Metabolic Control in Adolescent Girls

Links to relationality and the female sense of self

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OBJECTIVE — This study investigated whether intimacy and autonomy in mother-daughter interactions and relational aspects of the self are associated with metabolic control in adolescent girls with type 1 diabetes.

RESEARCH DESIGN AND METHODS — This cross-sectional study included 88 girls with diabetes (mean age 14.9 ± 2.2 years, diabetes duration 7.1 ± 3.9 years, and HbA_{1c} 8.9 ± 1.6%) from the Diabetes Clinic at the Hospital for Sick Children in Toronto and their mothers. Teens completed a self-report measure assessing self-concept in eight domain-specific areas. Mothers and daughters engaged in a 7-min, videotaped, problem-solving task involving a diabetes-related conflict issue. Interactions were rated using a macroanalytic rating system to assess intimacy and autonomy in parent-teen relationships. Metabolic control was measured using HbA_{1c}.

RESULTS — Self-concept in domains of perceived behavioral conduct ($P = 0.003$), social acceptance ($P = 0.03$), romantic appeal ($P = 0.03$), and close friendships ($P = 0.04$) independently predicted HbA_{1c} levels, together accounting for 30% of the variance. Also, the experience of emotional closeness (i.e., intimacy) rather than separateness (i.e., autonomy) in mother-daughter relationships was associated with lower HbA_{1c} ($P = 0.03$).

CONCLUSIONS — Relational aspects of the self and the experience of emotional closeness in relationships are associated with metabolic control in adolescent girls. Efforts to improve metabolic control in girls should include enhancing the self-concept and the experience of relatedness in familial, peer, and patient-caregiver relationships.

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Serious microvascular and macrovascular complications (1,2) occur in as many as 40% of individuals with type 1 diabetes (3). These complications develop relatively early in the course of the disease, with acceleration during the pubertal years (4). The Diabetes Control and Complications Trial (DCCT) (1,2) has provided incontrovertible evidence of the direct role of hyperglycemia in the onset and progression of these diabetes-related microvascular complications.

Adolescence is a developmental period associated with a worsening of metabolic control (5–7). In particular, adolescent girls appear to be at greatest risk for poor metabolic control (5–7). Compared with boys, girls have been shown to exhibit a constant increase in mean HbA_{1c}, with an estimated increase from pre- to postpuberty of 0.92% (6). Also, girls tend to be more distressed by diabetes (8), to exhibit higher rates of overall mismanagement of their diabetes (9) with less adherence to their diabetes meal plan during periods of stress (10), and to experience greater depressive and eating disorder symptoms, both of which are linked to poor metabolic control (9,11). Thus, there is a need to identify specific risk factors for poor metabolic control in girls.

Poor metabolic control in adolescent girls has been linked to the physiological changes of puberty (5). However, these pubertal changes take place within a larger developmental context of multiple psychosocial transitions in emotional, cognitive, familial, and social domains—changes that may affect diabetes management in many ways. Individuation and the development of an integrated sense of self are identified as the primary developmental tasks of adolescence (12) and have been linked to positive overall psychosocial adaptation (13) and adjustment to chronic medical illness (14). Disturbances in the teen's emerging sense of self may be associated with greater difficulties in managing the complex demands of diabetes and in maintaining optimal metabolic control (9,15,16).

Research on the links between metabolic control and aspects of the self has yielded inconsistent findings. Significant associations have been found among metabolic control and self-concept (15), self-esteem (5), and self-efficacy (9,16). For example, Littlefield et al. (9) found that adolescent girls not only exhibited poorer overall treatment compliance and metabolic control than boys, but that girls with poorer adherence also reported lower self-esteem, less self-efficacy, and more depressive symptoms. However, other studies (8,10,17) using similar methodologies have failed to demonstrate significant links between metabolic control and aspects of the self. In part, these inconsistent findings may result from the failure to consider the moderating role of gender on self-identity formation during adolescence.

Longitudinal studies of self-esteem in adolescents with diabetes (5,10) and in those without diabetes (18,19) illustrate a pattern from early adolescence to adult-

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Abbreviations: AIRS, Autonomy and Intimacy Rating System; DCCT, Diabetes Control and Complications Trial; DSED-M, Diagnostic Survey for Eating Disorders–Modified; EDI, Eating Disorder Inventory; SPPA, Self-Perception Profile for Adolescents.

hood of increasing self-esteem in males and decreasing self-esteem in females. Gender differences in self-esteem may be related to the gender-divergent pathways through which the emerging sense of self is developed and expressed (20). For girls more than boys, the sense of self emerges in a relational context, where self-esteem is defined by relationships with others (20,21). Since interpersonal adequacy is a salient aspect of many females' sense of self, it is likely that relational aspects of the self-concept will have particular relevance for their diabetes management. This link has been supported by research illustrating that the psychological sense of control in interpersonal relationships (22) and the quality of attachment to health care providers (23) significantly predict metabolic control in adult women with diabetes.

The family is the primary relational context for the emergence and differentiation of the teen's sense of self (12). Relational theorists emphasize that successful individuation during adolescence requires the simultaneous goals of developing a separate sense of self (i.e., autonomy) while maintaining emotionally close parental relationships (i.e., intimacy) (12,13). Parental communications that support the teen's separate perspective while maintaining emotional closeness, especially during periods of conflict, are the key to promoting individuation among teens (12,24). A chronic illness such as diabetes may interfere with successful individuation among adolescents (25). The complex demands of diabetes management may increase dependence upon parents at the very time that teens are struggling to achieve greater independence. This may exacerbate conflict in the negotiation of individuation and adversely impact the teen's emerging sense of self and the capacity to manage his or her diabetes (26).

Research has consistently linked metabolic control in teens to the quality of the overall family environment, with poor control associated with families characterized by high conflict and low cohesion, inadequate structure, impaired communication, and rejecting parent-child relationships (27–29). Yet, little is known about how the experience of separateness (i.e., autonomy) and connectedness (i.e., intimacy) in mother-daughter relationships is related to metabolic control in girls. Because relating to others is one of the central organizing structures through which many females organize their self experience (20), aspects of relatedness in parent-teen relationships may be important for their diabetes adjustment. Moreover, whether aspects of the self-concept add to the prediction of metabolic control over and above family relationship variables is unknown.

This study examines how relational aspects of the self and intimacy and autonomy in mother-daughter relationships are associated with metabolic control in adolescent girls. Specifically, we investigate whether: *1*) metabolic control is associated with self-concept in domains reflecting interpersonal adequacy and with the experience of emotional closeness (i.e., intimacy) rather than separateness (i.e., autonomy) in mother-daughter interactions; *2*) adolescent self-concept contributes to variance in HbA_{1c} over and above that accounted for by mother-daughter relationships; *3*) self-concept and the quality of mother-daughter interactions are interactive predictors of HbA_{1c}; and *4*) puberty is associated with impairment in self-concept and in mother-daughter interactions.

RESEARCH DESIGN AND METHODS

— Participants included 88 girls, 11–19 years of age (14.9 ± 2.2 years [mean ± SD]), who attended the Diabetes Clinic at the Hospital for Sick Children in Toronto, and their mothers. This clinic is the major primary care center for diabetes in south central Ontario. Girls with a medical illness other than type 1 diabetes or treated hypothyroidism were excluded. Participants were from middle socioeconomic class backgrounds (based on Statistics Canada socioeconomic groupings by postal code income ratings). Approximately 85% of the sample identified themselves as white. Girls had a mean (±SD) body weight of 58.9 ± 12.7 kg, with a mean BMI of 22.6 ± 3.7 kg/m^2. The average age of diabetes onset was 7.9 ± 4.0 years, with a mean diabetes duration of 7.1 ± 3.9 years. Average HbA_{1c} levels were 8.9 ±1.6%. Mothers ranged in age from 44 to 59 years (53.7 ± 5.5 years [mean ± SD]) and, on average, had completed 1–2 years of college, university, or specialized training. Four mothers (4.5%) reported having diabetes.

Measures

Self-concept. Self-concept was assessed by teens' responses on the Self-Perception Profile for Adolescents (SPPA) (30). This 28-item measure assesses eight domain-specific areas of self-concept and global self-worth. Four of the eight domains reflect interpersonal aspects of the self (i.e., romantic appeal, close friendships, social acceptance, and physical appearance), and four domains reflect achievement-related aspects of the self (i.e., job competence, scholastic competence, athletic competence, and behavioral conduct). The SPPA first asks the teen to choose one of two statements that most closely resembles the kind of teen she or he is and then to select whether the chosen statement is "really true for me" or "sort of true for me." The SPPA has been widely used with diabetic and nondiabetic populations and demonstrates good reliability and validity (30).

Intimacy and autonomy. Intimacy and autonomy in mother-daughter relationships were assessed using videotaped interactions of mothers and daughters completing a diabetes-related problem-solving task based on Strodtbeck's (31) "revealed differences" procedure. Mothers and teens were asked to independently identify and rank their three most conflictual diabetes-related issues from a list of six problem areas, including responsibility for diabetes self-care, participation in social/recreational activities, impact of diabetes on school, effect of diabetes on feeling overprotected, diet/eating behaviors, and family/peer support of diabetes. The topic rated by both mother and daughter as generating the most conflict was selected for discussion. They were instructed to recall the last time that they discussed this topic and to continue that conversation for 7 min, with each member presenting and defending her position on the issue, and then to attempt to reach a consensus. After delivering the instructions, the researcher started the video recording and exited the room.

Interactions were rated using the Autonomy and Intimacy Rating System (AIRS) (32). The AIRS is a macroanalytic coding system that rates communication patterns on 15 dimensions that reflect the ways in which autonomy (i.e., the ability to delineate clear boundaries between one's thoughts and feelings with those of

the other and to coordinate one's needs with those of the other) and intimacy (i.e., the sharing of thoughts, feelings, and experiences through which closeness, support, and validation are derived) are negotiated in these relationships. Each dimension is scored on a 6-point Likert scale in which a score of 0 reflects the most constraining interaction style and a score of 6 represents the most facilitating style.

Exploratory factor analysis of the AIRS, using principal component analysis, revealed a three-factor solution (accounting for 87% of the overall variance), each with five individual subscales:

1) Adolescents' Expression of Autonomy: This factor evaluates the adolescent's level of autonomy, including the Ability to Articulate Separate Views, Age-Appropriate Independence and Responsibility-Taking, Style of Presenting Concerns, Perspective-Taking, and Permeability/Openness to the Other (Cronbach's $\alpha = 0.92$).

2) Mothers' Facilitation of Autonomy: This factor evaluates the mother's support or constraint of the teen's autonomy, including the Articulation of Separate Views, Appropriate Promotion of Independence and Responsibility-Taking, Style of Presenting Concerns, Perspective-Taking, and Permeability/Openness (Cronbach's $\alpha = 0.89$).

3) Mother-Daughter Intimacy: This factor evaluates the Quality of Emotional Expression, Emotional Attunement, Quality of Affective Engagement, Mood and Feeling Tone, and Conflict Resolution Style (Cronbach's $\alpha = 0.91$).

Metabolic control. Metabolic control was assessed using HbA_{1c}, which was measured by high-pressure liquid chromatography (nondiabetic range, 4–6%; BioRad Variant). HbA_{1c} assessed by this method is ~0.3% higher than that reported in the DCCT (1,2).

Puberty. Adolescents were classified into one of four stages of pubertal development based on their age of onset of menarche and Tanner stage of physical development (33), as determined by physician examination (derived from the teen's medical chart at the time of study participation). The prepubertal to early pubertal stage included females at Tanner stages 1 or 2, who have not yet started to menstruate. The middle pubertal stage included females at Tanner stages 3 or 4, with no menses. The late pubertal stage included females at Tanner stage 4, who began menstruating <1 year ago. The postpubertal stage included females at Tanner stage 5, who began menstruating >1 year ago.

Age of diabetes onset and eating disturbances. Age of diabetes onset and eating disturbances were controlled in our study because they have been identified as risk factors for poor metabolic control (11,32) and have been linked to self-concept deficits in adolescent girls (34,35). Age of diabetes onset was derived from the teen's medical chart. Eating disturbance was determined based on the teen's responses to two self-report measures of disordered eating and weight loss behaviors [i.e., the Eating Disorder Inventory (EDI) (36) and the Diagnostic Survey for Eating Disorders–Modified (DSED-M) (37)]. See Maharaj et al. (32) for a description of the eating disorder measures and the severity of disordered behaviors reported. Based upon self-reported symptoms, girls were categorized as:

1) Highly eating disturbed ($n = 18$): This category included girls who reported both *1*) disturbed eating and/or body attitudes, as indicated by scores of ≥9 on the Drive for Thinness, ≥5 on the Bulimia, or ≥15 on the Body Dissatisfaction subscales of the EDI and *2*) engaging in one or more disordered eating and/or weight loss behaviors, including binge eating, self-induced vomiting, laxative/diuretic use, insulin omission to promote weight loss, or complete food avoidance, at a frequency of at least 2–3 times a month to >1 time a day over the preceding 3 months (as assessed by the DSED-M).

2) Mildly eating disturbed ($n = 30$): This category included girls who reported one or both of the following: *1*) engaging in one or more of the above disordered eating and/or weight loss behaviors at a frequency of ≤1 time a month over the preceding 3 months (as assessed by the DSED-M) and/or *2*) disturbed eating or body attitudes, as indicated by the cutoff scores listed above on any of the three subscales of the EDI.

3) Non–eating disturbed ($n = 40$): This category included girls who reported *1*) no disordered eating or weight loss behaviors over the preceding 3 months (as assessed by the DSED-M) and *2*) no disturbed eating or body attitudes, as indicated by scores of <9 on the Drive for Thinness, <5 on the Bulimia, and <15 on the Body Dissatisfaction subscales of the EDI.

Study procedure

Subject recruitment was linked to a larger study of family functioning and eating disturbances among girls with diabetes (32,35). Eligible girls were identified from a master list of patients of the Hospital for Sick Children Diabetes Clinic and contacted by telephone or directly during a regular clinic visit. Completed questionnaires were received from 113 of the 147 adolescents and mothers who consented to participate in the family study (77% return rate). In addition, 88 of these teens and mothers completed the videotaped problem-solving tasks. Participants in the study did not differ from nonparticipants in demographic or diabetes-related characteristics.

Videotaped interactions were conducted in a private room at the Hospital for Sick Children. All interactions were rated by coders trained in the AIRS to achieve a minimum level of interrater reliability, which was defined as 80% exact agreement on each code. Acceptable levels of interrater reliability were obtained across all codes: 78–87% exact agreement (mean 83%) and 0.74–0.83 Cohen's κ (mean 0.80).

Statistical analyses

Research questions were examined using multiple regression analyses. Questions 1 and 2 were addressed using regression analyses that were stepwise and hierarchical. That is, subsets of variables went into the model in blocks that were entered in a predetermined order (i.e., hierarchical) and variables within each block were entered in steps based on their *P*-to-enter values (i.e., stepwise). Research questions 3 and 4 were examined using hierarchical regression analyses. For all analyses, pubertal stage, eating disturbance status, and age of diabetes onset were entered as covariates; they were forced into the model as the first three hierarchical blocks. Nonsignificant terms were removed to conserve degrees of freedom and to maximize power. The full regression model is presented in Table 1. Examination of the conditioning index and variance proportions illustrated no multicollinearity within any of the regression models.

Table 1—*HbA_{1c} regressed on self-concept and mother-daughter interaction dimensions*

Source of variation	β*	SE-β	R^2	Adjusted R^2	F change	P
Block 1: covariates						
Eating disturbance status	0.16	0.09	0.06	0.05	4.21	0.04
Pubertal stage†	—	—	—	—	—	NS
Age of diabetes onset†	—	—	—	—	—	NS
Block 2: mother-daughter relationships						
Intimacy	−0.29	0.10	0.18	0.15	4.77	0.03
Daughter's autonomy†	—	—	—	—	—	—
Mother's promotion of autonomy†	—	—	—	—	—	—
Block 3: adolescent self-concept						
Behavioral conduct	−0.41	0.08	0.29	0.26	8.52	0.005
Social acceptance	0.35	0.07	0.35	0.32	4.98	0.03
Romantic appeal	−0.31	0.06	0.41	0.37	5.60	0.03
Close friendships	−0.25	0.07	0.46	0.41	4.67	0.04
Physical appearance†	—	—	—	—	—	NS
Job competence†	—	—	—	—	—	NS
School competence†	—	—	—	—	—	NS
Athletic competence†	—	—	—	—	—	NS
Global self-worth†	—	—	—	—	—	NS

F change = 6.18, P = 0.0003; overall F (6,60) = 5.25, P = 0.0001. *Coefficients are the β values at the end of the block in which they are located; †variable eligible for entry but removed due to nonsignificant contribution to the model.

RESULTS

Research question 1a: Which aspects of the self-concept are associated with HbA_{1c} in girls?

HbA_{1c} was regressed on nine self-concept dimensions in a stepwise manner, with the covariates forced into the model hierarchically. Pubertal stage and age of diabetes onset were nonsignificant covariates and were removed from the model. After controlling for eating disturbance status (P = 0.04), self-concept significantly predicted HbA_{1c} (F [5,61] = 5.91, P = 0.0002), accounting for 30% of the overall variance. Specifically, perceived behavioral conduct (P = 0.003), social acceptance (P = 0.03), romantic appeal (P = 0.03), and close friendships (P = 0.04) were found to independently predict HbA_{1c}. Higher HbA_{1c} levels were associated with poorer perceptions of one's behavioral conduct, romantic appeal, and close friendships and were associated with more positive perceptions of social acceptance.

Research question 1b: How is the experience of intimacy and autonomy in mother-daughter relationships associated with HbA_{1c}?

HbA_{1c} was regressed on the intimacy and autonomy dimensions in a stepwise manner, with the covariates forced into the model hierarchically. Puberty and age of diabetes onset were nonsignificant covariates. After controlling for eating disturbances (P = 0.04), mother-daughter relationship variables significantly predicted HbA_{1c} (F [2,65] = 3.18, P = 0.04), accounting for 12% of the overall variance. Specifically, mother-daughter intimacy independently predicted HbA_{1c} (P = 0.03), with higher HbA_{1c} associated with less intimacy in mother-daughter interactions.

Research question 2: Does adolescent self-concept add to the prediction of HbA_{1c} over and above that contributed by mother-daughter relationships?

Mother-daughter relationship dimensions, followed by self-concept variables, were entered into a stepwise regression model in hierarchical blocks, with HbA_{1c} as the criterion variable. Because puberty and age of diabetes onset were nonsignificant covariates, eating disturbance status was the first block of entry. Nonsignificant terms were removed from the model to conserve degrees of freedom and to identify the most heuristic predictive model. Table 1 shows the final full model. This model contributed significantly to the prediction of HbA_{1c} (F [6,60] = 5.25, P = 0.0001), accounting for 46% of the overall variance. After controlling for mother-daughter relationships (P = 0.03, R^2 change = 0.12), self-concept dimensions significantly predicted metabolic control (P = 0.0003), accounting for 28% of the overall variance in HbA_{1c} levels.

Research question 3: Are self-concept and mother-daughter relationships interactive predictors of metabolic control?

Self-concept variables, mother-daughter relationship dimensions, and self-concept by mother-daughter relationship interaction terms were separately entered into a hierarchical regression analysis, with HbA_{1c} as the criterion variable. Since puberty and age of diabetes onset were nonsignificant covariates, eating disturbance status was retained as the first block of entry. While the self-concept (R^2 change = 0.30, P = 0.0006) and mother-daughter relationship (R^2 change = 0.12, P = 01) main effect terms were significant predictors of HbA_{1c}, the self-concept by mother-daughter relationship interaction terms were not significant contributors to the model (R^2 change = 0.03, P = NS).

Research question 4: What is the relationship among pubertal stage, self-concept, and mother-daughter relationships?

Self-concept and mother-daughter relationship dimensions were separately regressed on pubertal stage in a hierarchical regression analysis (results not shown). After controlling for age of diabetes onset and eating disturbances, pubertal stage significantly predicted *1*) self-concept in domains of behavioral conduct ($P = 0.04$), romantic appeal ($P = 0.003$), close friendships ($P = 0.01$), and perceived physical appearance ($P = 0.04$), accounting for 6, 13, 9, and 5% of the variance, respectively, and 2) intimacy in mother-daughter interactions ($P = 0.006$), accounting for 11% of the overall variance. Correlations revealed that advancing pubertal development is associated with poorer self-concept and with less mother-daughter intimacy.

CONCLUSIONS — Consistent with previous research findings (9,15,16), this study demonstrates that self-concept significantly predicts metabolic control in adolescent girls. For example, positive perceptions of one's behavioral conduct (i.e., the ability to act the way one is supposed to and avoid "getting into trouble") was associated with lower HbA_{1c} levels. Diabetes is a chronic medical illness that is largely regulated by behavioral adaptation (16). Achieving and maintaining good metabolic control requires adherence to a complex, multicomponent treatment regimen that is difficult for many teens to master (38). Teens with a vulnerable sense of self, who lack confidence in the ability to plan and to purposefully execute behavioral requirements, may be more impaired in their ability to adequately manage the complex demands of diabetes (9,15,16). These difficulties may further contribute to heightened feelings of helplessness and ineffectiveness. Thus, a positive self-concept may be an important developmental buffer that promotes successful adaptation among adolescent girls with diabetes who face concomitant stresses associated with the demands of a chronic illness and the developmental transitions of adolescence.

Our study demonstrates that metabolic control in adolescent girls is also associated with relational aspects of the self-concept, including perceptions of social acceptance, close friendships, and romantic appeal. For many girls, the emerging sense of self is defined in relation to others (20), whereby self-esteem is based on relatedness and interpersonal adequacy (20). Furthermore, results revealed that continued relatedness (i.e., intimacy) rather than separateness (i.e., autonomy) in mother-daughter relationships was most predictive of the quality of metabolic control in girls. The capacity of mothers and daughters to maintain intimacy, characterized by emotional attunement and continued affective sharing, during discussions of diabetes-related conflict issues is associated with lower HbA_{1c} levels. Thus, families that promote behavioral independence around diabetes self-care at the expense of continued emotional support might be problematic for girls whose adjustment to diabetes may require sharing and validation of their emotional experience, in addition to instrumental support. Study findings suggest that efforts to improve metabolic control in adolescent girls should pay particular attention to enhancing the self-concept and the experience of relatedness in family, peer, and patient-caregiver relationships.

Adolescent girls are at particular risk for poor metabolic control, especially during the pubertal years (5,6). In addition to biological transformations, puberty is a time of multiple psychosocial transitions. Our findings illustrate that advancing pubertal development is associated with less intimacy during mother-daughter discussions of diabetes-related concerns and with more negative self-evaluations in multiple domains of the self-concept, including behavioral conduct, romantic appeal, close friendships, and physical appearance. Importantly, we have shown that impairment in these domains (with the exception of perceived physical appearance) is linked to poor metabolic control in adolescent girls. Future research on the links between puberty and diabetes-related outcomes should determine whether puberty enhances vulnerability for poor metabolic control in adolescent girls through its adverse impact on the self-concept.

The study findings illustrate that perceived social acceptance among girls is associated with higher HbA_{1c}. This is consistent with previous research (10), which has demonstrated significant links between popularity among girls and poorer metabolic control. Strivings for social acceptance may be problematic for girls with a chronic medical illness such as diabetes, which makes them feel "different" from their nondiabetic peers. Vulnerable girls who seek social acceptance and connection may be more likely to conform to social pressures to engage in behaviors that may adversely impact metabolic control (39). Since our study did not include a measure of self-care behaviors to test this possibility, further research is necessary to examine the links between perceived social acceptance, peer conformity, and diabetes-related self-care behaviors.

While our study findings are consistent with previous research that has linked the quality of family interactions to metabolic control among teens (27–29), we demonstrated that adolescent self-concept is a more powerful predictor of HbA_{1c} in girls. More specifically, self-concept accounted for 28% of the variance in HbA_{1c} over and above that accounted for by mother-daughter relationships. Since the quality of parent-teen communications has been identified as a key in promoting or constraining the teen's emerging sense of self, it may be that self-concept is a more proximal determinant of diabetes outcomes, whereas family communication patterns are more distally related.

This study explored how the subjective sense of self and the experience of intimacy and autonomy in mother-daughter relationships are associated with diabetes outcomes in adolescent girls. However, because we did not examine similar correlates in adolescent boys with diabetes, we cannot make conclusions regarding the gender-specific nature of these interrelationships. Additionally, the absence of father-daughter interactions is a limitation of the current study. Further research is necessary to advance our understanding of how the experience of intimacy and autonomy in relationships with girls and boys and their fathers may be differentially associated with diabetes-related outcomes. Finally, conclusions regarding the role of adolescent self-concept and mother-daughter interactions as predictors of metabolic control must remain tentative because the cross-sectional nature of this study does not allow us to determine the direction of influence among these factors. Whether disturbances in the sense of self and in the experience of emotional connectedness in

mother-daughter interactions are predisposing factors or consequences of poor metabolic control is unclear. In the absence of a prospective methodology or the demonstration of behavioral mediation, the alternative interpretation that glycemic control predicts self-concept cannot be ruled out by the current study findings.

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