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Diabetes Distress, Emotional Dysregulation, and Depressive Symptoms among Black Adults with Type 2 Diabetes

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Diabetes Distress, Emotional Dysregulation, and Depressive Symptoms among Black Adults with Type 2 Diabetes

Abstract

The daily demands of diabetes self-management can be distressing, causing greater depressive symptomatology. Further, diabetes distress is positively associated with feelings of frustration and worry, causing increased emotional dysregulation that may further explain the association between diabetes distress and depressive symptomatology. The current study used cross-sectional data to assess the role of emotional dysregulation as a mediator of the association between diabetes distress and depressive symptoms in Black adults with type 2 diabetes. Participants ($n = 284$, 72% female, 62 ± 11 years old, mean diabetes diagnosis duration 11 ± 9 years) were recruited through local churches and completed self-report measures of diabetes distress, emotional dysregulation, and depressive symptoms. Path analyses were performed using Mplus 8 MODEL INDIRECT. Bootstrapping was used to establish robust point estimates. There was a significant direct effect between diabetes distress and depressive symptoms ($\beta = .12$, $p = .02$). A significant indirect effect was also found between diabetes distress and depressive symptoms through emotional dysregulation ($\beta = .30$, $p < .001$). The overall association between diabetes distress and depressive symptoms, including both direct and indirect effects, was $\beta = .42$, $p < .001$. Thus, the positive association between diabetes distress and depressive symptoms was mediated by emotional dysregulation. These findings suggest that strategies aimed at enhancing emotional regulation along with strategies to reduce diabetes distress may decrease depressive symptoms among Black adults with type 2 diabetes.

Keywords

diabetes distress, emotions, mental health, older adults, type 2 diabetes

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Abstract

The daily demands of diabetes self-management can be distressing, causing greater depressive symptomatology. Further, diabetes distress is positively associated with feelings of frustration and worry, causing increased emotional dysregulation that may further explain the association between diabetes distress and depressive symptomatology. The current study used cross-sectional data to assess the role of emotional dysregulation as a mediator of the association between diabetes distress and depressive symptoms in Black adults with type 2 diabetes. Participants ($n = 284$, 72% female, 62 ± 11 years old, mean diabetes diagnosis duration 11 ± 9 years) were recruited through local churches and completed self-report measures of diabetes distress, emotional dysregulation, and depressive symptoms. Path analyses were performed using Mplus 8 MODEL INDIRECT. Bootstrapping was used to establish robust point estimates. There was a significant direct effect between diabetes distress and depressive symptoms ($\beta = .12, p = .02$). A significant indirect effect was also found between diabetes distress and depressive symptoms through emotional dysregulation ($\beta = .30, p < .001$). The overall association between diabetes distress and depressive symptoms, including both direct and indirect effects, was $\beta = .42, p < .001$. Thus, the positive association between diabetes distress and depressive symptoms was mediated by emotional dysregulation. These findings suggest that strategies aimed at enhancing emotional regulation along with strategies to reduce diabetes distress may decrease depressive symptoms among Black adults with type 2 diabetes.

Keywords: diabetes distress, emotions, mental health, older adults, type 2 diabetes

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Introduction

Type 2 diabetes mellitus (T2D) is a metabolic disease characterized by insulin resistance and chronically elevated blood glucose levels that place individuals at a heightened risk for long-term health

complications such as heart disease, stroke, nephropathy, retinopathy, and lower extremity amputations (Deshpande et al., 2008). In 2021, 45.9 million adults (20 years and older) in the United States (U.S.) had diabetes mellitus (representing a prevalence of 13.8%) with 44.2 million cases (96.3%)

attributed to T2D (CDC National Diabetes Statistics Report, 2024). By 2050, the prevalence of diabetes mellitus is projected to increase to 21% (Boyle et al., 2010). Black adults have the highest prevalence of diabetes (17.4%; 12.7% diagnosed and 4.7% undiagnosed), compared with Hispanic (15.5%; 11.1% diagnosed, 4.4% undiagnosed), and non-Hispanic Whites (13.6%; 11.0% diagnosed, 2.7% undiagnosed; Institute for Health Metrics and Evaluation, 2024) and experience greater complications (Haw et al., 2021).

Comorbid T2D and depression can worsen health outcomes cumulatively contributing to the heightened risk of serious complications and early mortality (Robinson et al., 2018; Naicker et al., 2017). Depression is markedly higher for people with T2D (18%) than for the general population (10%; Ali et al., 2006), and depression among Black adults with T2D is even higher (25%; Ajuwon et al., 2020). Black adults are often underdiagnosed and less likely to seek treatment for depression because of perceived associations of psychotherapy with weakness and cultural norms that mental illness should be contained to the family unit or religious community (Bailey et al., 2019). Black individuals are also less likely to receive proper treatment, and due to a lower quality of care, are more likely to experience more severe and debilitating depression than non-Hispanic Whites (Hill-Briggs et al., 2021).

One factor that contributes to higher levels of depressive symptoms in people with T2D is diabetes distress (Snoek et al., 2015). The lifestyle changes and self-management routines required by T2D can be daunting and exhausting (Fisher et al., 2009; Robinson et al., 2018). For example, chronic worry about checking blood glucose levels frequently or effectively can contribute to feelings of frustration and overwhelm. Within the U.S., diabetes distress rates range between 45%

and 77% (Fisher et al., 2012; Fisher et al., 2022). Higher levels of diabetes distress are associated with poorer glycemic control (Schmitt et al., 2021), lower quality of life (Robinson et al., 2018), and elevated depressive symptomatology (Ehrmann et al., 2015; Sidhu & Tang, 2017). Although there is limited research on diabetes distress in minority populations, one study indicates that Black populations experience disproportionately higher rates of diabetes distress compared to non-Hispanic Whites (Hausmann et al., 2010). In addition to T2D-associated distress, Black adults often face additional stressors associated with racial inequities (e.g., economic inequality, racial discrimination, residential segregation, poverty; Lee et al., 2019) that further exacerbate poor glucose control and impact one's ability to reduce T2D-related complications (Dawson et al., 2015).

Although diabetes distress and depressive symptoms are positively associated (Ehrmann et al., 2015; Snoek et al., 2015), more research is needed to examine the mechanism underlying this association. One potential pathway is emotional dysregulation, defined as an individual's inability to control their emotional experience and regulate their emotional arousal (Gatz & Roemer, 2004). Emotion regulation theory (Gross, 1998) posits that individuals who have difficulty regulating their emotions often have difficulty down-regulating negative emotions and rumination that can lead to increased depressive symptoms. Further, according to the transactional model of stress and coping (Lazarus & Folkman, 1984), increased stress occurs when an individual appraises the demands of a situation to be greater than his or her perceived resources and ability to cope with those demands. Chronic stress is associated with increased depressive symptoms (Hammen, 2005). Emotional dysregulation may explain the association between diabetes distress and depressive

symptoms as individuals with T2D who appraise the daily self-management of the disease as threatening have higher perceived stress and a lower ability to cope effectively with the disease. Increased use of maladaptive coping strategies can disrupt emotional regulation and exacerbate depressive symptoms (Moritz et al., 2016).

Among adults with T2D, the prevalence of elevated diabetes distress (i.e., Diabetes Distress Scale cut point ≥ 3) ranges from approximately 35% in African American women (Cummings et al., 2017) to 50% in a study of multiracial identities (Fisher et al., 2010). Diabetes distress was positively associated with emotional dysregulation (e.g., self-criticism, self-judgement) in a sample comprised of 62% Black adults with T2D (Kane et al., 2018). Further, several studies have shown emotional dysregulation to be a mediator linking psychological variables (e.g., self-compassion, attachment) with depression in adults (Bakker et al., 2019; Malik et al., 2015). For example, in a large sample of middle-aged adults with recurrent depression, higher scores on self-compassion were associated with lower scores on depressive symptoms and this association was mediated by brooding rumination – a tendency to have repetitive and frequent negative thoughts (Bakker et al., 2019). Additionally, interventions to enhance emotional regulation have shown success in lowering depressive symptoms. In a sample of hospital mental health patients tested after admission and a second time prior to discharge, improvement in emotional regulation skills (e.g., problem solving, social competence, relaxation ability) was associated with a reduction of depressive symptoms (Fehlinger et al., 2013). A greater understanding of the role of emotional dysregulation in the association between diabetes distress and depressive symptoms is crucial for informing targeted interventions that address the complexity of emotional and

psychological factors in the management of diabetes distress and depression (Quoidbach et al., 2015; Bolier et al., 2013).

Using baseline data from Black adults with T2D enrolled in the TX STRIDE (*Texas Strength Through Resilience in Diabetes Education*) clinical trial (Steinhardt et al., 2021), the aims of the current study were twofold. First, we examined the direct association of diabetes distress with depressive symptoms. We hypothesized that higher levels of diabetes distress would be associated with higher levels of depressive symptoms. Second, we examined the potential mediating role of emotional dysregulation on the association between diabetes distress and depressive symptoms. We hypothesized that the association of diabetes distress with depressive symptoms would be mediated by emotional dysregulation.

Methods

Participants and Procedures

This study used baseline data ($n = 284$, 72% female, 62 ± 11 years old, mean diagnosis duration 11 ± 9 years) from TX STRIDE, an ongoing clinical trial examining the effectiveness of a resilience-based diabetes self-management education and support program compared to a standard diabetes self-management program. Participants were recruited from predominantly Black churches in the greater Austin, Texas area. Inclusion criteria included being Black, aged 18 years or older, and having a diagnosis of T2D. Individuals were excluded if they were pregnant, lactating, or had medical conditions for which changes in diet and/or physical activity would be contraindicated (e.g., lower limb amputations, undergoing dialysis).

Data were collected between August 2020 and April 2023. During data collection,

participants completed demographic (i.e., age, gender, educational level), diabetes distress, emotional dysregulation, and depressive symptoms questionnaires. All participants provided written informed consent, and the study was approved by the Institutional Review Board at The University of Texas at Austin.

Measures

Diabetes Distress

The four-item version of the Diabetes Distress Scale (DDS; Fisher, Glasgow, et al., 2008) was used to measure the emotional and regimen-related distress from living with T2D in the previous month. Each item was rated on a 6-point Likert scale from 1 = “not a problem” to 6 = “serious problem” with higher scores indicating greater diabetes distress. Sample items included “Feeling overwhelmed with the demands of living with diabetes” and “Feeling that I am often failing with my diabetes routine.” Cronbach’s alpha of the DDS in the current study was 0.89.

Emotional Dysregulation

The Difficulties in Emotional Regulation Scale (DERS-16) was used to measure the frequency that participants used maladaptive approaches when responding to emotional distress over the previous month (e.g., impulse control difficulties, difficulty engaging in goal-directed behavior, nonacceptance of emotional responses; Bjureberg et al., 2016). Sample items included “When I’m upset, I feel ashamed with myself for feeling that way” and “When I’m upset, I have difficulty controlling my behaviors.” Each item was rated on a 5-point Likert scale from 1 = “almost never” to 5 = “almost always” with higher scores indicating greater emotional dysregulation. Cronbach’s alpha of the DERS-16 in the current study was 0.96.

Depressive Symptoms

The Patient Health Questionnaire-9 (PHQ-9) was used to assess the frequency and severity of depressive symptoms over the past two weeks (Kroenke et al., 2001). Sample items included “Feeling tired or having little energy” and “Feeling down, depressed, or hopeless.” Each item was rated on a 4-point Likert scale from 0 = “not at all” to 3 = “nearly every day” with higher scores indicating more frequent and severe depressive symptoms. Cronbach’s alpha of the PHQ-9 in the current study was 0.89.

Data Analyses

Descriptive statistics were used to examine participant characteristics. Correlations among all study variables were assessed using Pearson (continuous variables) and point-biserial (continuous and categorical variables) correlation coefficients. These analyses were performed using SPSS version 29 (IBM, Chicago, Illinois).

The primary analysis of the present study was informed by the mediation method proposed by Baron and Kenny (1986) for conducting a path analysis. Mplus 8 MODEL INDIRECT Command software assessed the direct, indirect, and total effects of the mediation model in Figure 1. We assessed model fit using multiple indices, including the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis fit index (TLI; Tucker & Lewis, 1973), and the root mean square error of approximation (RMSEA; Kline, 2023). Generally, a good fit is indicated by a CFI or TLI > .95 and a RMSEA < .05. To minimize confounding effects and enhance the sensitivity of the path analysis, the model was adjusted by the potential confounders, including age, gender, and education (as a continuous variable with higher scores representing a higher educational level). Bootstrapping, a

Table 1. Selected participant characteristics ($n = 284$)

Characteristics	Mean (SD) or n (%)	Range
Age	61.6 (11.3)	25-86
Male/Female (% Female)	80/204 (72%)	
Education		
High school or lower	64 (22%)	
Some college/technical school	135 (48%)	
Undergraduate degree	52 (19%)	
Graduate degree	33 (11%)	
Diabetes Distress	2.4 (1.2)	1-5.5
Emotional Dysregulation	23.9 (10.5)	16-76
Depressive Symptoms	5.4 (5.2)	0-26

resampling method, was also used to establish robust point estimates and effectively address the non-normal distribution (i.e., skewed to the right) observed in emotional dysregulation and depressive symptoms (Mackinnon et al., 2004). While the dataset contained only a small percentage of missing data (1.8%), one of the key advantages of using Mplus software is its application of full information maximum likelihood (FIML). FIML effectively addresses missing data and provides unbiased estimates, even when faced with partially or fully missing entries (Valente et al., 2020). We also tested for potential interactions among confounders and diabetes distress. Specifically, we created interaction terms between the covariates (age, sex, education level) and diabetes

distress. All interaction terms were found to be statistically nonsignificant and were subsequently removed from the final model to ensure a more parsimonious solution.

Results

Sample participant characteristics are presented in Table 1. The mean depressive symptoms score was 5.4, indicating mild depression (Kroenke et al., 2001). The mean diabetes distress score was 2.4 indicating moderate distress. Overall, 33% of participants reported little or no distress (< 2.0), 39% reported moderate distress (2.0 to 2.9), and 28% reported high distress (≥ 3.0) (Fisher, Glasgow, et al., 2008). In bivariate analyses, diabetes distress was positively associated with emotional dysregulation ($r =$

Table 2. Associations among study variables and potential confounders in the path model

	1	2	3	4	5
1. Diabetes Distress					
2. Emotional Dysregulation	.56***				
3. Depressive Symptoms	.49***	.68***			
4. Gender ^a	-.04	.00	.00		
5. Age	-.28***	-.28***	-.30***	.08	
6. Education Level	-.11	-.10	-.11	.02	.13*

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

^aMale = 0; Female = 1

Table 3. Total, Indirect, and Direct Effects

	Estimate (β)	<i>S.E.</i>	95% C.I.	<i>p</i> -value
Total Effect DD to DEP	.42	.05	.32–.52	<.001
Indirect DD to ED to DEP	.30	.04	.22–.37	<.001
Direct DD to DEP	.12	.05	.02–.22	.02

Note: DD = Diabetes Distress; DEP = Depressive Symptoms; ED = Emotional Dysregulation; *S.E.* = Standard Error; C.I. = Confidence Interval

.56, $p < .001$) and depressive symptoms ($r = .49$, $p < .001$). Emotional dysregulation was positively associated with depressive symptoms ($r = .68$, $p < .001$). Among confounders, age was inversely associated with diabetes distress ($r = -.28$, $p < .001$), emotional dysregulation ($r = -.28$, $p < .001$), and depressive symptoms ($r = -.30$, $p < .001$) (Table 2).

Path Analysis

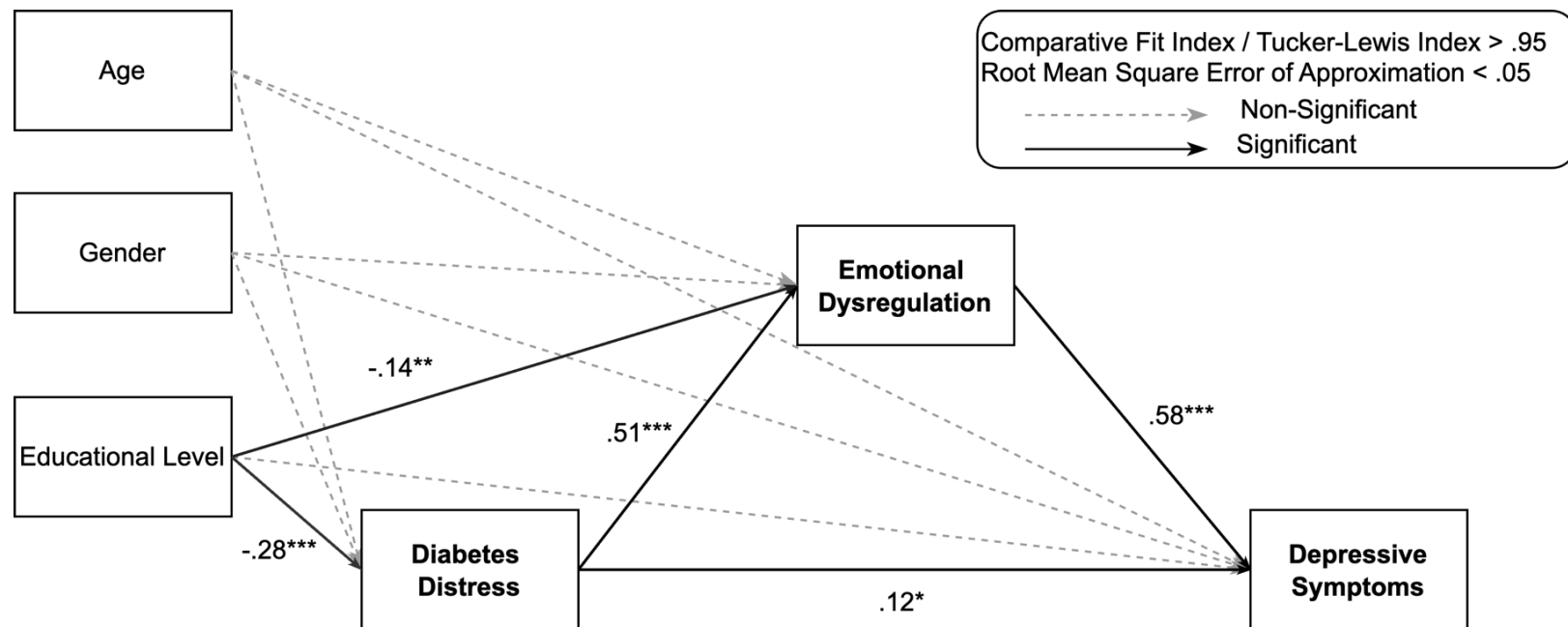
Path analyses resulted in a saturated model (CFI and TLI $> .95$, RMSEA $< .05$, $\chi^2 = 0.0$). Saturated models are defined as those that fully reproduce all variances, covariances, and means, using all available information (Geiser, 2012). Path coefficients (Table 3) showed that the total effect of diabetes distress on depressive symptoms was significant ($\beta = .42$, $p < .001$) including both indirect ($\beta = .30$, $p < .001$) and direct effects ($\beta = .12$, $p = .02$). Diabetes distress was positively associated with emotional dysregulation ($\beta = .51$, $p < .001$), which in turn was positively associated depressive symptoms ($\beta = .58$, $p < .001$). Diabetes distress was positively associated with depressive symptoms ($\beta = .12$, $p = .02$), and that effect increased when accounting for the effect of emotional dysregulation ($\beta = .42$, $p < .001$). Thus, the association between diabetes distress and depressive symptoms was significantly mediated by emotional dysregulation. Education was negatively associated with diabetes distress ($\beta = -.28$, p

$< .001$) and with emotional dysregulation ($\beta = -.14$, $p = .008$). The mediation pathway model is presented in Figure 1.

Discussion

This study found that emotional dysregulation mediated the association between diabetes distress and depressive symptoms in Black adults with T2D. Consistent with previous research conducted among a variety of ethnic groups, diabetes distress was positively associated with depressive symptoms (Ehrmann et al., 2015; Fisher, Skaff, et al., 2008; Reimer et al., 2017; Sidhu & Tang, 2017). Diabetes distress and depressive symptomatology can co-occur, and having either or both conditions increases the risk of poor disease management, cumulative adverse health effects, serious complications, and early mortality (Owens-Gary et al., 2019).

A key finding in this study was that emotional dysregulation mediated the association between diabetes distress and depressive symptoms. Like other studies that examined emotional regulation as a mediator between psychological measures and depression (Bakker et al., 2019; Malik et al., 2015), emotional dysregulation was positively associated with depressive symptoms. This result supports earlier research showing that individuals with lower awareness of and mastery over their emotions experience higher levels of negative affect which can lead to depressive symptoms

Figure 1. The mediating role of emotional dysregulation on the association between diabetes distress and depressive symptoms

Note: Standardized regression coefficients are shown. Model estimates were adjusted for age, gender, and educational level.

* $p < .05$, ** $p < .01$, *** $p < .001$

(Joormann & Quinn, 2014). An inability to regulate adverse emotions observed in the current study may explain the positive association between diabetes distress and depressive symptoms. As such, this finding suggests that interventions designed to help individuals decrease diabetes distress and enhance their ability to regulate negative emotions when distressed may be beneficial in reducing the burden of depressive symptoms among Black adults with T2D. Importantly, to enhance disease management, providers should screen patients for diabetes distress, use evidence-based treatments, and make referrals as needed to qualified mental health professionals (American Diabetes Association 2023; Skinner et al., 2020).

After adjusting for confounding variables and considering the mediating effect of emotional dysregulation on the association between diabetes distress and depressive symptoms, higher education levels remained significantly associated with lower diabetes distress and lower emotional dysregulation. Taken together with previous research (Spencer et al., 2006), these findings indicate that adults with lower education levels may benefit more from this type of intervention. Some studies have found age to be negatively associated with diabetes distress, meaning that younger people are more likely to have higher levels of diabetes distress (Reimer et al., 2017). Our study did not observe this association after controlling for other confounders, which may be primarily due to our older adult study sample. Nonetheless, given that T2D disproportionately affects racial minority populations, future research should examine additional social determinants of health (e.g., social capital, neighborhood and food environment, access to health care) as potential mediators and/or moderators of the association between diabetes distress and depression (Hill-Briggs et al., 2021).

The present findings suggest several clinical implications, including the significant role that emotional dysregulation plays in the association between diabetes distress and depressive symptoms in Black adults with T2D. Depressive symptoms can be reduced with positive psychology interventions (Bolier et al., 2013). A variety of interventions, such as a self-regulating writing intervention, emotional-regulation training (Cameron & Jago, 2008) or positive thinking interventions can improve emotional regulation (Quoidbach et al., 2015). Further, individuals with T2D who experience greater difficulty regulating emotions have poorer self-management behaviors (i.e., medication nonadherence, poorer self-monitoring of blood glucose; Kollin et al., 2024). Thus, similar interventions, paired with diabetes self-management education, may show positive changes in emotional regulation and depressive symptoms. Interventions that also target diabetes distress may help decrease both emotional dysregulation and depressive symptoms.

There were several important limitations to this study that should be emphasized. Although TX STRIDE is a longitudinal clinical trial, the current study used only baseline data to examine the mediation path model. The use of cross-sectional data does not allow us to make conclusions about the temporality of the associations among diabetes distress, emotional dysregulation, and depressive symptoms. Future longitudinal studies are needed to confirm our findings. Second, we acknowledge that our sample was heavily female (72%) and older (mean age of 62), which may limit the generalizability of our findings. While we controlled for gender and age as covariates in our mediation model to address any confounding biases related to these variables, we highlight that other sampling biases, such as selection bias—where population

characteristics may be misrepresented due to the sampling method (e.g., underrepresentation of males and younger African Americans)—and sampling error—which refers to discrepancies between sample estimates and true population parameters—remain limitations of this study. Third, the study included self-reported data, which makes the study outcome subject to social desirability bias (Latkin et al., 2017). For example, a participant may have reported lower depressive symptoms due to personal or social taboos about mental health, resulting in participants reporting what is socially acceptable. However, the use of validated scales in the current study along with strong internal consistency helps to minimize the effect of bias in self-report measures. Fourth, a portion of the data in this study was collected during the COVID-19 pandemic (Steinhardt et al., 2021). The effect of the pandemic may have impacted the mental health measures self-reported for this study. Finally, the study sample was limited to Black adults recruited from church settings, and studies have found that the social support provided by church networks is protective against psychological distress and depressive symptoms (Chatters et al., 2015). It is unclear if participants in the current study are broadly representative of the larger Black adult population with T2D, or if emotional regulation plays a similar role in other populations disproportionately affected by T2D, such as Hispanic or Indigenous populations.

Implications for Health Behavior Research

This study establishes the potential role of emotional dysregulation as a mediator in the association between diabetes distress and depressive symptoms among Black adults with T2D. Strategies aimed at enhancing emotional regulation and reducing diabetes

distress may decrease depressive symptoms among Black adults with T2D. In line with these findings, the American Diabetes Association (2023) recommends that primary care providers routinely screen patients for diabetes distress and depression, emphasizing the need for comprehensive care that includes mental health support for this population.

Ethical Approval

All participants provided written informed consent, and the study was approved by the Institutional Review Board at The University of Texas at Austin.

Conflict of Interest

The authors have no conflicts of interest to declare.

Discussion Questions

What explanations exist for why Black adults bear a disproportionate burden of the diabetes epidemic? What can be done to minimize this burden?

Diabetes distress and depressive symptomology can co-occur and worsen health outcomes. Our findings indicate that emotional dysregulation mediates the association between diabetes distress and depressive symptomology. What recommendations do you propose to reduce emotional dysregulation and diabetes distress among Black adults with T2D?

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