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Longitudinal Trajectories of Benefit Finding in Adolescents With Type 1 Diabetes

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Objectives: Benefit finding, which refers to perceiving positive life changes resulting from adversity, has been associated with better psychosocial well-being in different chronic illnesses. However, little research to date has examined how benefit finding develops in the context of Type 1 diabetes (T1D). The present study aimed to identify trajectories of benefit finding across adolescence and to investigate prospective associations with depressive symptoms, self-care, and metabolic control. ***Method:*** Adolescents with T1D aged 10 to 14 (M_{age} = 12.49 years, 54% girls) participated in a 4-wave longitudinal study spanning 1.5 years (N = 252 at Time 1). Adolescents filled out questionnaires on benefit finding, self-care, depressive symptoms, and illness perceptions. HbA_{1c} values were obtained through point of care assays. We used latent growth curve modeling (LGCM) and latent class growth analysis (LCGA) to examine the development of benefit finding. Cross-lagged path analysis and multi-group LGCM were used to examine prospective associations among the study variables. ***Results:*** Adolescents reported moderate levels of benefit finding which decreased over time. Three benefit finding trajectory classes were identified: low and decreasing, moderate and decreasing, and high and stable. These trajectory classes differed in terms of self-care, perceived personal and treatment control, and perceptions of illness cyclicality. Higher levels of benefit finding predicted relative increases in self-care 6 months later. Benefit finding was not prospectively related to depressive symptoms and metabolic control. ***Conclusions:*** Benefit finding may serve as a protective factor for adolescents with Type 1 diabetes and may motivate these adolescents to more closely follow their treatment regimen.

Keywords: benefit finding, self-care, metabolic control, adolescence, Type 1 diabetes

Adolescence is a critical time for diabetes management, as adolescents increasingly take responsibility for their own health (Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008) and various changes take place in the physical, cognitive, emotional, and social domain (Arnett, 1999). Although adolescents with Type 1 diabetes (T1D) are at increased risk for physical and psychosocial difficulties, the degree to which these adolescents experience such difficulties varies substantially (Helgeson et al., 2010; Oris et al., 2016; Schneider et al., 2007). In fact, many adolescents with T1D fare considerably well across adolescence (Seiffge-Krenke, 2001). Still, most studies have focused on risk factors for poor diabetes control rather than looking at sources of strength and resilience (Hilliard, Harris, & Weissberg-Benchell, 2012). The present study focused on one such source of resilience, that is, benefit finding. More specifically, this study examined different trajectories of benefit finding across adolescence and prospective associations with depressive symptoms, self-care, and metabolic control.

Benefit finding refers to perceiving positive life changes resulting from adversity (Helgeson, Reynolds, & Tomich, 2006). The experience of adversity can threaten one's views of the self, but by reevaluating these views and by finding benefits, a new sense of meaning can emerge (Tedeschi & Calhoun, 2004). A meta-analysis on benefit finding among adults showed that benefit finding was positively related to psychological well-being and negatively related to depression (Helgeson et al., 2006). Hence, benefit finding may be seen as an effective resource for adapting to certain stressors. However, other studies have found benefit finding to be unrelated or even negatively related to psychological well-being and depression (Helgeson et al., 2006). Therefore,

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some researchers have argued that benefit finding mainly represents a cognitive defense mechanism to manage negative emotions (Park & Helgeson, 2006). Taking these findings together, it has been hypothesized that benefit finding serves both functions by developing in a context of distress but, once developed, serving as a buffer against distress (Tran, Wiebe, Fortenberry, Butler, & Berg, 2011). As benefit finding requires adolescents to accommodate adverse circumstances into their views of the self and to set new life goals and priorities (Tran et al., 2011), growth experiences may be considered distressing—especially if these life changes are still ongoing (Helgeson et al., 2006). However, to the extent that these life changes are successful, benefit finding may relieve feelings of distress by allowing adolescents to positively reframe the meaning of their distress (Siegel & Schrimshaw, 2007).

Although the notion of benefit finding has gained more interest recently, the literature is still characterized by important gaps. First, benefit finding has been associated with better psychological well-being in numerous chronic illness populations (Algoe & Stanton, 2009). However, only two studies to date have examined benefit finding in the context of T1D. Benefit finding could be especially helpful for adolescents with T1D, as T1D requires a difficult management process including daily blood glucose testing, insulin injections, diet, and exercise. Prior research has linked benefit finding to less depressive symptoms and better self-care among adolescents with T1D (Helgeson, Lopez, & Mennella, 2009; Tran et al., 2011). These findings are important given that depressive symptoms and poor self-care behaviors increase the risk for suboptimal metabolic control (McGrady & Hood, 2010; Schneider et al., 2007) and diabetes-related complications (Stewart, Rao, Emslie, Klein, & White, 2005; White et al., 2001).

Second, little benefit finding research has focused on children and adolescents (Meyerson, Grant, Carter, & Kilmer, 2011). Adolescence is a difficult time for managing diabetes as evidenced by deteriorating metabolic control, poorer self-care, and heightened distress (Helgeson et al., 2010; Reynolds & Helgeson, 2011; Schneider et al., 2007). Adolescents are expected to take increasing responsibility for their diabetes, while also having to deal with various developmental challenges such as forming intimate friendships, which could detract them from a focused commitment to diabetes management. Understanding factors that predict adolescents' self-care is important given that self-care behaviors established during adolescence may carry well into adulthood (Dovey-Pearce, Doherty, & May, 2007).

Third, prior research on benefit finding has been mainly cross-sectional in nature. Longitudinal studies are needed to investigate the development of benefit finding across adolescence. During adolescence, patients develop their own illness perceptions, coming to view the illness as having more impact and being more chronic, but also having a greater illness understanding and feeling more in control over the illness (Fortenberry et al., 2014). In addition, more future-oriented thoughts and concerns emerge (Massey, Gebhardt, & Garnefski, 2008) and adolescents establish a personal identity (Luyckx et al., 2016). These changes may push some adolescents to be more aware of what it means to live with a challenging illness, potentially leading to *less* benefit finding. At the same time, adolescents are developing their coping skills, enhancing their ability to cognitively reframe problems and regulate their emotions (Band & Weisz, 1990; Seiffge-Krenke, Aunola, & Nurmi, 2009), and thoughts become more abstract (Dumontheil, 2014), which could lead to *more* benefit finding.

Although detecting general increases or decreases in benefit finding is important, adolescents may not all develop in the same direction. Identifying different trajectories of benefit finding and linking these trajectories to important health outcomes such as depressive symptoms, self-care, and metabolic control is vital for identifying vulnerable subgroups of adolescents who might benefit the most from interventions. Trajectories of benefit finding may also be related to adolescents' broader illness perceptions. Illness perceptions refer to the cognitive frameworks that patients construct to make sense of their illness and which develop through physical experiences, medical encounters, and interpretation of information from social and factual sources (Hagger & Orbell, 2003). In other chronic illness populations, benefit finding has been linked to stronger feelings of personal and treatment control (Ackroyd et al., 2011; Rogan, Fortune, & Prentice, 2013), more perceived consequences (Michel, Taylor, Absolom, & Eiser, 2010), and stronger views of the illness as being chronic or cyclical in nature (Ackroyd et al., 2011; Fortune, Richards, Griffiths, & Main, 2005).

Finally, longitudinal studies are needed to investigate prospective associations between benefit finding and important health outcomes such as self-care, depressive symptoms, and metabolic control. Although it is generally assumed that benefit finding may motivate adolescents to more closely follow their treatment regimen and lead to better metabolic control and psychological well-being, the reverse pathways may also be true (Helgeson et al., 2006, 2009). Adolescents who are well-adjusted may find it easier to identify benefits of having diabetes as compared to adolescents who are struggling with their illness. However, given that benefit finding typically emerges out of negative life stressors (Tedeschi & Calhoun, 2004), having a distressing and poorly managed illness may also give rise to more benefit finding.

In order to fill these gaps, the present study had four objectives. The first objective was to chart the development of benefit finding across adolescence. Benefit finding could either decrease due to adolescents' greater understanding of living with a chronic illness versus increase due to their greater coping skills. A second objective was to identify trajectory classes of benefit finding. No hypotheses were put forward regarding the number of classes and the developmental changes within these classes. A third objective was to examine whether these trajectory classes of benefit finding were related to trajectories of depressive symptoms, self-care, metabolic control, and a number of illness perceptions. We hypothesized that trajectory classes of benefit finding would be mainly related to trajectories of depressive symptoms, self-care, and illness perceptions, and less so to trajectories of metabolic control (Ackroyd et al., 2011; Fortune et al., 2005; Helgeson et al., 2006, 2009; Meyerson et al., 2011; Michel et al., 2010; Rogan et al., 2013). A last objective was to investigate prospective associations with depressive symptoms, self-care, and metabolic control. We tentatively hypothesized that benefit finding would predict relative decreases in depressive symptoms and increases in self-care 6 months later (Helgeson et al., 2006, 2009; Meyerson et al., 2011). However, as discussed earlier, the reverse pathways could also emerge.

Method

Participants and Procedure

This study is part of a larger longitudinal project, in which U.S. adolescents with T1D and their parents were followed over a period of 2.5 years with 6-month intervals. The main objective of the project was to examine how adolescents and their parents cope with diabetes-related stressors and how parental involvement in diabetes management relates to adolescents' autonomy development. More study details are provided in Wiebe et al. (2014). In the present study, we focused on data from Times 1 to 4, the time points for which benefit finding measures were available. Participants were recruited from a university/private partnership clinic and a community-based independent practice. To be eligible at Time 1, adolescents had to be: (a) between 10 and 14 years of age, (b) able to read and write either English or Spanish at the fourth grade level, and (c) diagnosed with T1D for at least 1 year. Adolescents completed self-report questionnaires at home or during an in-person research appointment, for which they received $50. This study was approved by the institutional review board of the University of Utah. Parents gave written informed consent and adolescents provided written assent.

Of the qualifying individuals approached, a total of 252 (66%) agreed to participate at Time 1 (M age = 12.49 years, SD = 1.53, 54% girls). At enrollment, mean illness duration was 4.74 years (SD = 2.96). Approximately half (51%) of participants used an insulin pump, with the remainder prescribed multiple daily injections. Families were largely Caucasian (92%) and middle class. A total of 214 (85%), 195 (77%), and 183 (73%) adolescents participated again at Time 2, 3, and 4, respectively. No differences were observed between participants with (n = 90) and without (n = 162) complete data on sex, $\chi^2(1) = 1.48$, $p = .224$; age, $F(1, 250) = 3.47$, $p = .064$, $\eta^2 = .01$; illness duration, $F(1, 247) = 1.71$, $p = .192$, $\eta^2 = .01$; benefit finding at Time 1, $F(1, 250) = 0.36$, $p = .550$, $\eta^2 = .00$; self-care at Time 1, $F(1, 250) = 2.60$, $p = .108$, $\eta^2 = .01$; metabolic control at Time 1, $F(1, 249) = 6.67$, $p = .102$, $\eta^2 = .01$; depressive symptoms at Time 1, $F(1, 249) = 2.81$, $p = .095$, $\eta^2 = .01$; and illness perceptions at Time 2, $F(7, 197) = 1.40$, $p = .208$, $\eta^2 = .05$. Furthermore, patients with and without complete data were compared using Little's (1988) Missing Completely At Random test, which revealed a normed chi-square of 1.07 (Bollen, 1989). Hence, we used the full information maximum likelihood (FIML) procedure in MPLUS 6.0 to deal with missing values (Dong & Peng, 2013).

Measures

Benefit finding. At Times 1–4, participants reported on the benefits of diabetes using Tomich and Helgeson's (2004) 16-item benefit finding scale, as described in Antoni et al. (2001). Participants rated their agreement with items (e.g., "Having diabetes has led me to be more accepting of things") using a 1 (*not at all*) to 5 (*extremely*) scale. One item was eliminated because it was not applicable to adolescents. Scores across all items were averaged such that higher scores indicated higher benefit finding. The present scale has mainly been used in adult samples, in which positive associations have been reported with quality of life, optimism, and coping strategies such as positive reframing, and negative associations with distress and negative affectivity (Tomich & Helgeson, 2004; Urcuyo, Boyers, Carver, & Antoni, 2005). The present scale is believed to be a valid and reliable measure of benefit finding among adolescents, as the items are highly similar to those of the more recently developed Benefit Finding Scale for Children (BFSC; Phipps, Long, & Ogden, 2007)—a widely used measure of benefit finding with good psychometric properties. Unfortunately, this scale was unavailable at the time of data collection. Furthermore, principal component analysis at Time 1 revealed one large factor with good internal consistency (α = .89; Tran et al., 2011).

Depressive symptoms. At Times 1–4, participants completed the Children's Depression Inventory (CDI), a 27-item self-report questionnaire measuring cognitive, affective, and behavioral symptoms of depression during the past 2 weeks (Kovacs, 2003). Total scores on the CDI range from 0 to 54, with higher scores representing more severe depressive symptoms. Reliability in the present study was excellent ($\alpha \geq .84$).

Self-care. At Times 1–4, participants completed the 14-item Self Care Inventory (La Greca, Follansbee, & Skyler, 1990) to assess self-care behaviors over the preceding month. The scale correlates well with more time-intensive interview methods for measuring self-care (La Greca et al., 1990). The scale was adapted to reflect current diabetes regimens (i.e., adding items for counting carbohydrates and calculating insulin doses based on carbohydrates) by a certified diabetes educator and a patient with T1D. Reliability was excellent ($\alpha \geq .85$).

Illness perceptions. At Times 2–4, participants completed the Illness Perceptions Questionnaire Revised (IPQ-R; Moss-Morris et al., 2002). We assessed the following perceptions: chronicity (e.g., "My diabetes is likely to be permanent rather than temporary," α = .77–.83); cyclicality (e.g., "I go through cycles in which my diabetes gets better and worse," α = .69–.79), consequences ("My diabetes has major consequences on my life," α = .68–.71); personal control (e.g., "There is a lot I can do to control my symptoms," α = .66–.81), treatment control (e.g., "My treatment can control my diabetes," α = .58–.61); coherence (e.g., "I have a clear picture or understanding of my diabetes," α = .85–.87); and emotional representations (e.g., "I get depressed when I think about my diabetes," α = .79–.89). Participants answered all items (five to six per subscale) using a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate strongly held perceptions about the illness (e.g., scoring high on chronicity suggests a firm belief that the illness will last for a long time).

Metabolic control. As part of the routine clinic visit, participants' glycosylated hemoglobin (HbA_{1c}) levels were obtained through point of care assays. HbA_{1c} provides information on average blood glucose levels over the preceding 3 or 4 months, and is the current standard to index whether diabetes treatment goals are being achieved. Higher levels indicate poorer control, with 7.5% or lower being the target for good control during adolescence (American Diabetes Association, 2016). Data on HbA_{1c} were available for 251, 242, 227, and 209 participants at Time 1, 2, 3, and 4, respectively.

Statistical Analysis

In all analyses, maximum likelihood estimation with robust standard errors (MLR) was used to take into account the non-

normality of the data. For Objective 1—the general developmental trend in benefit finding—we used latent growth curve modeling (LGCM) in Mplus. The path from the slope to the indicator at Time 1 was fixed to zero so that the intercept would represent the initial level. Given the equally spaced measurement intervals, subsequent linear slope pattern coefficients were fixed at 1, 2, and 3 for Times 2, 3, and 4, respectively. As the quadratic slope was nonsignificant, our model included a linear slope only. To evaluate model fit, standard fit indices were used (Kline, 2006). The robust Satorra-Bentler scaled chi-square statistic (S-B χ^2) should be as small as possible; RMSEA should be $<.08$ and, preferably, $<.06$; and CFI should be $>.90$, and preferably $>.95$. In a second model, the role of age, sex, illness duration, and treatment type was examined by regressing the intercept and slope of benefit finding on these variables.

For Objective 2—trajectory classes of benefit finding—latent class growth analysis (LCGA) at Times 1–4 was conducted. LCGA summarizes longitudinal data by modeling individual-level variability in developmental trajectories through a small number of classes that are defined by unique initial levels (intercepts) and rates of change (slopes). Hence, trajectory classes can be operationalized as collections of individuals who follow approximately the same developmental trajectory. Two- to five-class solutions were estimated. Several criteria were used to decide on the number of classes (Muthén & Muthén, 2000; Nagin, 2005). First, the Bayesian Information Criterion (BIC) for a solution with *k* classes should be at least 10 points lower than for a solution with *k-1* classes, suggesting that adding classes improves model fit. Second, classification quality was assessed by entropy (E), a standardized summary measure of classification accuracy. Values of .70 or higher indicate accurate classification. Third, we used the bootstrapped likelihood ratio test (BLRT), which provides a *p* value that can be used to determine whether there is a significant improvement in fit through the inclusion of an additional class. Finally, it is important to balance objective fit with theoretical justification, parsimony, and interpretability to arrive at a meaningful solution (Jung & Wickrama, 2008).

For Objective 3—distinguishing trajectory classes of benefit finding—multigroup latent growth curve modeling was conducted. We investigated whether the intercepts and slopes of depressive symptoms, self-care, illness perceptions, and metabolic control differed among the three benefit finding trajectory classes. First, a fully unconstrained baseline model was estimated. Next, we reestimated the model with intercepts constrained equal across classes. In a third model, we constrained linear (and, if applicable) quadratic slopes as equal across classes. If S-B χ^2 difference tests (Satorra & Bentler, 2001) show that these latter two constrained models provide a significantly poorer fit compared to the baseline model, this suggests that the classes differ from one another on some of the parameters tested. Using follow-up multigroup models, we then examined which intercepts or slopes could be held equal across each possible pair of classes.

Finally, for Objective 4—prospective associations with health outcomes—we conducted cross-lagged analysis in Mplus. A separate model was fitted for depressive symptoms, self-care, and metabolic control. In all three models, all within-time associations, stability paths, and cross-lagged paths were estimated. In addition, age, sex, illness duration, and treatment type were controlled for by estimating paths to each construct in the model.

Results

Objective 1: General Developmental Trend in Benefit Finding

Our LGCM model fit the data very well, S-B $\chi^2(5) = 2.75$, $p = .739$; RMSEA = .000; CFI = 1.000. Adolescents reported moderate levels of benefit finding which tended to decrease from Times 1 to 4. The mean intercept was 3.11 ($p < .001$) and the mean slope was −.09 ($p < .001$). Variances were 0.39 ($p < .001$) and 0.02 ($p = .042$), respectively, pointing to individual differences in the level and rate of change in benefit finding. None of the paths from sex, age, and illness duration to both the intercept and slope were significant. However, adolescents using an insulin pump reported higher levels of benefit finding ($\beta = -.20$, $p = .008$).

Objective 2: Trajectory Classes of Benefit Finding

LCGA was conducted to examine trajectory classes of benefit finding. Table 1 provides an overview of the statistical indices used to decide on the number of classes. A three-class solution was favored over a two-class solution, as evidenced by a lower BIC value and a higher value for entropy. The BLRT also favored a three-class solution over a two-class solution. In the four-class solution, the value for entropy decreased and two classes were quite overlapping in interpretation. Finally, in the five-class solution, the BIC value slightly increased and one class consisted of only 3% of the total sample. For these reasons, we selected the more parsimonious three-class solution. Intercepts and slopes are presented in Table 2. Adolescents in Class 1 (25%) reported low levels of benefit finding which further decreased from Times 1 to 4. Class 2 (58%) consisted of adolescents reporting moderate levels of benefit finding which decreased from Times 1 to 4. Finally, adolescents in Class 3 (17%) reported the highest levels of benefit finding which remained stable over time. Figure 1 depicts the observed values for benefit finding from Times 1 to 4 for all three classes. No differences in age, $F(2, 249) = 0.03$, $p = .975$; sex, $\chi^2(2) = 3.41$, $p = .182$; illness duration, $F(2, 246) = 0.05$, $p = .947$; or treatment type, $F(2, 250) = 2.39$, $p = .303$ were found among these classes.

Objective 3: Distinguishing the Benefit Finding Trajectory Classes

Multigroup latent growth curve modeling was conducted to investigate whether the intercepts and slopes of self-care, depres-

Table 1
Results of Latent Class Growth Analysis on Benefit Finding

Solution	BIC	Entropy	BLRT	Trajectory group prevalence (%)				
				1	2	3	4	5
2-class	1866.16	.70	−1018.15, $p < .001$	52	48			
3-class	**1816.16**	**.71**	−908.20, $p < .001$	**25**	**58**	**17**		
4-class	1804.26	.70	−874.90, $p < .001$	44	35	12	9	
5-class	1805.83	.72	−860.66, $p < .001$	43	33	9	3	12

Note. BIC = Bayesian Information Criterion; BLRT = Bootstrapped Likelihood Ratio Test. The solution in bold was selected.

sive symptoms, and HbA_{1c} differed among the three benefit finding trajectory classes. For self-care, the unconstrained model had an adequate fit, S-B $\chi^2(7) = 10.61$, $p = .156$; RMSEA = 0.045; CFI = 0.970. Constraining intercepts to be equal among the three classes significantly decreased model fit, ΔS-B $\chi^2(2) = 12.12$, $p = .002$. As illustrated in Table 3, follow-up analyses indicated that adolescents in the high stable class reported better self-care compared with adolescents in the low decreasing class and the moderate decreasing class. Further analyses indicated that the slopes could be fixed as equal among all classes, ΔS-B $\chi^2(2) = 0.32$, $p = .850$. For HbA_{1c}, the unconstrained model had an adequate fit, S-B $\chi^2(5) = 7.75$, $p = .171$; RMSEA = .047; CFI = .988. Both intercepts and slopes could be fixed as equal among the three classes, ΔS-B $\chi^2(4) = 0.94$, $p = .919$. Finally, for depressive symptoms, the unconstrained model had an acceptable fit, S-B $\chi^2(5) = 14.13$, $p = .015$; RMSEA = .085; CFI = .964. Again, both intercepts and slopes could be fixed as equal among the three classes, ΔS-B $\chi^2(4) = 5.33$, $p = .255$.

Further analyses[1] did not show any significant differences in intercepts or slopes among the three benefit finding classes for chronicity, consequences, coherence, and emotional representations. For personal control, treatment control, and cyclicality, constraining intercepts to be equal among the three classes significantly decreased model fit. As shown in Table 3, adolescents in the high stable class reported stronger feelings of personal control compared with adolescents in the low and moderate decreasing classes. In addition, adolescents in the moderate decreasing and high stable classes reported stronger feelings of treatment control compared with adolescents in the low decreasing class. Finally, adolescents in the low decreasing class reported lower views of the illness as being cyclical in nature compared with adolescents in the moderate decreasing class. Slopes could be fixed as equal among all three classes.

Objective 4: Prospective Associations With Health Outcomes

Cross-sectional associations among the study variables are presented in Table 4. At each time point, benefit finding was positively associated with self-care. Benefit finding was negatively associated with depressive symptoms at Time 1 only. No significant associations were observed between benefit finding and HbA_{1c} To investigate prospective associations, we conducted cross-lagged analysis. First, all cross-lagged paths were freely estimated. Second, all cross-lagged paths were constrained as equal across all time intervals, Model 1 (self-care): S-B $\chi^2(12) = 23.41$, $p = .024$; RMSEA = .062; CFI = .977; Model 2 (HbA_{1c}): S-B $\chi^2(12) = 13.72$, $p = .319$; RMSEA = .024; CFI = .997; Model 3 (depressive symptoms): S-B $\chi^2(10) = 10.55$, $p = .394$; RMSEA = .015; CFI = .999. These more parsimonious models fitted the data equally well, Model 1 (self-care): ΔS-B $\chi^2(4) = 3.81$, $p = .432$; Model 2 (HbA_{1c}): ΔS-B $\chi(4) = 7.98$, $p = .092$; Model 3 (depressive symptoms): ΔS-B $\chi(4) = 3.77$, $p = .438$, and, hence, were retained. Benefit finding predicted better self-care over time ($\beta = .11$, $p = .003$). The reverse path from self-care to benefit finding was nonsignificant ($\beta = .05$, $p = .119$). No significant cross-lagged association emerged between benefit finding on the one hand and HbA_{1c} and depressive symptoms on the other hand.

Table 2
Final Parameter Estimates of Latent Class Growth Analysis

Parameters	Total sample	Benefit finding trajectory classes		
		Class 1	Class 2	Class 3
M intercept	3.10***	2.32***	3.22***	3.93***
M linear slope	−.09***	−.10***	−.11**	.01

** $p < .01$. *** $p \leq .001$.

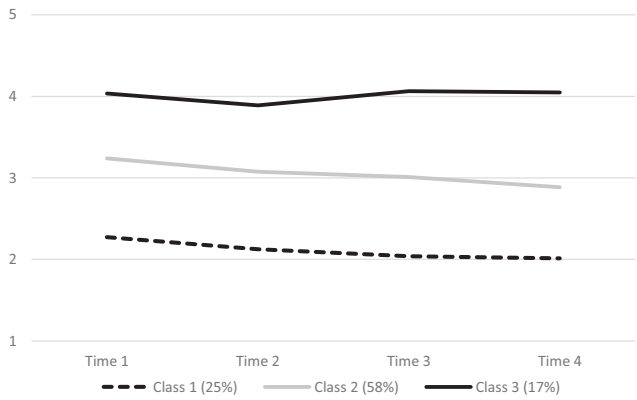

Figure 1. Observed values for benefit finding from Time 1 to 4 for all three classes.

Discussion

First, as a group, adolescents with Type 1 diabetes (T1D) reported moderate levels of benefit finding. This finding is in line with the literature demonstrating that children and adolescents are able to construe benefits from adversity (Meyerson et al., 2011). Indeed, a prior study in adolescents with T1D has shown that 75% of adolescents were able to identify at least one benefit of having diabetes (Helgeson et al., 2009). In the present study, a slight decrease in benefit finding was observed from Time 1 to Time 4 (i.e., 1.5 years later). As adolescents grow older, they take on more responsibility for their diabetes and develop more future-oriented thoughts and concerns (Massey et al., 2008; Schneider et al., 2007). This may result in a stronger awareness of the illness and its impact on daily life (Fortenberry et al., 2014), potentially undermining adolescents' ability to find benefits. These findings are in line with the literature reporting heightened emotional distress during adolescence (Reynolds & Helgeson, 2011). At the same time, benefit finding typically emerges out of negative life stressors and is sometimes seen as a way to relieve distress (Park & Helgeson, 2006) and, hence, an increase in benefit finding over the course of adolescence would have been equally plausible. However, the present study did not provide support for this hypothesis. An alternative explanation for the decrease in benefit finding might be found in the fact that children and adolescents, relative to adults, may require more assistance in making meaning from

[1] More detailed information on these analyses can be obtained from the first author.

Table 3
Parameter Estimates of Multigroup Latent Growth Curve Modeling

Parameters	Benefit finding trajectory class		
	Class 1 (Low)	Class 2 (Moderate)	Class 3 (High)
Self-care			
M intercept	3.81^{***a}	3.92^{***a}	4.18^{***b}
M linear slope	−.04	−.02	−.02
HbA_{1c}			
M intercept	8.40***	8.39***	8.16***
M linear slope	.13*	.14**	.15*
Depressive symptoms			
M intercept	6.24***	5.49***	3.99***
M linear slope	−.13	−.08	−.01
Illness perceptions			
Chronicity			
M intercept	4.08***	3.91***	4.08***
M linear slope	.04	.02	.00
Cyclicality			
M intercept	2.54^{***a}	2.82^{***b}	2.90***
M linear slope	.01	−.03	.00
Consequences			
M intercept	3.13***	3.32***	3.47***
M linear slope	.05	.07*	.05
Personal control			
M intercept	4.12^{***a}	4.10^{***a}	4.42^{***b}
M linear slope	−.38*	.12	−.19
M quadratic slope	.20**	−.04	.10
Treatment control			
M intercept	3.47^{***a}	3.75^{***b}	4.00^{***b}
M linear slope	.08	.01	−.06
Coherence			
M intercept	4.04***	4.08***	4.11***
M linear slope	−.26	−.14	−.30*
M quadratic slope	.12	.11	.16*
Emotional representations			
M intercept	2.32***	2.51***	2.43***
M linear slope	.03	−.02	−.04

Note. Within rows, intercepts, and slopes differ at $p < .05$ if they different superscripts.
* $p < .05$. ** $p < .01$. *** $p < .001$.

adversity (Kilmer & Gil-Rivas, 2010; Meyerson et al., 2011). Adult support and scaffolding of growth may dissipate over time, which may give rise to a decrease in benefit finding. Finally, our findings are in line with the general literature which has found that, on average, benefit finding does not increase with time among children and adolescents (Meyerson et al., 2011).

Table 4
Correlations Among the Study Variables at Times 1, 2, 3, and 4

	1	2	3	4
1. Benefit finding	—			
2. Self-care	.26***/.17* .27***/.25***	—		
3. HbA_{1c}	−.12/−.01 −.06/−.04	−.31***/−.20** −.25***/−.36***	—	
4. Depressive symptoms	−.22***/−.04 −.13/−.13	−.21***/−.23*** −.37***/−.29***	.23***/.35*** .31***/.18*	—

Note. The first coefficient is for Time 1; the second for Time 2; the third for Time 3; and the fourth for Time 4.
* $p < .05$. ** $p < .01$. *** $p \leq .001$.

There were no differences in mean levels of benefit finding nor in rates of change in benefit finding over time according to adolescents' sex, age, or illness duration. However, adolescents using a pump reported more benefits compared to adolescents using injections. Having a pump increases flexibility in one's eating schedule and decreases fear for hypoglycemia, possibly making it easier to identify benefits (Alsaleh, Smith, & Taylor, 2012; Seereiner et al., 2010). Alternatively, adolescents who display more benefit finding and are more seriously involved in the management of their diabetes have a higher probability of being selected for pump therapy, given that this type of therapy requires frequent blood sugar testing, carbohydrate counting, dose calculations, and cannula-site changing (Alsaleh et al., 2012).

Second, substantial interindividual variation was observed in the development of benefit finding over the course of adolescence. More specifically, three benefit finding trajectory classes were identified: low and decreasing, moderate and decreasing, and high and stable. These classes did not differ in terms of sex, age, illness duration, or treatment type. The majority of adolescents followed the general developmental trend, being characterized by moderate levels of benefit finding decreasing over time. About one fourth of

adolescents reported low levels of benefit finding which further decreased over time. Finally, about one sixth of adolescents reported high levels of benefit finding which remained fairly stable over time. Higher levels of benefit finding have been linked to several demographic, illness-related, and personality-related factors, with individuals high in benefit finding also reporting higher levels of optimism, religiosity, self-efficacy, self-worth, and positive reappraisal (Helgeson et al., 2006, 2009; Meyerson et al., 2011). Furthermore, it has been suggested that parents can provide a role model for deriving benefits from adversity (Helgeson et al., 2009). In sum, the present study identified three benefit finding trajectory classes, showing different levels of benefit finding as well as different rates of change in benefit finding over time (although it should be noted that these changes were rather limited).

Third, the three benefit finding trajectory classes were differentiated in terms of mean levels of self-care they but not in terms of rate of change in self-care over time. More specifically, we found that adolescents in the low decreasing and moderate decreasing classes reported poorer self-care as compared with adolescents in the high stable class. In addition, cross-lagged analysis indicated that higher levels of benefit finding were predictive of relative increases in self-care 6 months later, above and beyond the effects of sex, age, illness duration, and treatment type. Although it is generally assumed that benefit finding may lead to better self-care (Helgeson et al., 2009; Tran et al., 2011), we also tested the reverse pathway (Helgeson et al., 2006). More specifically, adolescents who are well-adjusted may simply find it easier to identify benefits of having diabetes. However, given that benefit finding typically emerges out of negative life stressors, having a poorly managed illness may also give rise to more benefit finding (Meyerson et al., 2011). In the present study, no such pathways were found. Our findings indicate that benefit finding serves as a protective factor for adolescents with T1D and may motivate these adolescents to more closely follow their treatment regimen. Understanding factors that predict self-care is important because self-care behaviors established during adolescence may carry well into adulthood (Dovey-Pearce et al., 2007). Some have argued that benefit finding reflects broader individual differences in emotion regulation capabilities (Rabe, Zöllner, Maercker, & Karl, 2006; Siegel, Schrimshaw, & Pretter, 2005; Tran et al., 2011). From this perspective, experiencing emotions as they occur and using these emotions as information to make sense of and manage illness experiences may allow adolescents to make more efficient behavioral management decisions (Kiviniemi, Voss-Humke, & Seifert, 2007).

Fourth, the three benefit finding trajectory classes were differentiated in terms of mean levels of illness perceptions but not in terms of rate of change in illness perceptions over time. Higher levels of benefit finding were associated with stronger beliefs of personal and treatment control. Maintaining a sense of control may help offset feelings of helplessness and distress brought on by adverse situations (Ackroyd et al., 2011; Rogan et al., 2013). In addition, lower levels of benefit finding were associated with lower views of the illness as being cyclical in nature. Researchers have hypothesized that patients who adopt a realistic world-view, which acknowledges the ups and downs of their illness, may find it easier to build a new sense of meaning (Fortune et al., 2005). Finally, although studies in both children and adults have linked benefit finding to greater perceived threat severity (Barakat, Alderfer, & Kazak, 2006; Helgeson et al., 2006), no such relationship was observed in the present study.

Fifth, the three benefit finding trajectory classes did not differ in terms of mean levels of HbA_{1c} nor in the development of HbA_{1c} over time. Cross-lagged analyses also did not show any prospective association between benefit finding and HbA_{1c}. These findings are in line with previous studies which also failed to find a direct relationship between benefit finding and metabolic control (Helgeson et al., 2009; Tran et al., 2011). However, in the study by Tran, Wiebe, Fortenberry, Butler, and Berg (2011), benefit finding was found to be a resource that buffered the disruptive effects of negative affective reactions to stress on metabolic control and depressive symptoms. Future research should examine which other psychosocial or contextual factors might be directly related to changes in metabolic control across adolescence. For instance, prior research has found that adolescents whose metabolic control deteriorated over time generally reported a more negative self-concept, higher peer conflict, more negative diabetes-related emotions, poorer family climate, and lower self-control (Helgeson et al., 2010; King et al., 2012; Luyckx & Seiffge-Krenke, 2009; Rohan et al., 2014).

Finally, the three benefit finding trajectory classes did not differ in terms of mean levels of depressive symptoms nor in the development of depressive symptoms over time. Cross-lagged analyses also did not show any prospective associations between benefit finding and depressive symptoms. Although it is typically assumed that distress is a prerequisite of growth (Tedeschi & Calhoun, 2004), benefit finding has also been found to be unrelated or negatively related to depressive symptoms in samples of both adults and children (Helgeson et al., 2006; Meyerson et al., 2011). In an attempt to integrate these findings, it has been hypothesized that benefit finding serves both functions by developing in a context of distress but, once developed, serving as a buffer against distress (Helgeson et al., 2006; Tran et al., 2011). Longitudinal studies following adolescents from the moment of diagnosis and over longer periods of time are needed to disentangle the dynamic relationship between benefit finding and distress.

In sum, the present findings underscore the importance of targeting resilience and growth in adolescents with chronic illnesses, including T1D. It has been suggested that integrating interventions targeting well-known risk factors for poor diabetes control with those focusing on sources of resilience may extend the impact of existing interventions (Hilliard et al., 2012). One particular approach that has been proven successful in helping people cope with adversity is cognitive–behavioral therapy (CBT; Roepke, 2015). CBT teaches clients to identify negative beliefs, to evaluate these beliefs, and to generate alternative interpretations that are more realistic and hopeful (Gillham & Reivich, 2004). In addition, CBT can train people in skills that promote growth such as how to recruit social support, share vulnerable information with others, engage in meaningful activities, and use coping skills (Bower & Segerstrom, 2004). Programs specifically developed for young adolescents such as the Penn Resiliency Program, which is aimed at building resilience and preventing anxiety and depression, have been proven effective (Gillham & Reivich, 2004; Reivich, Gillham, Chaplin, & Seligman, 2006), underscoring the importance of such positive, strength-based approaches.

There are limitations of the study that should be considered in future research. First, benefit finding and self-care were measured

using self-reports. Although benefit finding captures an internal process and, hence, is best assessed using self-reports, future studies should incorporate assessments from multiple informants. Second, the BFSC (Phipps et al., 2007) was unavailable at the time of data collection. Although the benefit finding measure used in the present study has not been validated in early adolescent samples, this scale appeared reliable, was at a reading level appropriate for the sample, and predicted important outcomes independently of age (Tran et al., 2011). Third, some factors might compromise the generalizability of our findings. The present sample was primarily middle-class and Caucasian and, hence, future research should replicate these findings in a sample that has more ethnic and economic diversity. Furthermore, the sample included adolescents who had been coping with diabetes for at least 1 year. Helgeson, Reynolds, and Tomich (2006) demonstrated that the positive effects of benefit finding may become stronger as the time since trauma increases. Hence, although we controlled for the duration of the illness in all analyses, different findings may have emerged had newly diagnosed participants been included.

Despite these limitations, the present study was the first to date to chart the development of benefit finding over the course of adolescence and to examine prospective associations between benefit finding and depressive symptoms, self-care, illness perceptions, and metabolic control among adolescents with T1D. Our findings underscore the importance of looking at sources of strength and resilience in this young patient group. Future research is needed to better understand which adolescents are deriving benefits from adversity and to uncover the mechanisms that could explain the links between benefit finding and important health outcomes such as self-care.

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