Relations of Behavioral Autonomy to Health Outcomes Among Emerging Adults With and Without Type 1 Diabetes

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Objective To examine the relation of behavioral autonomy to psychological, behavioral, and physical health among emerging adults with and without type 1 diabetes. **Methods** High school seniors with ($n = 118$) and without type 1 diabetes ($n = 122$) completed online questionnaires for three consecutive years. Behavioral autonomy, psychological health, risk behaviors, and diabetes outcomes were assessed. Regression analyses were conducted to predict Time 2 and 3 outcomes, controlling for Time 1 outcomes. **Results** There were no group differences in behavioral autonomy. Behavioral autonomy predicted better psychological health but only for emerging adults without diabetes. Behavioral autonomy was related to increased risk behavior for both groups. Behavioral autonomy was unrelated to self-care but predicted better glycemic control for females. **Conclusions** Behavioral autonomy may be beneficial for psychological health, but is related to increased risk behavior. The implications of behavioral autonomy for emerging adults with type 1 diabetes require careful consideration.

Key words adolescent; autonomy; diabetes mellitus, emerging adults; risk-taking; type 1.

A central goal of adolescence is the establishment of autonomy. A number of cognitive changes occur during adolescence that facilitate autonomy development. Youth begin to think in more abstract terms, are able to contemplate the future, and envision the consequences of their actions (Holmbeck, Friedman, Abad, & Jandasek, 2006). There are a series of age-related achievements that also promote autonomy, such as being able to obtain a drivers' license, vote, and join the military (Collins & Steinberg, 2007). As a consequence, youth seek and parents grant youth greater independence. Youth begin to make decisions about risky behavior, education and vocation, and the pursuit of romantic relationships. Today, many of these events and decisions extend into the late teens and early 20s or into what has come to be known as "emerging adulthood" (Arnett, 2000; Eccles, Templeton, Barber, & Stone, 2003).

Emerging adulthood is defined as the developmental period between the ages of 18 and 25 years (Arnett, 2000)—the period of time that directly follows adolescence but occurs before many traditional adult responsibilities such as marriage, parenthood, and work are assumed. Emerging adulthood is characterized by exploration in a variety of life domains, including vocation, relationships with parents, and relationships with friends and romantic partners. Psychological distress is a concern, as depressive symptoms increase during adolescence and peak in young adulthood (Arnett, 2004; Kessler, Mickelson, Walters, Zhao, & Hamilton, 2004), and reports of stress are at an all-time high (Stone, Schwartz, Broderick, & Deaton, 2010). The period of emerging adulthood is also an important one in which to examine disturbed eating behavior. The age of onset for bulimia is late adolescence and early adulthood (American Psychiatric Association, 2013).

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In addition, the rate of eating disorders is higher among college students than noncollege students (Vohs, Heatherton, & Herrin, 2001), although it is not clear whether this is due to the adverse effects of college or a selection bias in terms of who attends college.

Risk behaviors peak during emerging adulthood (Frech, 2009; Substance Abuse and Mental Health Services Administration, 2011) and health behaviors decline (Frech, 2009; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Specifically, emerging adults have the highest rate of alcohol use (Substance Abuse and Mental Health Services Administration, 2011), especially for those who attend college (White, Labouvie, & Papadaratsakis, 2005), and 90% of smokers begin the habit before the age of 21 years (Mowery, Brick, & Farrely, 2000). Emerging adulthood is an important period of development because patterns of behavior established during this time have been shown to persist into the later stages of adulthood (Nelson et al., 2008; Nelson, Lust, Story, & Ehlinger, 2009). Although research shows that autonomy is related to good psychological outcomes among adolescents (Noom, Dekovic, & Meeus, 1999; Smetana, Campione-Barr, & Metzger, 2006), there is less research on the implications of autonomy for psychological health and risk behavior among emerging adults (EAs).

Among the kinds of autonomy, behavioral autonomy—or independent decision-making—is expected to develop over the course of adolescence and extend into emerging adulthood. In fact, a key marker of adulthood is independent decision-making (Arnett, 2001). Because decision-making skills become more complex and mature throughout adolescence and emerging adulthood (Labouvie-Vief, 2006), behavioral autonomy ought to be related to good psychological well-being among EAs. There are some data to support this assertion. A study of college students found that independent decision-making was related to lower levels of psychological distress, higher self-esteem, and better grades (Lamborn & Groh, 2009). A study of EAs, ages 18–26 years, showed that parental undermining of behavioral autonomy (i.e., controlling behavior) was related to poor psychological outcomes and less close parent–child relationships (Nelson, Padilla-Walker, Christensen, Evans, & Carroll, 2010). Finally, a combined index of behavioral autonomy (e.g., makes decisions and follows through) and emotional autonomy (e.g., no longer needing others approval) during emerging adulthood (ages 17–23 years) predicted successful adaptation to young adulthood (ages 18–36 years; Masten et al., 2004). Thus, the first goal of the present study was to examine whether behavioral autonomy prospectively predicts successful adjustment to the transition to emerging adulthood.

Although behavioral autonomy has been linked to positive psychological outcomes, the implications of behavioral autonomy for risk behavior are less clear. Maturation of decision-making skills, including the capacity to understand the future consequences of one's actions, would suggest that autonomous EAs would engage in less risky behavior. However, engaging in risky behavior also might be viewed by EAs as a way to assert behavioral autonomy. A study of Dutch adolescents revealed no relation of behavioral autonomy to problem behavior (Noom et al., 1999). Because there are conceptual reasons for predicting that behavioral autonomy is related to increased as well as decreased risk behavior, we do not make a directional prediction about the relations of behavioral autonomy to risk behavior.

The final question that we address is the implications of chronic illness, specifically type 1 diabetes, for EAs' behavioral autonomy. Behavioral autonomy is an interesting issue to investigate in the case of type 1 diabetes because the regimen complexity might inhibit the development of behavioral autonomy and make the consequences of behavioral autonomy less clear. Individuals with type 1 diabetes need to monitor food intake, test blood sugar, exercise regularly, administer insulin, and adjust the amount of insulin based on the previously mentioned activities on a daily basis. Thus, the demands of taking care of diabetes might inhibit the development of behavioral autonomy because parents have been closely involved in their child's health care. Parents might be more likely to intervene in the lives of youth with type 1 diabetes than youth without diabetes because problems related to diabetes management erupt on a regular basis. On the other hand, those with diabetes might display more behavioral autonomy than those without diabetes because they have had experience with higher levels of responsibility. Research on this issue is not clear.

Several older studies have shown that behavioral autonomy development is inhibited among adolescents with chronic illness (Howe, Feinstein, Reiss, Molock, & Berger, 1993; Monsen, 1992). In the area of diabetes, one study showed no differences in the level of behavioral autonomy granted by parents of adolescents with and without type 1 diabetes, but the comparison group reported a more independent lifestyle, in terms of clothing, social activities, and hobbies, than the group with diabetes (Seiffge-Krenke, 1998). However, these group differences disappeared by the later stage of adolescence (age 17 years). In a study of EAs ages 18–30 years, behavioral autonomy was not measured but a related construct, identity development, was assessed (Luyckx et al., 2008). These researchers found that those with type 1 diabetes scored lower than

controls on the exploration aspects of identity development (i.e., searching for alternatives before making commitments) but were similar in commitment-making (i.e., making choices about identity-related issues). Here, we investigate whether there are differences in behavioral autonomy between EAs with and without type 1 diabetes during the transition to emerging adulthood.

Regardless of whether behavioral autonomy development is inhibited by type 1 diabetes, the enactment of behavioral autonomy may have different consequences for those with than without diabetes. Do the beneficial effects of behavioral autonomy extend to those with a chronic illness that requires complex decision-making skills for its effective management? Diabetes-care behavioral autonomy increases over the course of adolescence, but parental involvement in diabetes care remains beneficial—even among older adolescents (Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008). However, behavioral autonomy with respect to diabetes care is not the same as general behavioral autonomy with respect to daily life decisions. General behavioral autonomy among EAs with type 1 diabetes has been related to fewer depressive symptoms and fewer diabetes-related problems (Luyckx et al., 2008). One study showed that the effects of behavioral autonomy depended on the level of environmental risk (neighborhood, income): Autonomous behavior was related to good parent–child relationships among low-risk families but poor parent–child relationships among high-risk families (McElhaney & Allen, 2001). Thus, in the present study, we examine the links of behavioral autonomy to psychological health and risk behavior for those with and without diabetes and predict that relations will be stronger among those without than with diabetes. We also examine the links of behavioral autonomy with respect to diabetes outcomes among those with type 1 diabetes—specifically self-care behavior and glycemic control. Because there are potential benefits and costs to autonomy in the area of diabetes outcomes, we do not make a directional prediction.

In summary, the development and implications of behavioral autonomy for EAs is an unexplored but important topic because behavioral autonomy is considered to be a central achievement and sign of adulthood. The implications of behavioral autonomy for risk behavior are particularly important because there is evidence that health behaviors established in emerging adulthood persist into the later stages of adulthood and have implications for the development of health problems (Nelson et al., 2008, 2009). Behavioral autonomy is relatively unexplored among EAs with chronic illness, including those with type 1 diabetes. We measured general behavioral autonomy among youth with and without type 1 diabetes during their senior year of high school and examined psychological well-being and risk behavior 1 and 2 years later. In terms of psychological well-being, we measured both psychological distress and disturbed eating behavior. We measured psychological distress in this age group because previous research has shown high rates of psychiatric disorders among both college and noncollege peers (Blanco et al., 2008). We measured disturbed eating behavior because people with diabetes—especially females—are at increased risk for eating disorders compared with those without diabetes (Jones, Lawson, Daneman, Olmsted, & Rodin, 2000), and disturbed eating behavior is linked to diabetes-related complications (Rydall, Rodin, Olmsted, Devenyi, & Daneman, 1997). Although eating disorders typically emerge in early adolescence, the transition to college has been associated with increased eating disturbances (Vohs et al., 2001) and college students have higher rates of eating disorders than noncollege youth (Vohs et al., 2001). The two risk behaviors that we examined were binge drinking and cigarette smoking. Alcohol use disorders are high in this age group and higher in college students than their noncollege peers (Blanco et al., 2008). We also measured the two primary diabetes outcomes—self-care behavior and glycemic control.

We were uncertain whether there would be group differences in behavioral autonomy as previous research has been inconsistent on this issue. We hypothesized that behavioral autonomy would predict enhanced psychological well-being, but that benefits would be stronger for EAs without than with diabetes. We were unclear as to the implications of behavioral autonomy for risk behavior, as there are conceptual reasons for predicting both positive and negative relations. Given our prediction that behavioral autonomy might not be as beneficial for those with than without diabetes, we viewed the links to diabetes outcomes as exploratory.

Method

Participants

Participants were recruited from a previous study when they were on average 12 years old (see Helgeson, Snyder, Escobar, Siminerio, & Becker, 2007). Youth with type 1 diabetes were recruited from the Children's Hospital of Pittsburgh ($n = 132$), and controls were recruited from area malls ($n = 70$) and physicians' offices ($n = 61$) from the same geographic region. Participants with and without type 1 diabetes were recruited from the same age group, and the sex composition of the two groups was monitored to ensure equal representation across diabetes and

controls. When diabetes and controls were compared, there were no significant group differences on sex, age, race or ethnicity, household structure, or the racial composition and size of the communities in which participants lived. However, there were group differences in body mass index and social status, which persisted in the present study as described below. Of the original sample, 92% ($n = 121$) of youth with diabetes and 94% ($n = 123$) of youth without diabetes agreed to be contacted for this three-wave study on the transition to emerging adulthood. Youth were emailed an online questionnaire to complete during the spring of their senior year of high school (Time 1 [T1]), 1 year later (Time 2 [T2]), and 2 years later (Time 3 [T3]). They were paid for their completion of each questionnaire. For those with diabetes, 118 completed T1, 117 completed T2, and 113 completed T3. For those without diabetes, 122 completed T1, 121 completed T2, and 117 completed T3. Quarterly newsletters, holiday cards, birthday cards, and additional contact information contributed to this high rate of retention.

Procedure and Measures

This study was approved by the appropriate institutional review boards. Participants were mailed a consent form. When signed consent forms were received, a link to the online questionnaire was emailed to participants. Participants without online access were sent a questionnaire by mail to complete by hand (T1: 11.9%; T2: 11.5%; T3: 20%).

Demographic and disease-related information obtained from the earlier study (see Helgeson et al., 2007) are shown in Table I. Sex, race, social status, and household structure were measured at the time of enrollment in the original study and were not reassessed 6 years later at the time of this study. This average social status represents the lower end of technical workers, medium business, and minor professionals. As shown in Table I, there were only two significant group differences: Those with diabetes had a lower social status and a higher body mass index than controls.

A comparison of participants to nonparticipants on demographic and disease variables revealed only two differences. Nonparticipants with diabetes had a higher body mass index ($M = 24.72$) than participants ($M = 21.80$), $t(132) = -2.16$, $p = .03$. Control nonparticipants were more likely to be nonwhite (37.5%; $n = 3$) than participants (7.3%; $n = 9$), $X^2(131) = 8.22$, $p = .004$. There were no differences between EAs with and without diabetes in online access.

Table I. *Demographic and Disease-Related Variables*

	Diabetes ($n = 118$)	Controls ($n = 122$)
Sex	53% female	53% female
Race	93% white	93% white
Parent social status*	42.38 ($SD = 11.16$)	46.45 ($SD = 13.70$)
Household structure	75% live with both mom/dad	76% live with both mom/dad
T1 age	18.13 ($SD = 0.40$)	18.03 ($SD = 0.50$)
T1 body mass index*	25.76 ($SD = 4.16$)	24.07 ($SD = 4.71$)
T1 insulin delivery method	56% pump	
T1 duration of diabetes	11.12 years ($SD = 3.10$)	

Notes. Parent social status and household structure were measured at the initial recruitment of the parent study when youth were average age 12 years; social status was measured with the four-factor Hollingshead (Hollingshead, 1975) index based on parent education and occupational status; T1 = time 1 (baseline); SD = standard deviation; * denotes group differences significant at $p < .05$.

Behavioral Autonomy

Our behavioral autonomy measure was based on the behavioral control instrument developed by Steinberg and colleagues (Steinberg, Elmen, & Mounts, 1989) for adolescents. We omitted several items that did not pertain to high school graduates (e.g., age to leave school) or seemed inappropriate for emerging adults (e.g., choosing my clothes) and added eight items of our own that were suitable for emerging adults (see Table II). Respondents were asked who makes decisions about each of 15 tasks on 5-point scales: 1 (me only), 2 (me with parent involvement), 3 (both), 4 (parent with my help), and 5 (parent only). Although low scores on this index indicated higher levels of behavioral autonomy, we recoded the variable such that higher scores would indicate greater behavioral autonomy for ease of interpretation. To determine the dimensionality of the scale, we conducted a principal components analysis of these 15 items and found a three-factor solution. However, there was no conceptual distinction between the items that loaded on the three factors, there were substantial cross-loadings across factors, and all items had substantial loadings (ranged from 0.45 to 0.70) on the first principal component. Thus, we retained a one-factor solution. The internal consistency was good at all waves of assessment (T1 diabetes $\alpha = 0.84$, T1 controls $\alpha = 0.83$; T2 diabetes $\alpha = 0.82$, T2 controls $\alpha = 0.85$; T3 diabetes $\alpha = 0.79$, T3 controls $\alpha = 0.88$).

Psychological Outcomes

We had three indices of psychological distress. We measured *depressive symptoms* with the 20-item Center for Epidemiologic Study Depression Inventory (Radloff, 1977; T1 diabetes $\alpha = 0.90$, T1 controls $\alpha = 0.88$; T2

Table II. *Behavioral Autonomy Measure*

Who decides each of these tasks:

1—me only
2—me with parent involvement
3—both
4—parent with my help
5—parent only

*1. Which friends I spend time with.
*2. Whether or not I have a job.
*3. How I spend my money
*4. Whether or not I drink alcohol.
*5. How much time I spend with my friends.
*6. Whether or not I participate in a sport or activity.
*7. How late at night I stay out.
8. Choosing my career.
9. What kinds of food I eat.
10. How many nights per week I go out.
11. Who I date.
12. Where I live.
13. Whether or not I exercise.
14. Where I go on vacation.
15. What activities I do during my free time.

Note. *Indicates item taken from Steinberg et al. (1989).

diabetes $\alpha = 0.93$, controls $\alpha = 0.92$; T3 diabetes $\alpha = 0.92$, controls $\alpha = 0.91$); *loneliness* with the UCLA Loneliness Scale, Version 3 (Russell, 1996; T1 diabetes $\alpha = 0.82$, controls $\alpha = 0.86$; T2 diabetes $\alpha = 0.84$, controls $\alpha = 0.88$; T3 diabetes $\alpha = 0.86$, controls $\alpha = 0.87$); and *perceived stress* with the abbreviated form (4-item) of the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983; T1 diabetes $\alpha = 0.67$, controls $\alpha = 0.73$; T2 diabetes $\alpha = 0.75$, controls $\alpha = 0.77$; T3 diabetes $\alpha = 0.79$, controls $\alpha = 0.72$). All three scales have well-established reliability and validity and have been widely used with young adults. Because the three indices were strongly correlated at T1 (r's ranged from 0.53 to 0.70), T2 (r's ranged from 0.57 to 0.71), and T3 (r's ranged from 0.54 to 0.73), and we sought to reduce the number of analyses to reduce type 1 error, we standardized the three variables and took the average to create a psychological distress index at each wave.

We administered two subscales from the valid and reliable Eating Disorder Inventory (Garner, 1990): Drive for thinness (preoccupation with weight; T1 diabetes $\alpha = 0.93$, controls 0.89; T2 diabetes and controls $\alpha = 0.91$; T3 diabetes $\alpha = 0.92$, controls $\alpha = 0.90$) and bulimia (episodes of uncontrollable eating; T1 diabetes $\alpha = 0.83$, controls $\alpha = 0.79$; T2 $\alpha = 0.88$, controls $\alpha = 0.80$; T3 diabetes $\alpha = 0.91$, controls $\alpha = 0.83$). Three items from the drive for thinness scale were removed because they are biased by the presence of diabetes and inflate the presence of eating disturbances among people with diabetes (Steel, Young, Lloyd, & Macintyre, 1989). Because the two subscales were correlated at each wave of assessment (r's = 0.65, 0.66, and 0.54, respectively), we combined them into an *eating disturbance index*.

Risk Behavior

We asked participants how often they had *smoked* in the past 12 months, in accordance with this question from the Monitoring the Future Study (Johnston, O'Malley, Bachman, & Shulenberg, 2005). We created a dichotomous variable, such that 0 indicated never smoked and 1 indicated had ever smoked in the past year. At T1, 29% of participants smoked; the rate at T2 was 38% and at T3 was 41%. We measured *binge drinking* also with questions from the Monitoring the Future Study (Johnston et al., 2005). Participants were asked how often they had consumed five or more drinks on a single occasion (four or more drinks for females) in the past month. We created a categorical variable, such that 1 represented one or more binges and 0 represented no binges in the past month. Binge drinking occurred for 16% of participants at T1, 34% at T2, and 36% at T3.

Diabetes Outcomes

For participants with diabetes, self-care behavior was measured with the 14-item Self-Care Inventory (LaGreca, Swales, Klemp, & Madigan, 1988; Lewin et al., 2009), which was updated by adding eight more contemporary items as described previously (Helgeson et al., 2008). Respondents were asked how well they followed their physicians' recommendations on a 5-point scale (1 = never to 5 = always/very often) for glucose testing, insulin administration, diet, exercise, and other diabetes behaviors reflecting domains regarded as important by the American Diabetes Association. Internal consistency for this index was good (T1: $\alpha = 0.85$; T2: $\alpha = 0.88$; T3: $\alpha = 0.86$).

Glycemic control was measured with participants' most recent hemoglobin A1c (HbA1c), which was requested from their current physician. Higher numbers indicate poorer glycemic control. The average HbA1c at baseline was 8.97% ($SD = 1.76$). All physicians responded to our requests for HbA1c results. However, not all participants had an HbA1c taken in the past year. The number of participants who did not have an HbA1c taken was 11 (9%) at T1, 26 (22%) at T2, and 26 (23%) at T3. There are two primary reasons for missing HbA1c data: (1) some participants did not see a physician in the past year and (2)

some participants saw a physician but did not have their HbA1c evaluated. In the latter case, this occurred either because the physician did not order the test or the participant did not follow through with the laboratory test ordered by the physician; we have no way of distinguishing between the two. Participants without an HbA1c were obviously excluded from analyses of glycemic control but were retained in analyses of self-care behavior.

Overview of the Analyses

We began our analyses by examining changes in behavioral autonomy over time with a 2 (group) by 2 (sex) by 3 (time) repeated measures analysis of variance.

Before conducting the primary analyses to test whether behavioral autonomy predicted outcomes, we examined whether any of the demographic variables were related to behavioral autonomy with correlational analyses to see if they needed to be statistically controlled in these regression analyses. Behavioral autonomy was unrelated to group (diabetes, controls) and race. For youth with diabetes, behavioral autonomy was unrelated to time since diagnosis and insulin delivery method. However, behavioral autonomy was related to lower social status, $r = -0.23$, $p < .001$, and older age, $r = 0.25$, $p < .001$. In addition, males reported more behavioral autonomy ($M = 4.16$) than females ($M = 3.96$), t $(237) = 2.46$, $p < .05$. Thus, we controlled for age and social status in the analyses described below. In addition, because there were sex differences in behavioral autonomy and research suggests parents encourage greater behavioral autonomy in boys (Morrongiello, Klemencic, & Corbett, 2008), we took participant sex into consideration in all analyses to see if behavioral autonomy had similar implications for males and females or interacted with group.

To examine our primary aim of examining the relation of behavioral autonomy to psychological health outcomes, risk behaviors, and diabetes outcomes, we used multiple regression and logistic regression analyses to predict these outcomes at T2 and T3. For psychological health outcomes, we entered the respective T1 outcome on the first step of the equation (so that we are predicting changes in outcomes); age and social status simultaneously on the second step; sex, group, and behavioral autonomy simultaneously on the third step; and the three two-way interactions (sex X group, group X behavioral autonomy, sex X behavioral autonomy) on the final step of the equation. Results, including standardized betas, change in R^2, and total R^2 are shown in Table III. We show the final step for each equation in which a significant effect is detected. We used logistic regression analysis to predict T2 and T3 risk behaviors because the two risk behaviors are dichotomous. We used the same sequence of steps as described in the multiple regression analysis above, with the exception that there was no T1 outcome for risk behaviors. Thus, we entered age and social status on the first step; sex, group, and behavioral autonomy on the second step; and two-way interactions on the final step. Because none of the interactions were significant, they are not shown in Table IV. Table IV displays unstandardized betas and standard errors (as standardized betas are not available with logistic regression) and odds ratios. For diabetes outcomes, we used multiple regression analysis such that the T1 outcome was entered on the first step of the equation, sex and behavioral autonomy were entered on the second step of the equation, and the sex by behavioral autonomy interaction on the third step. Because these analyses were limited to those with diabetes, there was no need to statistically control for social status or age. These results are shown in Table V. All significant interactions were examined using simple slopes analysis (Aiken & West, 1991). Figures illustrating interactions depict the dependent variable for individuals who score + or −1 *SD* from the mean autonomy score.

Results

Changes in Behavioral Autonomy Over Time

The repeated measures analysis of variance on behavioral autonomy revealed a main effect of time, $F(2, 444) = 136.35$, $p < .001$, and a time by sex interaction, $F(2, 444) = 3.20$, $p < .05$. At T1 males reported more behavioral autonomy compared with females ($M = 4.15$ vs. $M = 3.99$), but behavioral autonomy increased over time such that males and females had equal behavioral autonomy by T3 (males T2 $M = 4.48$; T3 $M = 4.58$; females T2 $M = 4.44$; T3 $M = 4.57$). There were no effects involving group.

Predicting Psychological Outcomes

Behavioral autonomy did not predict T2 psychological distress. However, the behavioral autonomy by group interaction significantly predicted T3 psychological distress. Simple slopes analyses revealed that behavioral autonomy predicted less psychological distress for the control group (slope = −0.40), $t(225) = 3.21$, $p < .01$, but was unrelated to psychological distress for those with diabetes (slope = 0.13), $t(225) = 0.99$, n.s (see Figure 1 for residualized distress scores of individuals with and without diabetes who score + or −1 *SD* from the autonomy mean).

There was no relation of behavioral autonomy to the T2 or T3 eating disturbance index, but there was a marginally significant behavioral autonomy by group

Table III. *Multiple Regression: Predicting T2 (n = 238) and T3 (n = 230) Psychological Outcomes (Standardized Betas)*

	T2 psychological distress		T3 psychological distress		T2 disturbed eating		T3 disturbed eating	
Variable	Coefficient	ΔR^2	Coefficient	ΔR^2	Coefficient	ΔR^2	Coefficient	ΔR^2
T1 outcome	0.62***	0.41	0.47***	0.24	0.70***	0.57	0.66***	0.53
Age	−0.01		0.07		0.03		0.02	
Social status	0.08	0.00	0.00	0.00	0.07	0.00	0.05	0.00
Sex	0.08		0.06		0.17**		0.18**	
Group	0.05		−0.10		0.03		0.03	
Autonomy	0.05	0.00	−0.27	0.03	−0.09	0.02	−0.05	0.02
Sex × group			0.18		−0.04		−0.04	
Sex × autonomy			0.01		0.03		−0.09	
Group × autonomy			0.24**	0.03	0.11+	0.01	0.21***	0.03
Total ΔR^2		0.42		0.30		0.60		0.58

Note. +$p < .06$; *$p < .05$; **$p < .01$; ***$p < .001$; Sex 1 = male, 2 = female; Group 0 = healthy, 1 = diabetes.

Table IV. *Logistic Regression: Predicting T2 (n = 238) and T3 (n = 230) Risk Behaviors (Unstandardized Betas and Standard Errors)*

Variable	T2 binge	Odds ratio	T3 binge	Odds ratio	T2 smoke	Odds ratio	T3 smoke	Odds ratio
Age	0.28 (0.35)	1.33	0.07 (0.35)	1.08	0.34 (0.33)	1.40	0.38 (0.33)	1.47
Social status	0.05 (0.01)	1.05	0.05 (0.01)	1.05	0.00 (0.01)	1.00	0.01 (0.01)	1.01
Sex	−0.32 (0.30)	0.72	−0.45 (0.31)	0.64	−0.05 (0.29)	0.95	0.21 (0.29)	1.24
Group	−0.17 (0.30)	0.84	−0.50 (0.30)	0.61	0.24 (0.28)	1.27	0.11 (0.29)	1.11
Autonomy	0.31 (0.29)	1.37	0.61* (0.30)	1.83	0.68* (0.28)	1.96	0.98*** (0.29)	0.66

Note. +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$; Sex 1 = male, 2 = female; Group 0 = healthy, 1 = diabetes.

Table V. *Multiple Regression: Predicting T2 and T3 Diabetes Outcomes (Standardized Betas)*

	T2 self-care $n = 117$		T3 self-care $n = 112$		T2 HbA1c $n = 92$		T3 HbA1c $n = 92$	
Variable	Coefficient	ΔR^2	Coefficient	ΔR^2	Coefficient	ΔR^2	Coefficient	ΔR^2
T1 outcome	0.62***	0.64	0.58***	0.34	0.81***	0.61	0.75***	0.57
Sex	−0.02		0.04		−0.02		0.03	
Autonomy	−0.14+	0.02	−0.08	0.01	0.34	0.01	0.01	0.00
Sex × autonomy					−0.46*	0.02		
Total ΔR^2		0.66		0.35		0.64		0.57

Note. +$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$; Sex 1 = male, 2 = female.

interaction on the T2 eating disturbance index and a statistically significant behavioral autonomy by group interaction on the T3 eating disturbance index. Simple slopes analysis revealed that at T3 behavioral autonomy predicted less disturbed eating behavior for the control group (slope −0.29), $t(225) = 2.77$, $p < .01$, but more disturbed eating behavior for the diabetes group (slope = 0.26), $t(225) = 2.25$, $p < .05$. The effects were in the same direction at T2, but neither slope was significant.

Predicting Risk Behavior

Behavioral autonomy did not predict binge drinking at T2 but predicted greater binge drinking at T3. Behavioral autonomy predicted greater smoking at T2 and T3. Interestingly, group did not predict risk behaviors, indicating that the level of risk behaviors was similar for emerging adults with and without type 1 diabetes.

Predicting Diabetes Outcomes

There was no relation of behavioral autonomy to self-care behavior at T2 or T3. There was a sex by behavioral autonomy interaction on T2 glycemic control. Simple slopes analysis revealed that behavioral autonomy was unrelated to glycemic control for males (slope = 0.11), $t(87) = 0.37$, n.s., but was related to better glycemic control for females (slope = −0.91), $t(87) = -2.57$, $p < .01$ (see Figure 2 for

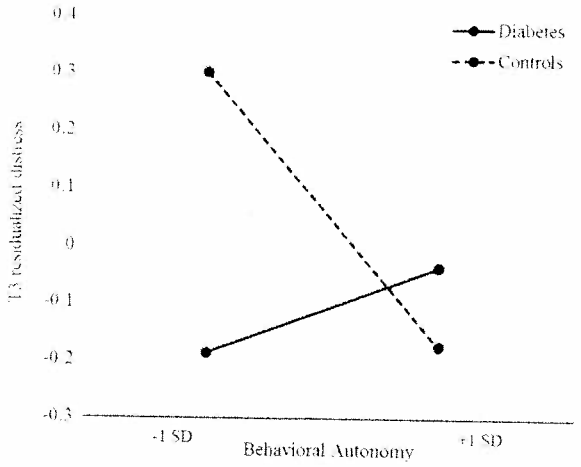

Figure 1. The relation of behavioral autonomy to T3 residualized distress for emerging adults with diabetes and controls.

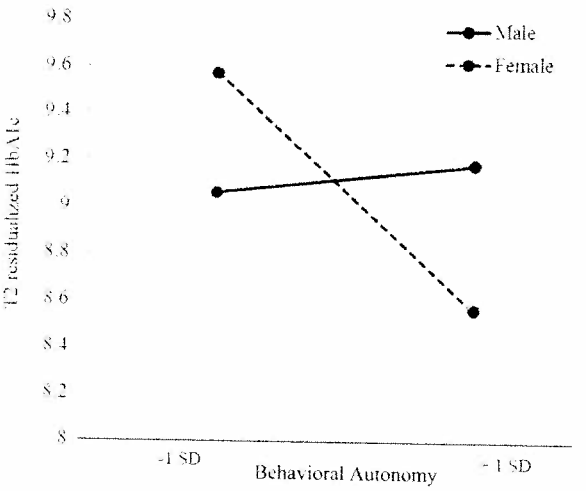

Figure 2. The relation of behavioral autonomy to T2 residualized HbA1c for males and females.

residualized HbA1c scores of males and females who scored plus or minus 1 *SD* from the mean autonomy score). Behavioral autonomy did not predict T3 glycemic control.

Discussion

The primary purpose of this study was to examine the implications of behavioral autonomy for psychological health and risk behavior for EAs with and without type 1 diabetes and for diabetes outcomes among the latter group. We did so in the context of a prospective study of EAs in their senior year of high school in which we predicted changes in outcomes 1 and 2 years later. In terms of psychological health, behavioral autonomy was related to reduced psychological distress and to reduced disturbed eating behavior for the control group, as predicted, but was unrelated to psychological distress and related to greater disturbed eating behavior for the diabetes group. In terms of diabetes outcomes, only a single relation emerged. One year later, behavioral autonomy was related to better glycemic control for females but unrelated to glycemic control for males. Two years later, there were no relations of behavioral autonomy to diabetes outcomes.

How can we explain the differential relations of behavioral autonomy to psychological health outcomes for emerging adults with and without diabetes? One possibility is that general behavioral autonomy is not as beneficial for those with diabetes because general behavioral autonomy is translated into diabetes-specific behavioral autonomy—that is, behavioral autonomy in taking care of diabetes. Self-reliance with respect to taking care of diabetes may not be advantageous to early emerging adults. There is substantial evidence that parental involvement in diabetes care is beneficial for youth with diabetes even among older adolescents (Helgeson et al., 2008). In the present study, general behavioral autonomy might have been translated into less parental involvement in diabetes self-care activities, which could explain, in part, why behavioral autonomy did not have the same benefits for those with diabetes.

Alternatively, it may be important to consider behavioral autonomy in the context of the individual's level of maturity. Wysocki and colleagues (Wysocki et al., 1996) created a self-care autonomy index which was a combination of child responsibility for diabetes self-care activities and parents' rating of the child's mastery of self-care behavior. Controlling for age, the ratio of self-care autonomy to maturity showed excessive autonomy in relation to maturity was associated with lower levels of adherence and increased hospitalizations. Thus, to better understand the implications of behavioral autonomy for health outcomes in the instance of type 1 diabetes, it may be especially important to take into consideration the individual's level of psychological maturity. We note that we found little evidence for relations of behavioral autonomy to diabetes outcomes in this sample.

Another reason for the differential relations of behavioral autonomy to psychological health for those with and without diabetes might have to do with our inability to distinguish between two kinds of autonomy, specifically behavioral and emotional autonomy. Behavioral autonomy represents the capacity to make independent decisions, whereas emotional autonomy reflects the lack of emotional dependence on relationships with others, most notably parents (Steinberg, 2013). Although the two can co-occur,

it is also possible to make decisions on one's own without distancing the self from others. That is, EAs can establish an autonomous lifestyle while maintaining a close connection to parents. Indeed, there is a great deal of research among adolescents that shows the best possible outcomes occur when families encourage autonomy in a context of support (Allen & Land, 1999). It is possible that our measure of behavioral autonomy did not disentangle the two—it tapped independence but also separation from parents. Autonomy in the context of connection to parents might be particularly important among EAs with type 1 diabetes.

Finally, we note that the beneficial relations we observed for behavioral autonomy in the control group were only significant for the T3 psychological health outcomes. It may be that the benefits of behavioral autonomy are not realized until the emerging adult has had time to adjust to the transition out of high school, and that this adjustment period is longer for those with diabetes. Because emerging adults with type 1 diabetes have to make greater adjustments during this time of transition (e.g., integrating diabetes into new social environments, transitioning from pediatric to adult health care), the beneficial effects of behavioral autonomy may take a bit longer to be realized. Further follow-up with this sample will examine this possibility.

We investigated whether there would be group differences in behavioral autonomy. There were no differences in the level of behavioral autonomy reported by emerging adults with and without type 1 diabetes. Thus, it is not the case that diabetes influences the level of general behavioral autonomy that parents grant as much as the fact that diabetes influences the relation of behavioral autonomy to health.

We also examined the implications of behavioral autonomy for risk behavior. Behavioral autonomy was related to higher levels of risk behavior—binge drinking and smoking. These findings may suggest a disadvantage of behavioral autonomy for both EAs with and without diabetes. However, one hopes that these risk behaviors reflect a transitory period of experimentation that will not persist into later adulthood. Support for this possibility comes from a longitudinal study of youth conducted by Shedler and Block (1990). They found that those who experimented with drugs were psychologically healthier at age 18 years than those who abstained and those who were frequent drug users. However, the same level of risk behavior may have more severe consequences for those with than without diabetes. Alcohol use is more problematic for those with diabetes because it affects blood glucose levels and impairs the judgment needed to enact appropriate self-care (Ahmed, Karter, & Liu, 2006). Interestingly, there was no group difference in risk behaviors, consistent with a previous study of similarly aged emerging adults with and without chronic illness from Switzerland (Suris, Michaud, Akre, & Sawyer, 2008). Given the greater risks of alcohol use for those with diabetes, it is of concern that those with diabetes use alcohol at the same rate as those without diabetes.

The findings from this study have implications for practitioners who work with young adults with type 1 diabetes. Certainly, the message cannot be that families and health care professionals should inhibit behavioral autonomy development. However, behavioral autonomy can be encouraged in the context of support, consistent with Allen and Land's (1999) research. Emerging adults should be encouraged to make both daily decisions (e.g., what to eat) and more futuristic decisions (e.g., what kind of career to choose) in the context of a warm, caring, and accepting familial and health care environment. In this sense, neither the family nor the health care team are making the decisions but are available to provide input and feedback in collaboration with the emerging adult. It might be especially beneficial if youth are provided with the opportunity to assert behavioral autonomy before emerging adulthood when parents are more readily available as collaborators. In regard to risk behaviors, especially drinking alcohol, it might be better if health care professionals focused their attention on helping youth manage these risk behaviors rather than deterring them, as emerging adults with diabetes are engaging in the same level of risk behavior as those without diabetes. Thus, rather than deterring the development of behavioral autonomy, families and health care professionals can better prepare emerging adults for exerting behavioral autonomy.

Before concluding, we note several study limitations. First, respondents were largely middle class and homogenous with respect to ethnicity and race, limiting the generalizability of these findings. Second, we modified an existing measure of behavioral autonomy to be relevant to emerging adults; thus, caution must be used in interpreting the findings of a modified measure. Future research should obtain additional reliability and validity information on the behavioral autonomy measure we used, including linking it to similar constructs in the literature and examining whether there are distinct domains of behavioral autonomy that change differentially over time for those with and without chronic illness. It would also be useful to explore this measure in a variety of populations that vary in ethnicity and social status. Third, with the exception of glycemic control, our measures are based on participant self-report. Our findings with regard to glycemic control, however, should be viewed with caution, as a substantial number of participants did not have a measure of HbA1c

taken at T2 or at T3, either because they did not see a physician in the past year or because no measure was taken. In the latter case, it is unclear whether the physician did not order an HbA1c or whether the participant did not follow through with the order. Regardless, it is likely that our findings for glycemic control are more likely to generalize to participants who are more conscientious with their clinical care. Fourth, we conducted 12 separate regression analyses (6 at T2 and at T3), which inflates our possibility of type I error. Thus, future research should replicate these results before clinical recommendations are implemented based on these findings. Finally, we studied only the earliest stage of emerging adulthood. It will be important to examine how behavioral autonomy evolves over time as well as its implications for health.

In sum, we showed that behavioral autonomy is related to good psychological health over the transition to emerging adulthood for those without type 1 diabetes but has a more complicated pattern of relations to psychological, behavioral, and physical outcomes among those with type 1 diabetes. Among those with diabetes, behavioral autonomy did not predict psychological distress or self-care behavior, predicted an increase in disturbed eating behavior and greater risk behavior, and predicted better glycemic control for females at one of the two assessments. These mixed findings suggest that the construct of behavioral autonomy needs to be studied in conjunction with other important variables (e.g., maturity, emotional autonomy) especially in the case of diabetes. Our finding that behavioral autonomy was related to greater enactment of risk behavior for EAs with and without diabetes is of some concern and warrants additional follow-up into the later years of emerging adulthood.

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