawn at the time of the interview for HbA_{1c} and plasma C-peptide levels to assess the child's level of metabolic control.

Measures

Adherence and IDDM Questionnaire-R. The Adherence and IDDM Questionnaire-R (12) was used to assess the degree to which an individual follows medical advice in several areas. The questionnaire was administered through face-to-face interview with the mother. The initial questionnaire consisted of 15 items measuring adherence to glucose and urine testing (3 items), diet (9 items), and treating hypoglycemia (3 items). For the present sample, the total scale and subscales were revised and items dropped based on reliability analyses. This resulted in the improvement of the internal consistency reliability coefficients for the subscales and total scale. Reliability analyses based on the mothers' reports resulted in the following: *1*) blood glucose and urine testing (2 items, Cronbach's α = 0.78), *2*) diet (9 items, Cronbach's α = 0.65), and *3*) total adherence, which combines adherence to blood glucose and urine ketone testing, diet, and treatment of hypoglycemia (14 items; Cronbach's α = 0.70). The hypoglycemia subscale was not used separately in the analyses since the Cronbach's α was too low (0.28).

Neighborhood stressors. A portion of Dressler's Survey Interview Schedule (13) was used to assess neighborhood stressors. Eight items were used to measure participants' ratings of their neighborhood in the following areas: police protection, neighborhood cooperation, protection of property, personal safety, friendliness, delivery of goods and services, cleanliness, and quietness. Mothers rated their neighborhood on these areas using a four-point scale from 1 = "bad" to 4 = "very good." All items were reverse-scored so that higher scores indicated higher neighborhood stressors. Cronbach's α coefficient for this scale was computed, and results indicated an α coefficient of 0.85.

Perception of racism. Dressler's (13) "racism" section in the Survey Interview Schedule was modified to measure perceptions of unfair treatment due to race by the following service providers: city officials, restaurant workers, health providers, and schoolteachers. Mothers responded to six items using a four-point Likert scale from 1 = "strongly disagree" to 4 = "strongly agree." Cronbach's α coefficient was computed. Results indicated a coefficient of 0.78 for the racism scale.

Family Inventory of Life Events and Changes. The Family Inventory of Life Events and Changes (FILE) (14) is a 71-item self-report instrument designed to record normative and nonnormative family demands and strains. The scale consists of nine subscales that include intrafamily strains, marital strains, pregnancy and childbearing strains, finance and business strains, work/family transitions, illness and family care strains, family losses, family transitions, and family legal violations. The validity of the instrument has been demonstrated in several reports (14). In the present study, the FILE was administered to the mothers. Reliability analysis using the total scale score revealed a Cronbach's α coefficient of 0.76.

Family Inventory of Resources for Management. The Family Inventory of Resources for Management developed by McCubbin and Comeau (15) is a 69-item self-report instrument that measures the family system resources in four areas: family esteem and communication, sense of mastery and health, financial well-being, and extended-family social support. A score for the total family resources is derived from adding these four subscales. Internal consistency reliability for the subscales and total inventory were considered adequate to good in previous reports (15). On our sample of mothers, the Cronbach's α coefficient for total family resources was 0.92.

Family Environment Scale. The Family Environment Scale (16) is a self-report instrument that consists of 90 true-false items that measure 10 dimensions of the family. Of particular interest for the present study are the cohesion, conflict, and control subscales, which have been found to relate to metabolic control and adherence in previous studies (4,17). Each subscale consists of nine items. According to the developers of the scale, family cohesion is defined as the "the degree of commitment, help, and support family members provide for one another," family conflict is defined as "the amount of openly expressed anger, aggression, and conflict among family members," and family control is defined as "the extent to which set rules and procedures are used to run family life." The internal consistency reliability (Cronbach's α coefficients) from the present data for the cohesion, conflict, and control subscales are 0.72, 0.69, and 0.39, respectively. Subscales were scored and analyzed independently. Because the internal consistency reliability coefficient for the control subscale was very low, this variable was not included in further analyses.

Child's glycemic control. The youths' glycemic control was assessed by glycated hemoglobin (HbA_{1c}). Glycated hemoglobin provides a reliable estimate of the average blood glucose during the previous 6- to 8-week period (18). In this study, glycated hemoglobin was measured as HbA_{1c} using the DCA 2000 method (Miles Laboratories, Elkhart, IN). This method shows excellent correlation and nearly identical values to those reported in the Diabetes Control and Complications Trial (19). The mean HbA_{1c} value ($\pm$ SD) for nondiabetic individuals using this assay was 5.9 $\pm$ 0.64%, and the mean for youths with diabetes treated at the clinic was 8.8%.

Serum C-peptide. A confounding disease variable in the relationship between psychosocial influences and metabolic control is the residual capacity of the subject to produce insulin. Residual endogenous insulin production could occur at various stages of remission, the so-called "honeymoon" phase (20), or as a result of atypical forms of diabetes with long-standing residual β-cell function (2). The latter may be more common among African-American children (21). To assess the role of residual β-cell function in metabolic control, we determined stimulated plasma C-peptide in all subjects. Blood for the C-peptide determination was obtained when the blood glucose was >150 mg/dl; C-peptide levels were determined by radioimmunoassay (22).

RESULTS

Sociodemographic, family, and community differences between African-American and Caucasian youths

χ^2 and correlation analyses were performed to determine how the African-American youths differed from Caucasian youths in our study according to sociodemographic characteristics. Results indicated that African-American mothers reported lower educational levels than their Caucasian counterparts: 49% did not complete high school vs. 26% of Caucasian mothers (χ^2 = 7.6, 1 df, $P < 0.01$). Of the African-American youths, 67% were from single-parent households vs. 18% of the Caucasian youths (χ^2 = 34.7, 1 df, $P < 0.0001$). African-American families were more likely to be receiving Medicaid than Caucasian families (35.3 vs. 9.47%; χ^2 = 14.7, 1 df, $P < 0.0001$). Last, the African-American mothers reported lower socioeconomic status than their Caucasian counterparts (29.7 vs. 41.3; $t[144] = 5.1$, $P < 0.0001$). There were no significant differences between African-American and Caucasian youths by age, sex, or duration of diabetes.

Of the family factors (stressors, resources, conflict, and cohesion), significant differences were found in family resources. The African-American families had fewer resources than the Caucasian families ($t[144] = 2.9$, $P < 0.01$). Examination of community factors indicated that the African-American mothers reported greater neighborhood stressors ($t[144] = -2.5$, $P < 0.01$) and perceived greater racism stressors ($t[144] = -8.2$, $P < 0.001$) than their Caucasian counterparts.

Disparity in metabolic control between African-American and Caucasian youths

Findings from the present study confirmed the previous observations that African-American youths were in poorer metabolic control than Caucasian youths. The mean HbA_{1c} for African-American youths was 10.1 $\pm$ 2.1% in comparison with 8.6 $\pm$ 1.3% for Caucasian youths ($t[72] = -4.64$, $P < 0.0001$). Not unexpectedly, African-American youths had higher plasma stimulated C-peptide levels than Caucasian youths (1.02 $\pm$ 1.55 vs. 0.22 $\pm$ 0.33 ng/ml; $t[50.30] = -3.5$, $P < 0.001$). This is likely to be a result of the inclusion of some African-American subjects with atypical forms of diabetes or NIDDM (2,21). Residual endogenous insulin secretion (as measured by plasma C-peptide) would not be expected to explain differences in metabolic control between African-American and Caucasian youths, since the higher C-peptide levels, as observed in the African-American youths, would be expected to be associated with better glycemic control (i.e., lower HbA_{1c}). In addition, plasma C-peptide levels were not significantly associated with HbA_{1c} in the patients studied here.

Determinants of metabolic control

Results of the bivariate analyses to determine the demographic, total adherence, family, and community variables that were significantly associated with the children's level of metabolic control are shown in Table 2. Dichotomous variables, such as sex (1 = male, 2 = female), marital status (1 = married or living with partner, 0 = single, widowed, divorced), education (1 = high school graduation or less, 2 = post–high school), and Medicaid status (1 = yes, 2 = no) were dummy coded for the correlation analyses. Of the demographic variables, older youths, single-parent household, lower educational level, and receiving Medicaid benefits were significantly associated with HbA_{1c} values. Among the family, community, and adherence variables, significant

Table 2—*Single-order correlations among psychosocial variables, race, metabolic control, and total adherence*

Psychosocial variables	Race	Metabolic control	Total adherence
Demographics			
Age	0.13	0.28†	−0.26*
Sex (1 = male, 2 = female)	−0.08	0.08	0.00
Marital status (1 = married, 0 = unmarried)	−0.49†	−0.36†	0.18
Education (1 = high school or less, 2 = post–high school)	−0.23*	−0.23*	0.27†
Medicaid (1 = yes, 2 = no)	−0.32†	−0.19	0.23*
Family factors			
Family stress	0.17	0.18	−0.29†
Total family resources	−0.24*	−0.16	0.30†
Conflict	−0.09	0.03	−0.23*
Cohesion	−0.11	−0.17	0.24*
Total adherence	−0.28†	−0.33†	—
Community stressors			
Neighborhood stressors	0.21*	0.15	−0.10
Perception of racism	0.57†	0.31†	−0.21*

For race, 1 = Caucasians and 2 = African-Americans. *$P < 0.01$; †$P < 0.001$.

determinants of poorer metabolic control included lower adherence levels and greater perception of racism. Disease duration and C-peptide levels were examined because of the likelihood that they may be associated with HbA_{1c}. Results indicated that neither the youths' disease duration nor their plasma C-peptide levels (as noted above) was significantly associated with HbA_{1c}. Therefore, they were omitted from further multivariate analyses.

Psychosocial variables to explain the disparity in glycemic control

To determine the psychosocial variables that might statistically account for the racial disparity in HbA_{1c} values in African-American and Caucasian youths, we performed multivariate analyses that included only the variables that were significantly associated with both race and HbA_{1c} on a bivariate level. Because of the number of correlations performed at the bivariate level (i.e., 12), Bonferroni's correction was used (23), and only those correlations that were <0.004 were considered significant and used in multivariate analyses. Variables included for further analysis were adherence, marital status, and perception of racism. Results of the multiple regression analysis indicated that all of the variables in the model remained significant predictors of HbA_{1c} ($F[3, 142] = 14.10$, $P < 0.0001$; Table 3). Race was then added to the model (Table 3). The results shows that when accounting for the variance contributed by total adherence, marital status, and the perception of racism, race remained a significant predictor of metabolic control ($F[4, 141] = 11.81$, $P < 0.0001$). Because race remained a significant predictor of HbA_{1c}, the lower levels of adherence and single-parent status only partially explained the poorer metabolic control of African-American youths.

By examining the adjusted means of HbA_{1c} for African-Americans versus Caucasians (9.6 and 8.9%, respectively), after partialling out the effects of adherence and marital status, the difference in means for HbA_{1c} between African-Americans and Caucasians was reduced from 1.5 to 0.7%. Thus, adherence and marital status accounted for 47% (0.7/1.5) of the difference in HbA_{1c} between African-Americans and Caucasians; 53% remained unexplained. No significant two-way interactions were found between race and the other independent variables in the model (i.e., total adherence, marital status, perception of racism).

Disparity in total adherence between African-American and Caucasian youths

The results indicate that African-American mothers report lower levels of total adherence than Caucasian mothers (1.67 vs. 1.94; $t(144) = 3.5$, $P = 0.0007$). Examination of the adherence subscales indicated that mothers' reports of adherence to diet ($t[144] = 3.1$, $P = 0.002$) and glucose testing ($t[144] = 3.2$, $P = 0.04$) were significantly lower among African-Americans than among Caucasians. Because the pattern of findings was similar for the two subscales and for the total adherence scale (i.e., lower adherence reported by African-American mothers), we chose a parsimonious approach and used the total adherence score for bivariate and multivariate analyses.

Determinants of adherence

Results of the bivariate analyses to determine the demographic, family, and community variables significantly associated with total adherence are shown in Table 2. Due to the number of correlations performed at the bivariate level (i.e., 12), Bonferroni's correction was used again and only those correlations that were <0.004 were used in multivariate analyses. Findings in Table 2 indicated that poorer adherence was significantly associated with older youths, lower educational status, receiving Medicaid, higher levels of family stress, fewer family resources, higher family con-

Table 3—*Regression models to predict metabolic control (HbA_{1c})*

Dependent variables and predictors (R^2)	β value	P value
$R^2 = 0.23$		
Total adherence	−0.25	0.001
Marital status	−0.26	0.001
Perception of racism	0.18	0.03
$R^2 = 0.25$ (race added to model)		
Total adherence	−0.22	0.004
Marital status	−0.19	0.02
Perception of racism	0.09	0.30
Race	0.19	0.05

β is the standardized regression coefficient, P is the significance level of unique variance.

flict, lower family cohesion, and higher perception of racism.

Psychosocial variables to explain the disparity in adherence

To identify factors that may account for the differences in reported adherence between African-American and Caucasian mothers, the same analytic strategy was employed that was used to explain the disparity in HbA_{1c} between the two racial groups. Only those variables significantly associated with both race and adherence on a bivariate level ($P < 0.004$) were entered into a multiple regression model to predict adherence. These variables included Medicaid status, mothers' education level, and family resources. Results of the multiple regression analyses indicated that of the independent variables, educational status and family resources remained significant predictors of adherence ($F[3, 142] = 7.64$, $P < 0.0001$, Table 4). When race was added to the model (Table 4), results showed that when accounting for the variance contributed by mother's education and family resources, race remained a significant predictor of total adherence ($F[3, 142] = 9.17$, $P < 0.0001$). Therefore, mothers' educational level and family resources only partially explained the lower adherence reported by the African-American mothers.

Table 4—*Multiple regression models to predict total adherence*

Dependent variables and predictors (R^2)	β value	*P* value
$R^2 = 0.14$		
Medicaid	0.10	0.23
Education	0.20	0.02
Family resources	0.21	0.02
$R^2 = 0.16$ (race added to model)		
Education	0.18	0.03
Family resources	0.21	0.009
Race	−0.19	0.02

β is the standardized regression coefficient; *P* is the significance level of unique variance.

CONCLUSIONS — The findings from this study indicate that African-American youths with diabetes are in significantly poorer metabolic control than Caucasian youths. These findings are similar to those from other studies that indicate poorer metabolic control in African-American youths than in Caucasian youths (3–5,24). In this study, there was a 1.5% difference in HbA_{1c} levels between African-Americans and Caucasian youths, which is clinically significant. According to results from the Diabetes Control and Complications Trial, which indicated that glycemic control can reduce the risk of long-term complications (19), a difference in HbA_{1c} between groups of 1.9% (9.0 vs. 7.1%) is associated with a 26–76% reduction in microvascular complications. Poor metabolic control over an extended period of time frequently leads to complications, such as end-stage renal disease, blindness, and amputation, all of which are more prevalent among African-Americans than among Caucasians (2).

Examination of sociodemographic, family, and community factors indicate that sociodemographic (single-parent household) and family behavioral factors (lower levels of adherence) partially account (47%) for the poorer glycemic control of African-American youths. The other 53% of the difference in HbA_{1c} may be due to variables that were not measured in this study or to biological factors. In our sample, 67% of the African-American youths were from single-parent families vs. 18% of Caucasian youths. McLanahan and Sanderfur (25) suggest that single-parent families are weaker in parental involvement and supervision than two-parent families. This may be a function of having less time and less authority than two parents who can share the responsibilities of parenthood. Less parental involvement and less supervision in families with a child with diabetes can have negative health consequences if the treatment regimen is inadequately followed. For example, in a previous study, when both youths and mothers reported that neither were taking primary responsibility for supervising diabetes-related management tasks, the youths were in poor metabolic control (26).

Other variables associated with single parenthood that could lead to poorer metabolic control among youths include lower financial resources, conflicts between work and family time commitments, reduced flexibility in leisure time, and lack of shared responsibility with a partner. Single parents often lack money for medical supplies, have problems with transportation, and receive insufficient emotional and tangible support. These stressors may contribute to the problems in managing diabetes. This was confirmed in an investigation by Banion et al. (27) who found that single mothers reported more difficulties with finances and receiving help and support in coping with their child's diabetes than did mothers with a spouse or partner in the home.

Another factor, in addition to marital status, that significantly contributes to the racial disparity in metabolic control is lower levels of adherence to the prescribed diet and glucose testing reported by African-American mothers. Previous research indicates that compared with Caucasians, African-American adolescents consume a higher percentage of calories from fat, fewer fruits and vegetables, and are more sedentary (28). Thus, it is likely that dietary patterns may have contributed to the poorer metabolic control found among African-American youths in this study. Future research with African-American youths with diabetes should include an assessment of their eating behavior.

To understand further the disparity in glycemic control between African-American and Caucasian youths, we examined the factors that might explain the difference in total adherence reported by African-American and Caucasians. Our data indicate that the racial difference in adherence is partially explained by the lower educational status and fewer family resources (primarily financial resources) of African-American mothers. Our findings were consistent with those from the Youth Risk Behavior Survey, a national survey of 6,321 adolescents that examined education as a predictor of risky health behaviors, such as lack of exercise, poor diet, smoking, and alcohol consumption (28). Those youths with the greatest level of risk behaviors were from families with parents who reported lower educational levels. The investigators assert that educated parents can impart knowledge, attitudes, and modeling of healthy behavior patterns to their children. Greater financial resources also can influence health behaviors in that they contribute to a family environment that provides youths with positive social, psychological, and economic skills, which in turn, can lead to higher self-esteem, self-efficacy, and positive diabetes management (29,30). It is important to note that adherence is not a unitary construct and that determinants of adherence may differ across the tasks of the diabetes regimen. Thus, the results may only apply to identifying predictors of overall adherence and not necessarily predictors of adherence to diet or glucose testing.

The ecological framework is useful in identifying cultural variables from individual, family, and community contexts that might explain the disparity in glycemic control and adherence between African-Americans and Caucasians. We found evidence to support the importance of family structure and family behavioral factors (adherence) on the child's glycemic control. Adherence to the prescribed regimen was influenced by educational levels and family resources. Although community-level variables (neighborhood stressors, perception of racism stressors) in this study do not uniquely contribute on a multivariate level to glycemic control in youths with diabetes, these factors still warrant further study, especially among youths with other chronic diseases such as asthma or cancer. Moreover, future studies that use the youths' perspectives (particularly older youths who assume greater responsibility for their diabetes care than younger children) may result in different findings on the influence of family and community stressors on adherence and metabolic control.

In conclusion, the results of this study suggest that African-American youths with diabetes may be at greater risk for poor glycemic control than Caucasian youths with diabetes because of the higher prevalence of single parenting and lower levels of adherence found in this population. All programs should address the special needs of single-parent families and develop strategies to improve adherence to treatment. However, particular attention is warranted for African-American youths with diabetes, because they are consistently in poorer glycemic control than their Caucasian counterparts.

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