

## **Main and Interactive Effects of Diabetes Distress and Stress from Life Events on Overall Psychological Distress**

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Main and Interactive Effects of Diabetes Distress and Stress from Life Events on Overall

Psychological Distress

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### Abstract

This study sought to extend previous research by examining rates of three different types of diabetes distress, and whether stress from life events amplified the association between diabetes distress and overall psychological distress in a community-based sample of 119 middle-aged and older adults with type 2 diabetes. Consistent with past research, individuals experienced a moderate level of diabetes distress. However, only some types of diabetes distress were associated with depressive symptoms, independent of stressful life events, whereas all types of diabetes distress were only related to anxious symptoms when stress from life events was also high.

*Keywords:* diabetes, distress, stressful life events, anxiety, depression

Main and Interactive Effects of Diabetes Distress and Stress from Life Events  
on Overall Psychological Distress

Approximately 1 in 11 adults globally have diabetes, with prevalence rates continuing to increase worldwide (International Diabetes Federation, 2017). Diabetes has been conceptualized as a chronic stressor ([Gonzalez et al., 2011](#)) given the many sources of disease-specific stress that individuals experience on an ongoing basis. The emotional response to this stress has been referred to as *diabetes distress*, and has been found to be common, but distinct from, general types of distress such as depression and anxiety ([Fisher et al., 2012](#); [Gonzalez et al., 2011](#)). Yet both types of distress are clearly related, as some evidence exists that individuals with diabetes may be up to twice as likely to experience depression and anxiety than the general population ([Ali et al., 2006](#); [Grigsby et al., 2002](#); [Smith et al., 2013](#)).

One factor that may account for the variability in the extent to which diabetes distress is related to overall psychological distress is other, more transient life stressors that individuals with diabetes experience related to their family, finances, or overall health. These stressful life events have been found to be associated with poor mental health in their own right ([Dohrenwend, 2006](#)). On the one hand, both types of stress might have additive effects on overall distress, in which diabetes-specific and stress from life events are independently associated with overall distress. On the other hand, stress from life events could exacerbate the association between diabetes distress and overall distress, consistent with the stress exacerbation hypothesis examined in the social relationship literature ([Fiore et al., 1983](#)). Specifically, coping with stress related to diabetes and then experiencing a stressful life event could tax individuals' coping resources and result in more marked psychological distress than if these two types of stress occurred in isolation ([August et al., 2007](#); [Fisher et al., 2001](#)).

This study is novel in that it sought to investigate the extent to which a community sample of individuals with diabetes experienced *different types* of diabetes distress. Consistent with other studies ([Fisher et al., 2012](#)) we hypothesized that up to 45% of individuals with diabetes would experience some type of diabetes distress (Hypothesis 1). This study also sought to examine how different types of diabetes distress (i.e., diabetes frustration, burden, and worry) were related to overall psychological distress (i.e., depressive and anxious symptoms). We hypothesized that individuals who reported higher levels of (all types of) diabetes distress would report higher levels of depressive and anxious symptoms (Hypothesis 2). Finally, this study sought to examine whether the stress experienced from life events had additive versus interactive effects with diabetes distress in the association with overall psychological distress. We hypothesized that if individuals experienced a high level of stress from life events in addition to high levels of diabetes distress, the association between each type of diabetes distress and depressive and anxious symptoms would be amplified (i.e., stress exacerbation; Hypothesis 3).

## **Method**

### **Participants and Procedure**

Middle-aged and older adults with type 2 diabetes residing in the greater Philadelphia area were recruited to participate ( $N=119$ ; 57 men, 62 women). Eligibility criteria consisted of being 45-85 years old; seeing a diabetes healthcare provider at least once per year; and being fluent in English and free of any significant cognitive impairment. The average age of participants was 59.71 (range=44-83,  $SD=11.19$ ). The sample was 59.1% non-Hispanic White, 30% non-Hispanic Black, and 10.9% other race/ethnicity. Of the sample, 6.8% had less than a high school degree, 30.5% had a high school degree, and 62.6% had at least some college education. Approximately half (50.4%) of participants were married/in a marital-like

relationship. Participants were diagnosed with diabetes for 12.15 years, on average ( $SD=8.42$ ). The mean number of diabetes-related complications was .76 ( $SD=.93$ ), with 49.6% of the sample reporting at least one complication. Over half (66.5%) of the sample reported experiencing at least one stressful life event in the past 6 months ( $M=1.19$ ,  $SD=1.27$ ), and a low level of subjective stress related to these events ( $M=1.62$ ,  $SD=0.56$ ). Finally, 32.7% of the sample reached the clinical threshold for depression ( $\geq 22$ ; Zich et al., 1990); 32.8% of the sample reached the clinical threshold for anxiety ( $\geq 36$ ; Zung, 1980).

Participants provided written consent and then completed two, self-administered questionnaires and participated in a structured interview with a research assistant, which took approximately 2 hours total. Participants were given \$20 for their time and entered into a drawing to win an additional \$100. This study was approved by the relevant Institutional Review Board. All de-identified participant data and supplementary materials (study protocol, statistical analysis plan, informed consent form, analytic code, and codebook) will be available immediately following publication to anyone who wishes to access it at for analysis purposes at: <https://rucore.libraries.rutgers.edu/research/>

## Measures

**Diabetes Distress.** Three types of diabetes distress were assessed; all scales were derived from the Patient Outcome Research Team study ([Greenfield et al., 1994](#)). Seven items, rated on a 5-point scale (1=*none of the time*, 5=*all of the time*), were averaged to assess the frequency of participants' **frustration** about having diabetes ( $\alpha=.90$ ). A sample item included "Was your diabetes a nuisance or a bother?" Seven items, rated on a 6-point scale (1=*not a burden at all*; 6=*very large burden*), were averaged to assess how much of a **burden** diabetes was on them or their family ( $\alpha=.91$ ). A sample item included "Overall, how much of a burden is

having diabetes on you and your family in each of the following areas... Your overall finances?” Finally, seven items, rated on a 5-point scale (1=*not at all worried*, 5=*extremely worried*), were averaged to assess **worries about complications** ( $\alpha=.95$ ). A sample item included “Dying earlier than most people because of diabetes.”

**Stress from Life Events.** To assess stress associated with life events, items were drawn from commonly used measures of life stress ([Dohrenwend et al., 1978](#); [Turner and Wheaton, 1995](#)) particularly events experienced in later life (e.g., [increase in caregiving](#); [Aldwin, 1990](#)). Participants were asked which of nine types of stressful life events had occurred in the past six months. If participants answered affirmatively to experiencing an event, they were asked a follow-up question, “How stressful?” (1=*not at all*, 5=*very*); participants who did not experience that event were coded as 1. The items were then averaged to create a composite measure of subjective ratings of stressful life events. Because not all individuals perceive stressors in the same way ([Lloyd et al., 2005](#)), these subjective ratings were used in analyses; however, findings were mostly replicated with the objective count of life events.

**Depressive Symptoms.** To assess depressive symptoms, the 11-item version of the Center for Epidemiological Studies Depression Scale (CES-D; [Kohout et al., 1993](#); [Radloff, 1977](#)) was used. Participants responded on a 4-point Likert-type scale (1=*rarely or none of the time*, 4=*most or all of the time*) about their experiences in the past month, which were summed to create a composite measure ( $\alpha=.83$ ).

**Anxious Symptoms.** To assess anxious symptoms, the Zung Self-Rating Anxiety Scale ([SAS](#); [Zung, 1971](#)) was used. Participants responded on a 4-point Likert-type scale (1=*rarely or none of the time*, 4=*most or all of the time*) about their experiences in the past month, which were summed to create a composite measure ( $\alpha=.85$ ).

**Covariates.** Sociodemographic and disease-related variables were considered as potential covariates, including age, race/ethnicity, gender, education, marital status, income, and number of diabetes complications.

## Results

Data were checked for completeness; with the exception of race/ethnicity (7.6% missing due to an error in data collection), the amount of missing data on any other variable used in analyses was  $\leq .84\%$ . Listwise deletion was used for missing data.

For Hypothesis 1, we conducted descriptive analyses. Of participants surveyed, 57.6% said they were frustrated at least some of the time or more with having diabetes (a moderate level, on average,  $M=2.27$ ,  $SD=1.02$ ); 35.3% said they viewed diabetes as a small burden or greater (a low to moderate level, on average,  $M=2.56$ ,  $SD=1.27$ ); and 39.5% of participants said they had at least some worries about diabetes complications (a moderate level, on average,  $M=2.73$ ,  $SD=1.11$ ). In response to a question, “How much stress does managing your diabetes cause you? (1=*not at all*, 5=*a great deal*), individuals reported that diabetes caused them a moderate amount of stress, on average ( $M=2.46$ ,  $SD=1.13$ ). In addition, individuals ranked diabetes versus other stressors in their life as moderately stressful (on a scale of 1-10, 1=*not very stressful*, 10=*very stressful*,  $M=4.19$ ,  $SD=2.43$ ).

For Hypothesis 2, we examined correlations among all variables. All types of diabetes distress were significantly associated with each other ( $r_s > .51$ ; all  $p_s < .001$ ). Depressive and anxious symptoms also were significantly associated with each other ( $r = .69$ ,  $p < .001$ ). Frustration and burden were significantly related to depressive symptoms ( $r = .44$ ,  $.34$ , respectively, both  $p_s < .001$ ); frustration, burden, and worries about complications were significantly related to anxious symptoms ( $r = .47$ ,  $.34$ ,  $.24$ , respectively, all  $p_s < .009$ ). Finally,



stress from life events was significantly related to anxious and depressive symptoms ( $r=.40, .33$ , respectively,  $p<.01$ ).

For Hypothesis 3, linear multivariable regression analyses were performed to examine the main and interactive effects of diabetes distress and stress from life events on overall psychological distress, controlling for sociodemographic and disease-related factors. Given multicollinearity among each type of diabetes distress, analyses were run separately for each type of diabetes distress in predicting depressive and anxious symptoms. For significant interactions, simple slopes were calculated. The covariates that were included in regression models (ones significantly associated with depressive and anxious symptoms) were race/ethnicity, education, marital status, and presence of diabetes complications.

***Correlates of depressive symptoms.*** As shown in Table 1, individuals who reported high levels of diabetes frustration and burden also reported significantly higher levels of depressive symptoms. Individuals who reported high levels of stress from life events also reported significantly higher levels of depressive symptoms. No significant interactions were found between any of the three types of diabetes distress and stress from life events in predicting depressive symptoms.

INSERT TABLE 1 HERE

***Correlates of anxious symptoms.*** As shown in Table 1, three significant interactions emerged between each type of diabetes distress and stress from life events in predicting anxious symptoms.

Simple slopes analysis revealed that among individuals with high levels of stress from life events, there was a positive association between each type of diabetes distress and anxious symptoms (frustration simple slope= $5.08(1.01)$ ,  $t=5.04$ ,  $p=.001$ ; burden simple slope= $1.87(0.91)$ ,

$t=2.05, p=.07$ ; worries about complication simple slope= $3.16(1.23), t=2.57, p=.03$ ). In contrast, among individuals with low levels of stress from life events, there was no association between each type of diabetes distress and anxious symptoms (frustration simple slope= $.57(.95), t=0.59, p=.57$ ; burden simple slope= $-0.20(0.75), t=-0.27, p=.80$ ; worries about complication simple slope= $-0.27(0.95), t=-0.29, p=.78$ ).

### **Discussion**

Consistent with other studies ([e.g., Fisher et al., 2012](#)), 1/3 to 1/2 of the sample reported some level of diabetes distress. Findings from this study that attempted to “unpack” the different types of diabetes distress suggest that frustration with having diabetes was the most common type of distress. Specifically, more than half of this sample experienced notable frustration associated with having diabetes, higher than past research examining diabetes distress in general. In contrast, diabetes as a source of burden and worries about complications were less common types of diabetes distress, which were reported at a lower level than past research examining diabetes distress in general. Thus, examining different types of diabetes distress allows for a more nuanced understanding of rates of diabetes distress.

### **Associations between Stress and Depressive Symptoms**

Providing partial support for Hypothesis 2, significant main effects were found such that individuals who reported higher levels of burden and frustration from their diabetes also reported more depressive symptoms, with frustration with having diabetes exhibiting a larger effect on depressive symptoms, albeit still relatively small. Individuals who reported more worries about diabetes complications did not report more depressive symptoms, suggesting that this type of diabetes distress is distinct from depressive symptoms ([Gonzalez et al., 2011](#)). Another explanation for these findings is that two types of diabetes distress were assessed by asking

individuals the extent to which diabetes caused them to feel frustrated or burdened – feelings they currently have. Worries about complications was assessed, in contrast, by asking individuals how they felt about possible future negative events (i.e., complications). Other research suggests that past or current – not future – experiences may be more important in contributing to depressive feelings ([Eysenck et al., 2006](#)). Moreover, the average number of current complications experienced was relatively low, and only 11.8% of participants reported being very or extremely worried about complications, which could be responsible for the lack of an association between worries about complications and depressive symptoms in this particular sample.

Although stress from life events also was significantly related to depressive symptoms, there was no support for Hypothesis 3. These findings suggest that stress from life events does not exacerbate the association between diabetes distress and depressive symptoms, but that each category of stress has unique, independent associations with depressive symptoms, consistent with the main effects hypothesis.

### **Associations between Stress and Anxious Symptoms**

Whether diabetes distress was related to anxious symptoms depended on the level of stress from life events individuals were also experiencing, providing support for Hypothesis 3. These findings are consistent with the stress-exacerbation hypothesis, whereby one type of stressor amplifies the association between another type of stressor and psychological distress. Similar to findings for depressive symptoms, frustration with having diabetes had the largest effect on anxious symptoms.

The findings of this study must be interpreted within the context of the study's limitations. Because this study used a cross-sectional design, causality cannot be conclusively

determined, nor can the direction of effects be established. It is possible that individuals who are already prone to depressive and anxious symptoms are more likely to experience stressors, or are more likely to have a negativity bias in perceiving their stressful experiences ([Piette and Kerr, 2006](#)). In addition, stressful life events may have more transient effects on well-being than chronic stressors ([Almeida et al., 2005](#)). Future research would need to examine these patterns longitudinally and at more frequent assessments in an attempt to disentangle the direction of this relationship. Furthermore, although the sample was community-based and relatively diverse, results would nonetheless need to be replicated among a larger, more diverse sample to increase confidence in the validity of these findings. Finally, future research should consider examining distinct types of stressful life events ([August et al., 2007](#)); given the relatively small sample in the current study, we lacked enough statistical power to test these more nuanced associations between specific types of diabetes distress *and* specific types of stress from life events.

Despite these limitations, the results of this study provide insight into unique types of diabetes distress, which types are associated with overall psychological distress, and the life context in which these associations are more likely to occur. As mental health issues hinder individuals' successful diabetes management ([Gonzalez et al., 2008](#)) efforts to understand the sources of these issues are particularly important for interventions designed to improve coping skills to promote successful disease management, as well as overall quality of life.

### Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest.

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Table 1

*Main and Interactive Effects of Diabetes Distress and Stress from Life Events on Overall Psychological Distress*

	Depressive symptoms				Anxious symptoms			
	$\beta$	$t$	$p$	Model $R^2$	$\beta$	$t$	$p$	Model $R^2$
<u>Main effects</u>								
Diabetes frustration	.39	3.82	<.001	Adjusted $R^2 = .26$	.31	3.28	<.001	Adjusted $R^2 = .34$
Stress from life events	.18	1.95	.05		.25	2.81	.006	
<u>Interaction effects</u>								
Frustration x life stress	.07	.68	.50	Adjusted $R^2 = .25$	.33	3.69	<.001	Adjusted $R^2 = .42$
<u>Main effects</u>								
Diabetes burden	.23	2.19	.03	Adjusted $R^2 = .19$	.16	1.65	.10	Adjusted $R^2 = .29$
Stress from life events	.22	2.27	.03		.28	3.14	.002	
<u>Interaction effects</u>								
Burden x life stress	.03	0.30	.77	Adjusted $R^2 = .18$	.19	2.11	.04	Adjusted $R^2 = .32$
<u>Main effects</u>								
Diabetes worries	.12	1.26	.21	Adjusted $R^2 = .16$	.13	1.44	.15	Adjusted $R^2 = .29$
Stress from life events	.26	2.64	.01		.30	3.36	.001	
<u>Interaction effects</u>								

Worries x life stress	.04	0.32	.75	Adjusted R <sup>2</sup> = .16	.23	2.10	.04	Adjusted R <sup>2</sup> = .31
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*Note.* A total of six separate regression analyses are reported above. All analyses controlled for race/ethnicity, education, marital status, and number of diabetes complications.