HEALTH PSYCHOLOGY REPORT · VOLUME 12(1), 2024
ORIGINAL ARTICLE

Keiliany Rivera-Santiago D,E,F
Eduardo Cumba-Aviles A,B,C,D,E,F,G
Demivette Gómez-Rivera E,F

Recurrent depression relates to worse outcomes than single episode depression among Hispanic adolescents with diabetes

BACKGROUND
Adolescents with type 1 diabetes (T1D) are at increased risk for depression. A history of recurrent depression (HRD) may relate to worse health outcomes than single-episode depression. However, no study has explored this issue among T1D adolescents.

PARTICIPANTS AND PROCEDURE
We examined differences in psychosocial and diabetes-related outcomes between T1D adolescents with (G1; n = 33) and without (G2; n = 18) HRD. Participants were 51 youths (aged 12-17 years) enrolled in a depression treatment study. Youths and one caregiver each completed several measures. Using MANOVA, followed by individual ANOVAs, and chi-square tests, we compared groups in continuous and categorical variables, respectively.

RESULTS
MANOVA results were significant, $F(7, 43) = 3.97$, $p = .002$. Adolescents from G1 obtained higher scores than youths in G2 in self-esteem/guilt problems, cognitive alterations, and sadness due to T1D. Their caregivers reported more burden and rated their offspring as having more internalizing problems, facing more barriers to complying with T1D treatment, and using a medical ID less frequently than their counterparts did. A higher percentage of G1 participants presented clinical anxiety and inadequate glycemic control, and reported a history of major depression. According to caregivers, a higher proportion of G1 members had experienced multiple diabetes-related hospitalizations, were non-compliant with insulin treatment, and lived in homes with a conflictive environment.

CONCLUSIONS
Our study documents important differences in outcomes between T1D youths with vs. without any HRD. Clinicians may need an intensive and integrative approach to treat mental and physical aspects of health among these patients.

KEY WORDS
diabetes treatment adherence; family conflict; glycemic control; mental health problems; persistent/recurrent depression

ORGANIZATION – Institute for Psychological Research, University of Puerto Rico, Rio Piedras Campus, San Juan, Puerto Rico

AUTHORS' CONTRIBUTIONS – A: Study design · B: Data collection · C: Statistical analysis · D: Data interpretation · E: Manuscript preparation · F: Literature search · G: Funds collection

CORRESPONDING AUTHOR – Eduardo Cumba-Aviles, Ph.D., Institute for Psychological Research, University of Puerto Rico, Rio Piedras Campus, 9 Ave. Universidad 901, San Juan, Puerto Rico 00925-2509, e-mail: eduardo.cumba1@upr.edu

TO CITE THIS ARTICLE – Rivera-Santiago, K., Cumba-Aviles, E., & Gómez-Rivera, D. (2024). Recurrent depression relates to worse outcomes than single episode depression among Hispanic adolescents with diabetes. *Health Psychology Report, 12*(1), 1–13. https://doi.org/10.5114/hpr/162649

RECEIVED 25.09.2022 · REVIEWED 12.11.2022 · ACCEPTED 27.03.2023 · PUBLISHED 28.04.2023

BACKGROUND

Diabetes is a chronic physical illness (CPI) linked with high comorbidity and care costs (American Diabetes Association [ADA], 2022). By 2021, high crude (16.8%) and age-adjusted (14.4%) rates of diabetes in adults (aged ≥ 18 years) from Puerto Rico (PR) were found (Centers for Disease Control and Prevention [CDC], 2023a). Based on 2019 crude estimates, about 0.35% of children under age 20 in the United States (US) had diabetes (CDC, 2022), with 244,000 out of 283,000 having type 1 diabetes (T1D). The only published study about the prevalence of diabetes in children (aged 6-16 years) from PR found a rate as high as 0.6% (Haddock & Torres de Conty, 1991). Pérez-Perdomo et al. (2005) reported a type 1/type 2 diabetes ratio of 29:1 among Puerto Rican youth. Crude (22.4%) and age-adjusted (23.9%) rates of depression among adults with diabetes (AWD) in PR exceeded those (15.3% and 14.7%, respectively) found in the general population (CDC, 2023b). Studies with T1D youths in PR showed significant depressive symptoms in 36.7% (Rivera et al., 2007), 45.5% (Rosselló & Jiménez-Chafey, 2007), and 57.5% (Rodríguez, 2006) of the cases, respectively. People with depression and diabetes have lower recovery rates and prolonged morbidity, posing a significant clinical and economic burden (Robinson et al., 2018; Sartorius, 2018).

Diabetes care imposes a significant burden on patients and their families (ADA, 2022). Given the difficulties inherent to T1D treatment in youth, a sense of overwhelming stress and uncertainty about the patient's health may arise among family members, leading to conflicts about different issues, including diabetes self-care (Matos-Melo & Cumba-Aviles, 2018). Compliance with the treatment regimen is important to prevent short- and long-term complications. In this context, adequate care of young patients requires a team approach consisting of a primary care provider, an endocrinologist, a nurse, a dietician, and a mental health professional, as early as possible after the diagnosis and regularly thereafter (ADA, 2022). A diabetes care team could help not only to discuss psychosocial issues, reduce family conflict, promote better adaptation, and prevent medical complications but also to prevent or manage stigma and emotional problems, such as depression (Jacobson, 1996). By preventing depression, the physical health and quality of life of patients may improve, since depression is related to diabetes distress, symptom severity, insulin resistance, diabetic complications, non-adherence to treatment, inactivity, obesity, and higher mortality rates (de Groot, 2012; González et al., 2016; Moussavi et al., 2007). In addition, since complications raise the risk for depression and reduce the durability of depression treatment gains in adults, preventing or treating depression in T1D youths before complications develop is essential (Stewart et al., 2005).

Depression may show as a single-episode or recurrent course. Recurrent depression (RD) is a unipolar mood syndrome of two or more episodes separated by at least 2 months without significant mood disturbance (American Psychiatric Association, 2022). In adults with major depression (MDD) and recurrent episodes, CPIs are associated with more psychiatric admissions (Šimunović-Filipčić et al., 2019). Spanish adults with RD had higher rates of CPIs than those with single episodes; RD was related to a 30% increased odds of diabetes (Gili et al., 2011).

According to Robinson et al. (2018), "episodes of depression in individuals with diabetes are likely to last longer and have a higher chance of recurrence compared to those without diabetes" (p. S131). Ceretta et al. (2012) and Maraldi et al. (2007) reported a twofold increase in the odds for RD among AWD compared to controls. In AWD and multiple depressive episodes, recovery time was shorter with each successive episode (de Groot et al., 2016). About 21 studies have reported rates of RD in depressed AWD (Bruce et al., 2006; Ceretta et al., 2012; de Groot et al., 2015, 2016; Fisher et al., 2008; Janssen et al., 2021; Jung et al., 2021; Katon et al., 2004; Lloyd et al., 2018; Lustman et al., 1988, 1997; Maraldi et al., 2007; Nefs et al., 2012; Nobis et al., 2015; Peyrot & Rubin, 1999; Schmitz et al., 2014; van Bastelaar et al., 2012; van Dooren et al., 2016; Wagner et al., 2009; Whitworth et al., 2017; Wu et al., 2020). Among those studies, rates of RD were from 10.27% (van Bastelaar et al., 2012) to 92% (Lustman et al., 1997), the latter within a 5-year follow-up. AWD depressed at intake and not seeking treatment had an average of 4.2 additional episodes within 5 years (Lustman et al., 1988). Consistent with Nefs et al. (2012), RD rates were similar for type 1 (T1D) or type 2 diabetes (T2D). Within the same period, the average number of episodes in AWD seeking treatment was 4.8 (Lustman et al., 1997).

The overall exposure to depression in AWD contributes to negative psychiatric and medical outcomes (de Groot et al., 2016). Either if present as a disorder or as discrete episodes of elevated depressive symptoms, correlates of RD in AWD include more diabetic complications, comorbid medical conditions, increased complexity of diabetes treatment, more severe depression at intake, incomplete remission after treatment, higher body mass index (BMI), reduced quality of life or functionality, worse glycemic control, death by suicide or other unnatural cause, increased risk for all-cause mortality, increased use of diabetes-related services and antidepressants, and decreased satisfaction with antidepressants (Bobrov et al., 2021; Ceretta et al., 2012; de Groot et al., 2015, 2016; Deschênes et al., 2017; Fisher et al., 2008; Janssen et al., 2021; Jung et al., 2021; Lustman et al., 1988, 1997, 2007; Maraldi et al., 2007; Schmitz et al., 2014; Wagner et al., 2009; Whitworth et al., 2017; Wu et al., 2020). Among AWD, a history of MDD was related to

a sixfold increase in the risk of recurrent depressive symptoms (Whitworth et al., 2017).

Several studies have examined the relationship between RD and demographics in AWD. Some of them did not find sex differences in rates of RD (Lustman et al., 2006; Nefs et al., 2012). However, Fisher et al. (2008) and Whitworth et al. (2017) found that being a woman was related to the recurrence of depressive symptoms. Two studies found that diabetes duration was unrelated to RD (Fisher et al., 2008; Nefs et al., 2012). Fisher et al. (2008) reported that ethnicity and education level were unrelated to the recurrence of MDD or depressive symptoms, but that younger age was associated with a more frequent occurrence of both. Whitworth et al. (2017) also reported that younger age was related to recurrent depressive symptoms. In antidepressant maintenance trials, younger age predicted RD (Lustman et al., 2007; Williams et al., 2007).

Among depressed youth without diabetes, some demographics have been related to RD. Several studies have shown higher rates of RD among girls (Birmaher et al., 2004; Curry et al., 2011; Dunn & Goodyer, 2006; Hamlat et al., 2020; Lewinsohn et al., 1994, 2000), but others have contradicted these findings (Emslie et al., 1997; Kiviruusu et al., 2020; Kovacs et al., 1984; Rao et al., 1995; Warner et al., 1992). Although some studies found an association between RD and older age in adolescents (Dunn & Goodyer, 2006; Emslie et al., 1997), others found age to be unrelated to RD (Curry et al., 2011; Rao et al., 1995; Warner et al., 1992) and one study reported that younger age was related to RD (Kiviruusu et al., 2020). Two studies have reported an association between RD and lower socioeconomic status (Melvin et al., 2013; Rao et al., 1995), but another study did not (Curry et al., 2011). No association has been reported between race/ethnicity and RD in youths (Curry et al., 2011; Emslie et al., 1997; Rao et al., 1995).

Diverse psychosocial and clinical history factors have been related to RD in adolescents without diabetes. These include the severity of and comorbidity at the index episode, comorbid anxiety, suicide ideation/behavior, family conflict, comorbid dysthymia, lower self-efficacy for depression, family history of recurrent MDD, parental history of MDD, personal history of minor depression, lower global and social functioning, problems with spare-time activities, lower social support, interpersonal stress, psychotic symptoms, dissatisfaction with life, poor self-regulation of sadness, as well as lower global self-worth and more negative cognitions (Birmaher et al., 2004; Curry et al., 2011; Dunn & Goodyer, 2006; Emslie et al., 1997; Hammen, 2009; Hammen et al., 2008; Kovacs et al., 1984, 2016; Lewinsohn et al., 1994, 1999, 2000; Melvin et al., 2013; Peters et al., 2016; Pettit et al., 2013; Rao et al., 1995, 2010; Warner et al., 1992). Also, early onset (< 15 years old) RD relates to higher rates of chronic and severe depression at ages 15-20 and poorer interpersonal outcomes at age 20 (Hammen et al., 2008).

T1D youths are at increased risk for depression compared with controls (Cumba-Aviles & Sáez-Santiago, 2016). Although it has been hypothesized that RD may relate to reduced treatment adherence and glycemic control in youths, no study has examined this issue. The first study on RD rates in T1D youth found that 32% to 46% had recurrent episodes at 2-year and 6.5-year follow-ups, respectively (Kovacs et al., 1997). RD rates were similar among T1D youths and depressed psychiatric controls, although the former were less likely to have had extended depression-free periods. In that study, being a girl predicted RD among youths with T1D, but not social class, psychiatric comorbidity or the age of recovery of the previous depressive episode. Insabella et al. (2007) followed T1D adolescents (aged 12-20) during a 5-year period and reported that 23.5% of those with high depression symptoms at intake were depressed again at the last follow-up. Among T2D youth who presented significant depressive symptoms within a 2-year follow-up, 43.44% were depressed in at least 2 out of 3 assessments (Van Buren et al., 2018). However, symptom recurrence was unrelated to glycemic control. Studies on the rate of RD among depressed adolescents without diabetes are more common, yielding rates from 16.1% (Warner et al., 1992) to 61% (Emslie et al., 1997) among clinical samples in up to 5-year follow-up periods. Rates of recurrence within follow-up periods of 8, 12, and 20 years were 67% (Kiviruusu et al., 2020), 72.88% (Pettit et al., 2013), and 75.2% (Fombonne et al., 2001), respectively.

Findings from studies on AWD and depressed youths with or without diabetes suggest that a history of recurrent depression (HRD) may worsen health-related and psychosocial outcomes more deeply than single-episode depression. However, no study has thoroughly examined its psychosocial or diabetes-related correlates among youths with T1D. In this study, we examined differences in both domains among T1D adolescents with (Group 1; $n = 33$) and without (Group 2; $n = 18$) any HRD. We hypothesized that youth with any HRD will show worse outcomes than their counterparts in diabetes-related and psychosocial domains.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

Participants were 51 T1D youths (29 girls) aged 12-17 years ($M = 15.26$, $SD = 1.60$) recruited for a depression treatment study from which data we conducted secondary analyses. They attended public (66.67%) or private schools. About 43.14% lived in the San Juan Metropolitan Area. Their mean Children's Depression Inventory (CDI) score was 19.53. The mean glycosylated hemoglobin result obtained from their private laboratory tests before enrollment

was 9.14 (*SD* = 2.25; range = 5.76-17.70). The mean T1D duration was 6.12 years (*SD* = 3.88). Ten (19.61%) youths were using an insulin pump at intake. The mean household size was 4.02 members (*SD* = 0.95). About 86.27% of caregivers were women. Their mean age was 43.45 years (*SD* = 6.59). Most families (72.55%) were of lower-middle/low socioeconomic status with a mean annual income (in U.S. dollars) of $37,024.42 (*SD* = 3,837.64). Twenty of them (39.22%) lived under U.S. poverty levels.

For inclusion in the main study, youths had to be 12-17 years old, obtain a CDI score ≥ 13 or a score ≥ 44 in the Children's Depression Rating Scale-Revised, and be willing to attend weekly cognitive-behavioral group psychotherapy sessions (conducted by clinical psychology graduate students). History of psychotic symptoms, bipolar disorder, last-year substance dependence/abuse, imminent suicide risk, concurrent depression treatment, current child maltreatment/abuse, and having a non-depressive disorder that was in primary need of intervention were exclusion criteria (Cumba-Aviles & Sáez-Santiago, 2016).

MEASURES

Sociodemographic data form. Besides sociodemographic data on youths and caregivers, the latter provided data on perceived socioeconomic status (SES), history of mental health treatment, T1D duration, and comorbid CPIs. Youths provided data on their height and weight to compute BMI.

Diagnostic Interview Schedule for Children-IV (DISC-IV) – Spanish version. The DISC-IV assesses DSM criteria for several mental disorders in youths. Its Spanish version has adequate reliability in PR (Bravo et al., 2001) and has been successfully used in clinical samples of depressed youths and their parents (Bernal et al., 2019). Caregivers and youths in our sample completed the MDD module at intake. Although designed for a DSM-IV diagnosis, we asked additional questions (when needed) to ensure the assessment of DSM-5 criteria.

MINI International Neuropsychiatric Interview-Spanish 6.0 (kid and adult versions). The MINI assesses the criteria for the most common mental disorders in children (Sheehan et al., 2010) and adults (Sheehan et al., 1998). We used the MDD module from each version and other relevant information needed for differential diagnosis. Although designed for DSM-IV criteria, we also asked questions (when needed) to ensure the assessment of DSM-5 criteria.

Beck Anxiety Inventory (BAI). This 21-item anxiety measure has been used with adults and adolescents (Beck & Steer, 1993). In this sample, its α value was .86 (Morales-Espada et al., 2016). Scores ≥ 8, ≥ 16, and ≥ 26 indicate mild, moderate, or severe anxiety symptoms, respectively.

Undervaluing/Self-reproach and Cognitive Alterations Scale. This scale contains two subscales from the Depressive Symptom Spectrum Assessment Inventory (Cumba-Aviles & Feliciano-López, 2013). Its α value for T1D youth is .87 for the 12-item Undervaluing/Self-reproach (self-esteem/guilt) and .90 for the 10-item Cognitive Alterations subscale (Matos-Melo & Cumba-Aviles, 2016).

Child Behavior Checklist/4-18 (CBCL/4-18). This measure has been widely used in PR (Achenbach, 1991). We used the Internalizing scale, whose α value in this sample was .84 (Muñoz-Reyes et al., 2017).

Burden Assessment Scale (BAS). This scale assesses the burden of caring for people with a mental illness (Matías-Carrello et al., 2003). Its α value in this sample was .90 (Rodríguez-Beato et al., 2018).

Family conflict. To classify cases with regard to the presence/absence of family conflict at home, we asked caregivers to rate the following statements: "We fight a lot (not physically)" and "We rarely become openly angry". If the first item was rated as *true* and/or the second was rated as *false*, we coded family conflict as 1 (*present*). Otherwise, we coded conflict as 2 (*absent*).

Barriers to Adherence Questionnaire (BAQ). The BAQ assesses the frequency of cognitive and environmental obstacles to adherence (self-care) in people with diabetes (Glasgow et al., 1987). Its 20 items are rated on a frequency scale from 0 (*never or rarely*) to 6 (*every day*). We used a parent-rated Spanish version. In this sample, its internal consistency was .80 (Piñero-Meléndez et al., 2016).

Glycosylated hemoglobin (HbA1c). Qualified personnel conducted HbA1c tests at lab facilities from the University of Puerto Rico, Medical Sciences Campus. We used the latter for the analysis of glycemic control included in the Results section.

Kovacs-Diabetes Management Information Sheet (K-DMIS). Through the K-DMIS (Kovacs et al., 1986), we collected from parents T1D-related information, including youth's non-compliance with insulin treatment (past 3 months), medical identification (ID) use, sadness due to T1D, type of treatment (i.e., insulin pump or multiple daily injections), and number of lifetime diabetes-related hospitalizations.

PROCEDURE

Institutional review boards from two university campuses (Río Piedras Campus approval no. 1112-005 and Medical Sciences Campus approval no. A9530112) approved the study. Study procedures were in accordance with the Helsinki Declaration of 1975, as revised in 2000. We shared information on the main study via T1D clinics, local media, and printed materials. We recruited youths through summer camps, educational and recreational activities, and referrals from endocrinologists, school personnel, and other

participants. Caregivers completed requests for participation forms by phone. We invited youths and one parent each to an in-person screening if they met the initial eligibility criteria. After consent/assent, they completed some of the measures at this visit and other instruments during a mental health diagnostic evaluation scheduled within 2 weeks. Data collected through the DISC-IV and the MINI, including questions to assess the clinical history of depressive disorders and symptoms (e.g., age of onset, number of episodes, and duration of symptom-free periods) were used to establish the recurrence of depression. Youths were classified into Group 1 (G1) if criteria for a history of recurrent depressive disorder or recurrent depressive symptoms were confirmed either by self-report and/or caregiver's report.

DATA ANALYSIS

We used SPSS 27.0 for all statistical analyses. After classifying the sample between youths with vs. without any HRD, we used chi-square and Student's *t*-tests for comparing groups in categorical and continuous sociodemographic variables. Then, we conducted a multivariate analysis of variance (MANOVA), followed by individual analyses of variance (ANOVAs) to compare group means for the continuous dependent variables, considering their HRD status. For comparing groups in categorical dependent variables, we used chi-square tests. We assessed all group comparisons using the criterion of $p \leq .05$. We used the partial eta squared (η_p^2) indicator provided in the MANOVA/ANOVA analyses and calculated Cohen's *d* to estimate the effect size of mean differences in continuous variables. To assess the effect size of differences between groups in categorical outcome variables, we estimated Cohen's *d* and η_p^2 based on a chi-square transformation (for a 2 x 2 cross-tab), following the formula provided by DeFife (2009).

RESULTS

We found no group differences in sociodemographic variables (Table 1). Therefore, we did not need to control for their effects in subsequent analyses. Groups were similar even in the proportion of cases with a history of mental health treatment, comorbid CPIs, or using insulin pumps, as well as in their diabetes duration and their BMI.

Table 1

Sociodemographic variables by depression recurrence status

Variables	Recurrent (*n* = 33)	Single episode (*n* = 18)	χ^2/t	*d*
Categorical variables				
Adolescent's sex (Girls)	51.52% (17)	66.67% (12)	1.09	0.30
School attended (Public)	69.70% (23)	61.11% (11)	0.39	0.18
Metropolitan zone (Yes)	48.48% (16)	33.33% (6)	1.09	0.30
Rural vs. urban (Rural)	27.27% (9)	44.44% (8)	1.55	0.35
SES (lower-middle/low)	78.79% (26)	61.11% (11)	1.83	0.39
Two-parent home (Yes)	48.48% (16)	38.89% (7)	0.43	0.19
Mental health Tx (Yes)	69.70% (23)	72.22% (13)	0.04	0.05
Comorbid CPI (Yes)	51.52% (17)	44.44% (8)	0.23	0.14
Insulin pump (Yes)	21.21% (7)	16.67% (3)	0.15	0.11
Continuous variables				
Adolescent's age	15.45 (1.70)	14.91 (1.39)	1.14	0.33
T1D duration	6.42 (3.66)	5.56 (4.31)	0.76	0.22
Body mass index	22.52 (5.37)	20.24 (3.77)	1.59	0.47
Caregiver's age	43.42 (6.64)	43.50 (6.69)	−0.04	0.01
Caregiver's education	14.67 (1.87)	14.56 (3.38)	0.15	0.04
Annual family income	$35,521.98 (25,061.96)	$39,778.89 (31,849.51)	−0.53	0.15
Household size	3.91 (0.80)	4.22 (1.17)	−1.13	0.33

Note. Cohen's *d* values within intervals in parentheses are considered as small (0.20-0.49), medium (0.50-0.79), and large (0.80 and above); CPI – chronic physical illness; Tx – treatment; T1D – type 1 diabetes; SES – perceived socio-economic status.

The MANOVA that examined continuous variables by HRD status was significant [$F(7, 43) = 3.97$, $p = .002$; multivariate effect size = .39]. Individual ANOVAs showed that youth in G1 had significantly more self-esteem/guilt problems and cognitive alterations than youth in G2. The caregivers of G1 members indicated that their children had more internalizing problems, showed more sadness due to T1D, and faced more barriers to complying with T1D treatment (Table 2). Caregivers of G1 members also indicated that their offspring used a diabetes medical ID less frequently than reported by caregivers of G2 members. Parents of youth with any HRD also reported a higher caregiver burden mean score. The effect sizes of these differences were medium in all cases, except for medical ID, which reflected a large effect.

When comparing groups in categorical outcomes, we found that a significantly higher proportion of G1 members had two or more hospitalizations in their lifetime due to T1D, inadequate glycemic control, and non-compliance with insulin treatment in the past 3 months. In addition, youth in G1 were more likely to have mild to severe anxiety levels, to have a lifetime or a past-year history of MDD, or to live in households in which family conflict was present. Effect sizes for such differences were mostly medium but large for family conflict. As regards youths' lifetime history of suicidality or chronic depressive symptoms (that is, lasting ≥ 1 year), as well as caregivers' history of MDD, rates of occurrence were not significantly different between groups.

DISCUSSION

We examined differences in psychosocial and diabetes-related outcomes between T1D adolescents with (G1) and without (G2) any HRD. As reported for AWD (de Groot et al., 2015, 2016; Lustman et al., 2006; Schmitz et al., 2014; Wu et al., 2020), we found worse

Table 2

Group comparison in outcome variables by depression recurrence status

Variables	Recurrent (n = 33)	Single episode (n = 18)	F/χ^2	η_p^2	d
Continuous outcome variables					
Self-esteem/Guilt problems	6.70 (6.04)	3.39 (3.70)	6.87*	0.12	0.78
Cognitive alterations	7.97 (6.21)	4.22 (4.35)	6.34*	0.12	0.75
Internalizing problems	17.58 (7.65)	13.11 (7.07)	4.18*	0.08	0.60
Sadness due to T1D	1.85 (1.28)	1.06 (1.30)	4.42*	0.08	0.61
Caregiver's burden	58.67 (12.71)	50.56 (14.71)	4.24*	0.08	0.60
Medical ID use	2.09 (1.18)	3.11 (1.18)	8.67**	0.15	0.86
Barriers to T1D adherence	51.12 (17.37)	36.11 (21.38)	7.38**	0.13	0.79
Categorial outcome variables					
Two or more T1D hospitalizations	72.73% (24)	38.89% (7)	5.59*	0.11	0.70
Insulin non-compliance events	57.58% (19)	22.22% (4)	5.88*	0.12	0.72
HbA1c (% inadequate control)	45.45% (15)	16.67% (3)	4.23*	0.08	0.60
Mild to severe anxiety (Yes)	72.73% (24)	44.44% (8)	3.99*	0.08	0.58
Youth-reported MDD (Past year)	48.48% (16)	16.67% (3)	5.04*	0.10	0.66
Youth-reported MDD (Lifetime)	57.58% (19)	22.22% (4)	5.88*	0.12	0.72
History of suicidality (Youth)	75.76% (25)	55.56% (10)	2.21	0.04	0.43
Chronic depressive symptoms (Yes)	36.36% (12)	27.78% (5)	0.39	0.01	0.18
Parental history of MDD (Lifetime)	63.64% (21)	44.44% (8)	1.75	0.03	0.38
Parent-rated family conflict (Yes)	81.82% (27)	44.44% (8)	7.56**	0.15	0.83

Note. η_p^2 values within intervals in parentheses are considered as small (0.01-0.05), medium (0.06-0.13), and large (0.14 and above); Cohen's d values within intervals in parentheses are considered as small (0.20-0.49), medium (0.50-0.79), and large (0.80 and above). Inadequate control – HbA1c of 9.50 or higher; T1D – type 1 diabetes; ID – identification; HbA1c – glycosylated hemoglobin; MDD – major depressive disorder. *$p \leq .05$, **$p \leq .01$.

psychosocial and diabetes-related outcomes among G1 members, which supported our hypothesis. Mental health outcomes in G1 included more cognitive and self-esteem/guilt problems, higher rates of clinical anxiety, and more severe internalizing problems (i.e., somatic, depressive, anxious, and withdrawal symptoms). These results are consistent with reports of studies with non-T1D youths (Curry et al., 2011; Dunn & Goodyer, 2006; Emslie et al., 1997; Hammen et al., 2008; Kovacs et al., 2016; Lewinsohn et al., 1999; Warner et al., 1992). Furthermore, following findings from Whitworth et al. (2017) among AWD, we observed that youths with RD had a higher rate of last-year and lifetime history of MDD. We also found that RD was associated with more severe sadness in youths, specifically related to having T1D. In fact, our study is the first to document the association of RD with worse mental health outcomes of any kind among T1D youth.

The higher proportion of G1 (HRD) cases with youth-reported MDD and/or significant anxiety is consistent with caregivers' reports of more internalizing problems in this group. Such results, along with those about self-esteem/guilt problems and cognitive alterations, suggest that having any HRD might pose a perfect storm of comorbid emotional and cognitive problems for these youths. Thus, it is not surprising that caregivers of G1 members experimented higher burden levels associated with caring for their children and that a higher proportion reported a conflictive environment at home. Our finding establishing a link between family conflict and RD is consistent with studies of adolescents without diabetes (Hammen et al., 2008; Lewinsohn et al., 2000) but also the first report of that relationship among T1D youths. This research is also the first to document significant differences in caregivers' burden, with higher scores for the HRD group, among patients with diabetes of any age or racial/ethnic background.

We found that no sociodemographic variable was related to RD. Contrary to previous findings in T1D youths (Kovacs et al., 1997), RD did not relate to the child's sex in our sample. Precisely, studies conducted with depressed adolescents without diabetes and AWD have yielded inconsistent results about sex differences in that area. The same pattern of findings applies to SES. On the other hand, our findings about diabetes duration and education level are consistent with previous reports of a lack of relationship with RD. Regarding age, the association of younger age with RD has been reported among AWD but not among youth.

We did not find an association between RD and a history of chronic depressive symptoms. Our result is contrary to studies reporting that dysthymia was related to RD in youth (Kovacs et al., 1984; Warner et al., 1992). This may be due, in part, to the fact that, in the main study from which we draw our data, assessments about dysthymia focused on the 2-year period before intake, while questions about MDD or minor depression addressed a lifetime period.

Our study contributes to the research literature by considering correlates of any HRD not previously examined among adolescents, particularly among those with diabetes. Some of the correlates are related to diminished adherence to T1D treatment. On the one hand, this study is the first to show the association of any HRD with increased difficulties complying with diabetes self-care (i.e., insulin treatment or wearing a medical ID) or with a higher rate of multiple diabetes-related hospitalizations in youths with diabetes. The latter finding is consistent with the observed increased use of diabetes-related services (Whitworth et al., 2017) and more diabetes-related complications (Bobrov et al., 2021; de Groot et al., 2016; Deschênes et al., 2017; Lustman et al., 1997; Wu et al., 2020) among AWD and RD. On the other hand, our finding of a higher rate of inadequate glycemic control among G1 (HRD) cases is also in line with reports from studies with depressed AWD (Ceretta et al., 2012; Fisher et al., 2008; Lustman et al., 1988, 1997; Maraldi et al., 2007) but opposed to Van Buren et al.'s (2018) findings with T2D youths.

LIMITATIONS

This study has several limitations. First, our sample size reduced the statistical power to detect potentially significant differences among groups (e.g., in youths' suicidality and parental history of depression). Second, our cross-sectional design precludes examining causal relationships among variables. Longitudinal studies with adequate sample sizes should be conducted to further examine rates of RD among T1D youths and its temporal association with candidate correlates. Third, our family conflict measure was limited to caregivers' overall conflict assessment. Future studies should include a diabetes-specific conflict measure and examine adolescents' ratings of such conflict. Finally, the histories of psychiatric admissions and antidepressant medication were not systematically assessed in our sample, precluding their examination as potential RD correlates.

IMPLICATIONS AND FUTURE DIRECTIONS

Understanding the course of depression in people with diabetes has implications for treatment and standards of care (de Groot et al., 2016). In Lustman et al.'s (1997) study, even among AWD responsive to antidepressant medication, a reemergence of MDD occurred in as many as 60% of patients within a year, if pharmacotherapy was discontinued. Continuation of antidepressant medication beyond depression re-

mission reduces the risks of both relapse and recurrence (DeRubeis et al., 2020). This protection against RD has also been observed in AWD (Lustman et al., 2006, 2007; Williams et al., 2007). In youths, cognitive-behavioral therapy (CBT) in combination with antidepressants reduces the risk for relapse by eightfold compared with pharmacotherapy alone (Kennard et al., 2008). Considering these findings, RD may require combined treatments, maintenance psychotherapy and/or pharmacotherapy, and primary care assessment protocols that explore past episodes more deeply and not only current symptoms (Katon et al., 2009; Williams et al., 2007). Adequate medical treatment also plays an essential role in preventing RD (Lustman et al., 1997; Sartorius et al., 2018).

Clinicians might need a more intensive, integrative, and interdisciplinary approach to treat mental and physical aspects of health among the subgroup of patients with diabetes and RD. The standards of medical care in diabetes (ADA, 2022) establish that "adult patients with a history of depressive symptoms need ongoing monitoring of depression recurrence within the context of routine care" (p. S73). The rates of RD observed in adolescent studies (including 64.71% of cases with RD in the current sample) suggest that this standard should also be applied to T1D youths. According to Lustman et al. (1997), "each episode of depression in diabetes should be treated aggressively to the point of complete remission" (p. 142). As some psychosocial correlates of RD identified in our sample of T1D Hispanic youths tend to persist in time (e.g., family conflict and caregiver's burden), the integration of caregivers (and family members) into treatment, as well as the inclusion of booster or maintenance sessions in treatment protocols, may be required in many cases (Bernal et al., 2019; Cumba-Aviles & Saez-Santiago, 2016). In addition, an integrated strategy to target depressive and anxious symptoms simultaneously may be needed when applying psychotherapy (such as CBT) with this group of patients, alone or in combination with pharmacotherapy, as reducing comorbid anxiety may help to prevent relapse and/or recurrence. In general, further studies should examine the role of RD in moderating or predicting gains in interventions to reduce depression and/or improve glycemic control among T1D adolescents. Within its limitations, this study represents an initial and significant contribution to research on the correlates of RD in youths with T1D.

FUNDING

The research was funded by the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health of the Unites States under award number R03DK092547. This study also received support from the Puerto Rico Clinical and Translational Research Consortium, under award number 2U54MD007587 from the National Institute on Minority and Health Disparities. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. We also thank the support of the Institutional Funds for Research (FIPI by its Spanish acronym) from the Deanship of Graduate Studies and Research of the University of Puerto Rico, Río Piedras Campus.

References

Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist/4-18 and 1991 profile*. Department of Psychiatry, University of Vermont.

American Diabetes Association (2022). Standards of medical care in diabetes – 2022. *Diabetes Care, 45*, S1–S269. https://doi.org/10.2337/dc22-Sint

American Psychiatric Association (2022). *Diagnostic and statistical manual of mental disorders – DSM-5-TR* (5th ed., text revision). APA Publishing.

Beck, A. T., & Steer, R. A. (1993). *Beck Anxiety Inventory manual*. Psychological Corporation.

Bernal, G., Rivera-Medina, C. L., Cumba-Aviles, E., Reyes-Rodríguez, M. L., Sáez-Santiago, E., Duarté-Vélez, Y., Nazario, L., Rodríguez-Quintana, N., & Rosselló, J. (2019). Can cognitive-behavioral therapy be optimized with parent psychoeducation? A randomized effectiveness trial of adolescents with major depression in Puerto Rico. *Family Process, 58*, 832–854. https://doi.org/10.1111/famp.12455

Birmaher, B., Williamson, D. E., Dahl, R. E., Axelson, D. A., Kaufman, J., Dorn, L. D., & Ryan, N. D. (2004). Clinical presentation and course of depression in youth: Does onset in childhood differ from onset in adolescence? *Journal of the American Academy of Child and Adolescent Psychiatry, 43*, 63–70. https://doi.org/10.1097/00004583-200401000-00015

Bobrov, A. E., Starostina, E. G., Agamamedova, I. N., Volodina, M. N., Karacheva, Y. V., Nikitina, T. E., Parpara, M. A., Subbotnikova, O. A., Tsarenko, D. M., Nouwen, A., Lloyd, C., & Sartorius, N. (2021). Psikhicheskie rasstroistva pri sakharnom diabete 2-go tipa [Mental disorders in type 2 diabetes]. *Zhurnal Nevrologii i Psikhiatrii Imeni S.S. Korsakova*, *121*, 22–30. https://doi.org/10.17116/jnevro202112107122

Bravo, M., Ribera, J., Rubio-Stipec, M., Canino, G., Shrout, P., & Ramirez, R. (2001). Test-retest reliability of the Spanish version of the Diagnostic Interview Schedule for Children (DISC-IV). *Journal of Abnormal Child Psychology, 29*, 433–444. https://doi.org/10.1023/ a:1010499520090

Bruce, D. G., Casey, G., Davis, W. A., Starkstein, S. E., Clarnette, R. C., Foster, J. K., Ives, F. J., Almeida, O. P.,

& Davis, T. M. (2006). Vascular depression in older people with diabetes. *Diabetologia, 49*, 2828–2836. https://doi.org/10.1007/s00125-006-0478-y

Centers for Disease Control and Prevention (2022). *National Diabetes Statistics Report: Prevalence of diagnosed diabetes*. Retrieved from https://www.cdc.gov/diabetes/data/statistics-report/diagnosed-diabetes.html

Centers for Disease Control and Prevention (2023a). *BRFSS prevalence & trends data: Puerto Rico 2021*. Retrieved from https://www.cdc.gov/brfss/brfssprevalence/

Centers for Disease Control and Prevention (2023b). *U.S. chronic health indicators: Diabetes*. Retrieved from https://chronicdata.cdc.gov/Chronic-Disease-Indicators/U-S-Chronic-Disease-Indicators-Diabetes/f8ti-h92k

Ceretta, L. B., Réus, G. Z., Abelaira, H. M., Jornada, L. K., Schwalm, M. T., Hoepers, N. J., Tomazzi, C. D., Gulbis, K. G., Ceretta, R. A., & Quevedo, J. (2012). Increased prevalence of mood disorders and suicidal ideation in type 2 diabetic patients. *Acta Diabetologica, 49*, S227–S234. https://doi.org/10.1007/s00592-012-0435-9

Cumba-Aviles, E., & Feliciano-López, V. (2013). Estudio piloto de validación del Inventario para la Evaluación del Espectro de la Sintomatología Depresiva (INEESD) [Pilot-validation study of the Depressive Symptoms Spectrum Assessment Inventory]. *Ciencias de la Conducta, 28*, 1–33.

Cumba-Aviles, E., & Sáez-Santiago, E. (2016). Research program on type 1 diabetes and youth depression in Puerto Rico. *Puerto Rican Journal of Psychology, 27*, 44–60.

Curry, J., Silva, S., Rohde, P., Ginsburg, G., Kratochvil, C., Simons, A., Kirchner, J., May, D., Kennard, B., Mayes, T., Feeny, N., Albano, A. M., Lavanier, S., Reinecke, M., Jacobs, R., Becker-Weidman, E., Weller, E., Emslie, G., Walkup, J., Kastelic, E., … March, J. (2011). Recovery and recurrence following treatment for adolescent major depression. *Archives of General Psychiatry, 68*, 263–269. https://doi.org/10.1001/archgenpsychiatry.2010.150

DeFife, J. (2009). *Effect size calculator and effect size conversions (statistical program).* Emory University. Retrieved from http://web.cs.dal.ca/~anwar/ds/Excel4.xlsx

de Groot, M. (2012). Depression and diabetes. In D. Young-Hyman & M. Peyrot (Eds.), *Psychosocial care for people with diabetes* (pp. 1–16). American Diabetes Association.

de Groot, M., Crick, K. A., Long, M., Saha, C., & Shubrook, J. H. (2016). Lifetime duration of depressive disorders in patients with type 2 diabetes. *Diabetes Care, 39*, 2174–2181. https://doi.org/10.2337/dc16-1145

de Groot, M., Doyle, T., Averyt, J., Risaliti, C., & Shubroo, J. (2015). Depressive symptoms and type 2 diabetes mellitus in rural Appalachia: an 18-month follow-up study. *International Journal of Psychiatry in Medicine, 48*, 263–277. https://doi.org/10.2190/PM.48.4.c

DeRubeis, R. J., Zajecka, J., Shelton, R. C., Amsterdam, J. D., Fawcett, J., Xu, C., Young, P. R., Gallop, R., & Hollon, S. D. (2020). Prevention of recurrence after recovery from a major depressive episode with antidepressant medication alone or in combination with cognitive behavioral therapy: Phase 2 of a 2-phase randomized clinical trial. *JAMA Psychiatry, 77*, 237–245. https://doi.org/10.1001/jamapsychiatry.2019.3900

Deschênes, S. S., Burns, R. J., Pouwer, F., & Schmitz, N. (2017). Diabetes complications and depressive symptoms: Prospective results from the Montreal Diabetes Health and Well-Being Study. *Psychosomatic Medicine, 79*, 603–612. https://doi.org/10.1097/PSY.0000000000000447

Dunn, V., & Goodyer, I. M. (2006). Longitudinal investigation into childhood- and adolescence-onset depression: Psychiatric outcome in early adulthood. *British Journal of Psychiatry, 188*, 216–222. https://doi.org/10.1192/bjp.188.3.216

Emslie, G. J., Rush, A. J., Weinberg, W. A., Gullion, C. M., Rintelmann, J., & Hughes, C. W. (1997). Recurrence of major depressive disorder in hospitalized children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 785–792. https://doi.org/10.1097/00004583-199706000-00015

Fisher, L., Skaff, M. M., Mullan, J. T., Arean, P., Glasgow, R., & Masharani, U. (2008). A longitudinal study of affective and anxiety disorders, depressive affect and diabetes distress in adults with type 2 diabetes. *Diabetic Medicine, 25*, 1096–1101. https://doi.org/10.1111/j.1464-5491.2008.02533.x

Fombonne, E., Wostear, G., Cooper, V., Harrington, R., & Rutter, M. (2001). The Maudsley long-term follow-up of child and adolescent depression: 1. Psychiatric outcomes in adulthood. *The British Journal of Psychiatry, 179*, 210–217. https://doi.org/10.1192/bjp.179.3.210

Gili, M., Garcia-Toro, M., Vives, M., Armengol, S., Garcia-Campayo, J., Soriano, J. B., & Roca, M. (2011). Medical comorbidity in recurrent versus first-episode depressive patients. *Acta Psychiatrica Scandinavica, 123*, 220–227. https://doi.org/10.1111/j.1600-0447.2010.01646.x

Glasgow, R. E., McCaul, K. D., & Schafer, L. C. (1987). Self-care behaviors and glycemic control in type I diabetes. *Journal of Chronic Diseases, 40*, 399–412. https://doi.org/10.1016/0021-9681(87)90173-1

González, J. S., Kane, N. S., Binko, D. H., Shapira, A., Hoogendoorn, C. J. (2016). Tangled up in blue: Unraveling the links between emotional distress and treatment adherence in type 2 diabetes. *Diabetes Care, 39*, 2182–2189. https://doi.org/10.2337/dc16-1657

Haddock, L., & Torres de Conty, I. T. (1991). Prevalence rates for diabetes mellitus in Puerto Rico. *Diabetes Care, 14*, 676–684. https://doi.org/10.2337/diacare.14.7.676

Hammen, C. (2009). Adolescent depression: Stressful interpersonal contexts and risk for recurrence. *Current Directions in Psychological Science, 18*, 200–204. https://doi.org/10.1111/j.1467-8721.2009.01636.x

Hammen, C., Brennan, P. A., Keenan-Miller, D., & Herr, N. R. (2008). Early onset recurrent subtype of adolescent depression: Clinical and psychosocial correlates. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 49*, 433–440. https://doi.org/10.1111/j.1469-7610.2007.01850.x

Hamlat, E. J., McCormick, K. C., Young, J. F., & Hankin, B. L. (2020). Early pubertal timing predicts onset and recurrence of depressive episodes in boys and girls. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 61*, 1266–1274. https://doi.org/10.1111/jcpp.13198

Insabella, G., Grey, M., Knafl, G., & Tamborlane, W. (2007). The transition to young adulthood in youth with type 1 diabetes on intensive treatment. *Pediatric Diabetes, 8*, 228–234. https://doi.org/10.1111/j.1399-5448.2007.00266.x

Jacobson, A. (1996). The psychological care of patients with insulin dependent diabetes mellitus. *New England Journal of Medicine, 334*, 1249–1253. https://doi.org/10.1056/NEJM199605093341907

Janssen, E., Köhler, S., Geraets, A., Stehouwer, C., Schaper, N. C., Sep, S., Henry, R., van der Kallen, C., Schalkwijk, C. G., Koster, A., Verhey, F. R., & Schram, M. T. (2021). Low-grade inflammation and endothelial dysfunction predict four-year risk and course of depressive symptoms: The Maastricht study. *Brain, Behavior, and Immunity, 97*, 61–67. https://doi.org/10.1016/j.bbi.2021.06.013

Jung, I., Rhee, E. J., & Lee, W. Y. (2021). Increased risk of cardiovascular disease and mortality in patients with diabetes and coexisting depression: a nationwide population-based cohort study. *Diabetes & Metabolism Journal, 45*, 793–794. https://doi.org/10.4093/dmj.2021.0222

Katon, W., Russo, J., Lin, E. H. B., Heckbert, S. R., Ciechanowski, P., Ludman, E. J., & Von Korff, M. (2009). Depression and diabetes: Factors associated with major depression at five-year follow-up. *Psychosomatics, 50*, 570–579. https://doi.org/10.1016/s0033-3182(09)70858-8

Katon, W. J., Von Korff, M., Lin, E. H., Simon, G., Ludman, E., Russo, J., Ciechanowski, P., Walker, E., & Bush, T. (2004). The pathways study: a randomized trial of collaborative care in patients with diabetes and depression. *Archives of General Psychiatry, 61*, 1042–1049. https://doi.org/10.1001/archpsyc.61.10.1042

Kennard, B. D., Emslie, G. J., Mayes, T. L., Nightingale-Teresi, J., Nakonezny, P. A., Hughes, J. L., Jones, J. M., Tao, R., Stewart, S. M., & Jarrett, R. B. (2008). Cognitive-behavioral therapy to prevent relapse in pediatric responders to pharmacotherapy for major depressive disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 47*, 1395–1404. https://doi.org/10.1097/CHI.0b013e31818914a1

Kiviruusu, O., Strandholm, T., Karlsson, L., & Marttunen, M. (2020). Outcome of depressive mood disorder among adolescent outpatients in an eight-year follow-up. *Journal of Affective Disorders, 266*, 520–527. https://doi.org/10.1016/j.jad.2020.01.174

Kovacs, M., Brent, D., Feinberg, T. F., Paulauskas, S., & Reid, J. (1986). Children's self-reports of psychological adjustment and coping strategies during the first year of insulin-dependent diabetes mellitus. *Diabetes Care, 9*, 472-479. https://doi.org/10.2337/diacare.9.5.472

Kovacs, M., Feinberg, T. L., Crouse-Novak, M., Paulauskas, S. L., Pollock, M., & Finkelstein, R. (1984). Depressive disorders in childhood. II. A longitudinal study of the risk for a subsequent major depression. *Archives of General Psychiatry, 41*, 643–649. https://doi.org/10.1001/archpsyc.1984.01790180013001

Kovacs, M., Obrosky, D. S., Goldston, D., & Drash, A. (1997). Major depressive disorder in youths with IDDM: a controlled prospective study of course and outcome. *Diabetes Care, 20*, 45–51. https://doi.org/10.2337/diacare.20.1.45

Kovacs, M., Yaroslavsky, I., Rottenberg, J., George, C. J., Kiss, E., Halas, K., Dochnal, R., Benák, I., Baji, I., Vetró, A., Makai, A., & Kapornai, K. (2016). Maladaptive mood repair, atypical respiratory sinus arrhythmia, and risk of a recurrent major depressive episode among adolescents with prior major depression. *Psychological Medicine, 46*, 2109–2119. https://doi.org/10.1017/S003329171600057X

Lewinsohn, P. M., Allen, N. B., Seeley, J. R., & Gotlib, I. H. (1999). First onset versus recurrence of depression: differential processes of psychosocial risk. *Journal of Abnormal Psychology, 108*, 483–489. https://doi.org/10.1037//0021-843x.108.3.483

Lewinsohn, P. M., Clarke, G. N., Seeley, J. R., & Rohde, P. (1994). Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 809–818. https://doi.org/10.1097/00004583-199407000-00006

Lewinsohn, P. M., Rohde, P., Seeley, J. R., Klein, D. N., & Gotlib, I. H. (2000). Natural course of adolescent major depressive disorder in a community sample: Predictors of recurrence in young adults. *The American Journal of Psychiatry, 157*, 1584–1591. https://doi.org/10.1176/appi.ajp.157.10.1584

Lloyd, C. E., Nouwen, A., Sartorius, N., Ahmed, H. U., Alvarez, A., Bahendeka, S., Basangwa, D., Bobrov, A. E., Boden, S., Bulgari, V., Burti, L., Chaturvedi, S. K., Cimino, L. C., Gaebel, W., de Girolamo, G.,

Gondek, T. M., de Braude, M. G., Guntupalli, A., Heinze, M. G., Ji, L., … Xin, Y. (2018). Prevalence and correlates of depressive disorders in people with type 2 diabetes: Results from the International Prevalence and Treatment of Diabetes and Depression (INTERPRET-DD) study, a collaborative study carried out in 14 countries. *Diabetic Medicine, 35*, 760–769. https://doi.org/10.1111/dme.13611

Lustman, P. J., Clouse, R. E., Nix, B. D., Freedland, K. E., Rubin, E. H., McGill, J. B., Williams, M. M., Gelenberg, A. J., Ciechanowski, P. S., & Hirsch, I. B. (2006). Sertraline for prevention of depression recurrence in diabetes mellitus: a randomized, double-blind, placebo-controlled trial. *Archives of General Psychiatry, 63*, 521–529. https://doi.org/10.1001/archpsyc.63.5.521

Lustman, P. J., Griffith, L. S., & Clouse, R. E. (1988). Depression in adults with diabetes. Results of 5-yr follow-up study. *Diabetes Care, 11*, 605–612. https://doi.org/10.2337/diacare.11.8.605

Lustman, P. J., Griffith, L. S., Freedland, K. E., & Clouse, R. E. (1997). The course of major depression in diabetes. *General Hospital Psychiatry, 19*, 138–143. https://doi.org/10.1016/S0163-8343(96)00170-3

Lustman, P. J., Williams, M. M., Sayuk, G. S., Nix, B. D., & Clouse, R. E. (2007). Factors influencing glycemic control in type 2 diabetes during acute- and maintenance-phase treatment of major depressive disorder with bupropion. *Diabetes Care, 30*, 459–466. https://doi.org/10.2337/dc06-1769

Maraldi, C., Volpato, S., Penninx, B. W., Yaffe, K., Simonsick, E. M., Strotmeyer, E. S., Cesari, M., Kritchevsky, S. B., Perry, S., Ayonayon, H. N., & Pahor, M. (2007). Diabetes mellitus, glycemic control, and incident depressive symptoms among 70- to 79-year-old persons: The health, aging, and body composition study. *Archives of Internal Medicine, 167*, 1137–1144. https://doi.org/10.1001/archinte.167.11.1137

Matías-Carrelo, L. E., Chavez, L. M., Negron, G., Canino, G., Aguilar-Gaxiola, S., & Hoppe, S. (2003). The Spanish translation and cultural adaptation of five mental health outcome measures. *Culture, Medicine and Psychiatry, 27*, 291–313. https://doi.org/10.1023/a:1025399115023

Matos-Melo, A., & Cumba-Aviles, E. (2016). *Infravaloración, autorreproche y alteraciones cognitivas asociadas con la depresión en adolescentes con diabetes tipo 1* [Undervaluing, self-reproach and depression-related cognitive alterations among adolescents with type 1 diabetes]. Paper presented at the 8th Iberoamerican Congress of Clinical and Health Psychology, San Juan, Puerto Rico.

Matos-Melo, A. L., & Cumba-Aviles, E. (2018). Family Environment Scale parental ratings of conflict among Latino families of depressed adolescents with type 1 diabetes. *Puerto Rico Health Sciences Journal, 37*, 200–207.

Melvin, G. A., Dudley, A. L., Gordon, M. S., Ford, S., Taffe, J., & Tonge, B. J. (2013). What happens to depressed adolescents? A follow-up study into early adulthood. *Journal of Affective Disorders, 151*, 298–305. https://doi.org/10.1016/j.jad.2013.06.012

Morales-Espada, O. A., Ramos-Ayala, N., & Cumba-Aviles, E. (2016, September 17). *The Beck Anxiety Inventory: Psychometric properties in Latino adolescents with type 1 diabetes and depression.* Poster presented at the 2nd Behavioral Health Student Research Symposium of Southern Puerto Rico at Ponce Health Sciences University, Ponce, PR.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: Results from the World Health Surveys. *The Lancet, 370*, 851–858. https://doi.org/10.1016/S0140-6736(07)61415-9

Muñoz-Reyes, A. M., Asencio-Torres, V., & Cumba-Aviles, E. (2017, May 13). *Psychometric properties of the Child Behavior Checklist Internalizing Scales in adolescents with type 1 diabetes.* Poster presented at the 13th Annual Scientific Conference, Ponce Health Science University, Ponce, Puerto Rico.

Nefs, G., Pouwer, F., Denollet, J., & Pop, V. (2012). The course of depressive symptoms in primary care patients with type 2 diabetes: Results from the Diabetes, Depression, Type D Personality Zuidoost-Brabant (DiaDDZoB) Study. *Diabetologia, 55*, 608–616. https://doi.org/10.1007/s00125-011-2411-2

Nobis, S., Lehr, D., Ebert, D. D., Baumeister, H., Snoek, F., Riper, H., & Berking, M. (2015). Efficacy of a web-based intervention with mobile phone support in treating depressive symptoms in adults with type 1 and type 2 diabetes: a randomized controlled trial. *Diabetes Care, 38*, 776–783. https://doi.org/10.2337/dc14-1728

Peters, A. T., Jacobs, R. H., Feldhaus, C., Henry, D. B., Albano, A. M., Langenecker, S. A., Reinecke, M. A., Silva, S. G., & Curry, J. F. (2016). Trajectories of functioning into emerging adulthood following treatment for adolescent depression. *The Journal of Adolescent Health, 58*, 253–259. https://doi.org/10.1016/j.jadohealth.2015.09.022

Pettit, J., Hartley, C., Lewinsohn, P., Seeley, J. & Klein, D. (2013). Is liability to recurrent major depressive disorder present before first episode onset in adolescence or acquired after the initial episode? *Journal of Abnormal Psychology, 122*, 353–358. https://doi.org/10.1037/a0032655

Peyrot, M., & Rubin, R. R. (1999). Persistence of depressive symptoms in diabetic adults. *Diabetes Care, 22*, 448–452. https://doi.org/10.2337/diacare.22.3.448

Pérez-Perdomo, R., Perez-Cardona, C. M., Allende-Vigo, M., Rivera-Rodriguez, M. I., Rodriguez-Lugo, L. A. (2005). Type 2 diabetes mellitus among youth in Puerto Rico, 2003. *Puerto Rico Health Sciences Journal, 24*, 111–117.

Piñero-Meléndez, M., Quiles-Jiménez, M., & Cumba-Aviles, E. (2016). *Barreras en la adherencia en adolescentes con diabetes tipo 1 y depresión* [Barriers to adherence in adolescents with type 1 diabetes and depression]. Paper presented at the 8th Iberoamerican Congress of Clinical and Health Psychology, San Juan, Puerto Rico.

Rao, U., Hammen, C. L., & Poland, R. E. (2010). Longitudinal course of adolescent depression: Neuroendocrine and psychosocial predictors. *Journal of the American Academy of Child and Adolescent Psychiatry, 49*, 141–151. https://doi.org/10.1097/00004583-201002000-00008

Rao, U., Ryan, N. D., Birmaher, B., Dahl, R. E., Williamson, D. E., Kaufman, J., Rao, R., & Nelson, B. (1995). Unipolar depression in adolescents: Clinical outcome in adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 566–578. https://doi.org/10.1097/00004583-199505000-00009

Rivera, A., González-Nieves, M. I., Vélez, N., & Colón de Martí, L. N. (2007). Indicadores de síntomas depresivos en una muestra de jóvenes de 12 a 17 años de edad con diabetes mellitus tipo 1 [Indicators of depressive symptoms in a sample of youth aged 12 to 17 years with type 1 diabetes mellitus]. *Puerto Rico Health Sciences Journal, 26*, 51–56.

Robinson, D. J., Coons, M., Haensel, H., Vallis, M., & Yale, J. F. (2018). Diabetes and mental health. *Canadian Journal of Diabetes, 42*, S130–S141. https://doi.org/10.1016/j.jcjd.2017.10.031

Rodríguez, J. (2006). *Depresión en un grupo de adolescentes entre las edades de 12 a 17 años que padecen de diabetes mellitus tipo 1* [Depression in a group of adolescents aged 12 to 17 years who have type 1 diabetes mellitus] [Unpublished dissertation]. Carlos Albizu University, San Juan Campus.

Rodríguez-Beato, J. N., Ruiz-Raíces, N. E., & Cumba-Aviles, E. (2018, January 20). *Carga parental en cuidadores/as de adolescentes con diabetes tipo 1 y depresión* [Parental burden among caregivers of adolescents with type 1 diabetes and depression]. Paper presented at the 3rd Behavioral Health Student Research Symposium of Southern Puerto Rico, Ponce Health Sciences University, Ponce, PR.

Rosselló, J., & Jiménez-Chafey, M. I. (2007). Depressive and anxious symptomatology in Puerto Rican youth with type 1 diabetes mellitus and their relationship to glycemic control. *Ciencias de la Conducta, 22*, 103–126.

Sartorius, N. (2018). Depression and diabetes. *Dialogues in Clinical Neuroscience, 20*, 47–52. https://doi.org/10.31887/DCNS.2018.20.1/nsartorius

Schmitz, N., Gariépy, G., Smith, K. J., Clyde, M., Malla, A., Boyer, R., Strychar, I., Lesage, A., & Wang, J. L. (2014). Recurrent subthreshold depression in type 2 diabetes: an important risk factor for poor health outcomes. *Diabetes Care, 37*, 970–978. https://doi.org/10.2337/dc13-1832

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry, 59*, 22–57.

Sheehan, D. V., Sheehan, K. H., Shytle, R. D., Janavs, J., Bannon, Y., Rogers, J. E., Milo, K. M., Stock, S. L., & Wilkinson, B. (2010). Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). *Journal of Clinical Psychiatry, 71*, 313–326. https://doi.org/10.4088/JCP.09m05305wh

Šimunović-Filipčić, I., Filipčić, I., Glamuzina, L., Devčić, S., Bajić, Ž., Braš, M., Mihaljević Peleš, A., Marčinko, D., & Sartorius, N. (2019). The effect of chronic physical illnesses on psychiatric hospital admission in patients with recurrent major depression. *Psychiatry Research, 272*, 602–608. https://doi.org/10.1016/j.psychres.2018.12.178

Stewart, S. M., Rao, U., & White, P. (2005). Depression and diabetes in children and adolescents. *Current Opinion in Pediatrics, 17*, 626–631. https://doi.org/10.1097/01.mop.0000176441.49743.ea

van Bastelaar, K. M., Pouwer, F., Cuijpers, P., Riper, H., Twisk, J. W., & Snoek, F. J. (2012). Is a severe clinical profile an effect modifier in a Web-based depression treatment for adults with type 1 or type 2 diabetes? Secondary analyses from a randomized controlled trial. *Journal of Medical Internet Research, 14*, e2. https://doi.org/10.2196/jmir.1657

Van Buren, D. J., Wilfley, D. E., Marcus, M. D., Anderson, B., Abramson, N. W., Berkowitz, R., Ievers-Landis, C., Trief, P., Yasuda, P., Hirst, K., & TODAY Study Group (2018). Depressive symptoms and glycemic control in youth with type 2 diabetes participating in the TODAY clinical trial. *Diabetes Research and Clinical Practice, 135*, 85–87. https://doi.org/10.1016/j.diabres.2017.11.008

van Dooren, F. E., Denollet, J., Verhey, F. R., Stehouwer, C. D., Sep, S. J., Henry, R. M., Kremers, S. P., Dagnelie, P. C., Schaper, N. C., van der Kallen, C. J., Koster, A., Pouwer, F., & Schram, M. T. (2016). Psychological and personality factors in type 2 diabetes mellitus, presenting the rationale and exploratory results from the Maastricht Study, a population-based cohort study. *BMC Psychiatry, 16*, 17. https://doi.org/10.1186/s12888-016-0722-z

Wagner, J., Tennen, H., Mansoor, G., & Abbott, G. (2009). Endothelial dysfunction and history of recurrent depression in postmenopausal women with type 2 diabetes: a case-control study. *Journal of Diabetes and Its Complications, 23*, 18–24. https://doi.org/10.1016/j.jdiacomp.2007.11.007

Warner, V., Weissman, M. M., Fendrich, M., Wickramaratne, P., & Moreau, D. (1992). The course of major depression in the offspring of depressed

parents: Incidence, recurrence, and recovery. *Archives of General Psychiatry, 49*, 795–801. https://doi.org/10.1001/archpsyc.1992.01820100039008

Whitworth, S. R., Bruce, D. G., Starkstein, S. E., Davis, W. A., Davis, T., Skinner, T. C., & Bucks, R. S. (2017). Depression symptoms are persistent in type 2 diabetes: Risk factors and outcomes of 5-year depression trajectories using latent class growth analysis. *Diabetic Medicine, 34*, 1108–1115. https://doi.org/10.1111/dme.13372

Williams, M. M., Clouse, R. E., Nix, B. D., Rubin, E. H., Sayuk, G. S., McGill, J. B., Gelenberg, A. J., Ciechanowski, P. S., Hirsch, I. B., & Lustman, P. J. (2007). Efficacy of sertraline in prevention of depression recurrence in older versus younger adults with diabetes. *Diabetes Care, 30*, 801–806. https://doi.org/10.2337/dc06-1825

Wu, C. S., Hsu, L. Y., & Wang, S. H. (2020). Association of depression and diabetes complications and mortality: a population-based cohort study. *Epidemiology and Psychiatric Sciences, 29*, e96. https://doi.org/10.1017/S2045796020000049