Diabetes-related stigma among adolescents: Emotional self-efficacy, aggressiveness, self-care, and barriers to treatment compliance

Estigma relacionado a la diabetes en adolescentes: Auto-eficacia emocional, agresividad, auto-cuidado y barreras para cumplir el tratamiento

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Abstract

Recent studies indicate that over 60% of adolescents with type 1 diabetes (T1D) experience diabetes-related stigma (DRS). DRS may affect their emotional self-efficacy (ESE), behavior, and self-care while increasing barriers to comply with physical and mental health treatment. We examined differences in ESE, aggressiveness, self-care, and barriers to comply with treatment among 51 T1D youths (aged 12-17 years) with (G1; $n = 35$) and without (G2; $n = 16$) any history of DRS enrolled in a depression treatment study. Using a MANOVA followed by individual univariate analyses, we compared groups in continuous variables, and to conduct comparisons in categorical variables, we used Chi-square tests. MANOVA results were significant, $F(5, 45) = 3.20$, $p = .015$. G1 reported lower scores than G2 on ESE, perception of the potential therapeutic impact of group sessions, and family support to comply with insulin treatment. G1 caregivers perceived their offspring as more aggressive and affected by barriers to treatment adherence than their counterparts. G1 members showed a higher proportion of cases with body mass index problems, non-compliance with their meal plan, and multiple episodes of hypoglycemia. Compared to G2, a lower percentage of adolescents in G1 met the recommended glycemic control levels. Our findings support the relationship of DRS with a lower ESE, more behavioral problems, difficulties in food-related self-care, and more barriers to comply with the treatment of diabetes and emotional problems in adolescents. They suggest the need for large-scale education to prevent DRS and psychosocial interventions to combat its impact in adolescents.

Keywords: adolescents, stigma, emotional self-efficacy, diabetes, self-care

Resumen

Según estudios recientes, sobre 60% de las/os adolescentes con diabetes tipo 1 (DT1) experimentan estigma relacionado con la diabetes (ERD). Éste puede afectar la autoeficacia emocional (AE), el comportamiento y el autocuidado, aumentando las barreras para cumplir el tratamiento de salud física y mental. Examinamos diferencias en AE, agresividad, autocuidado y barreras para cumplir el tratamiento en 51 jóvenes con DT1 (12-17 años) con (G1; $n = 35$) y sin (G2; $n = 16$) antecedentes de ERD, inscritos/as en un estudio de tratamiento para la depresión. Utilizando el MANOVA y análisis de varianza individuales, comparamos los grupos en variables continuas. Utilizamos el Chi-cuadrado para variables categóricas. El MANOVA fue significativo, $F(5, 45) = 3.20$, $p = .015$. Quienes pertenecían al G1 reportaron puntuaciones menores que el G2 en AE, percepción del potencial terapéutico grupal y apoyo familiar con el tratamiento de insulina. Las/os cuidadoras/es del G1 percibieron una progenie más agresiva y con más barreras para cumplir el tratamiento que sus contrapartes. El G1 mostró mayor proporción de problemas del índice de masa corporal, incumplimiento del plan alimentario y episodios hipoglucémicos múltiples. Un porcentaje menor alcanzó el control glucémico recomendado, comparado con el G2. Nuestros hallazgos apoyan la asociación del ERD con una menor AE, más agresividad, dificultades en el autocuidado alimentario y más barreras para cumplir el tratamiento de la diabetes y los problemas emocionales en adolescentes. Estos sugieren la necesidad de educación a gran escala para prevenir el ERD e intervenciones psicosociales para combatir su impacto en jóvenes.

Palabras claves: adolescentes, estigma, autoeficacia emocional, diabetes, autocuidado

Type 1 diabetes (T1D) is the most common type of diabetes in children and adolescents (American Diabetes Association [ADA], 2021). Diabetes prevalence in Puerto Rico is higher than in the U.S., including rates of pediatric diabetes (Haddock & de Conty, 1991; Puerto Rico Department of Health [PRDH], 2015). The treatment regimen for T1D is complex and demanding and often requires self-care activities in public places. Adolescents with T1D often experience stigma: devaluation or discredit due to their illness (Crespo-Ramos et al., 2018).

Similar to other chronic illnesses, we can classify diabetes-related stigma (DRS) as internalized (felt) or social (enacted) stigma. DRS implies a social judgment due to the condition, which leads to rejection or exclusion; this could develop in the person's possible internalization, shame, and fear of such judgment (Schabert et al., 2013). At least two recent studies indicate that over 60% of adolescents with T1D have experienced DRS (Brazeau et al., 2018; Crespo-Ramos et al., 2018). Results from the study conducted in Puerto Rico showed that 67.69% of T1D adolescents reported at least one lifetime experience of DRS (Crespo-Ramos et al., 2018).

Stigma and Body-Related Issues in Adolescents With T1D

Many adolescents with T1D struggle with body mass index (BMI) and body image issues (Basinger et al., 2020; Troncone et al., 2020). According to Lawrence et al. (2008), about 30.5% of T1D youth (aged 10–21 years) in their sample were worried about weight. In a systematic review, Minges et al. (2013) reported a prevalence of obesity or overweight as high as 33.3% among T1D youth, with most studies reporting rates higher than 20%. Baskaran et al. (2015) reported similar rates (up to 36%), while Minges et al. (2017) found that Hispanic adolescents with T1D had the highest rate (46.1%) of overweight/obesity. Among

T1D youth, underweight rates as high as 11.5% have been reported (Ferrante et al., 1999). Research also documents that eating problems or disorders are more common in T1D compared with peers (Young et al., 2013). Likewise, Neumark-Sztainer et al. (2002) found that 37.9% of the females and 15.9% of the male adolescents with T1D reported unhealthy weight control practices. According to the authors, these practices, which may include deliberate insulin under-dosing and omission or skipping insulin doses after overeating, relate significantly with higher levels of weight dissatisfaction. Obesity, overweight, excessive lost weight, or visible signs and practices related to unhealthy weight control may lead to negative social judgment and internalized stigma among adolescents with T1D, which may exacerbate body image issues (ADA, 2021; Schabert et al., 2013).

Diabetes-Related Stigma and Self-Care

Some studies have examined the link between DRS and aspects of diabetes self-care and the management of glucose levels. For instance, in qualitative studies, T1D self-care activities have been identified as targets of stigma (Leung et al., 2020). Among T1D adolescents from Puerto Rico, DRS related to more problems adhering to insulin treatment and a higher percentage of cases in need of insulin reminders (Quiles-Jiménez & Cumba-Avilés, 2018). Bregani et al. (1979) argued that school-age children with diabetes often feel a sense of social stigma from their dietary restrictions. Zuppinger et al. (1979) found that half of the children with diabetes identified teasing from peers among the main difficulties in following their diet. According to Pond et al. (1995), the need for regularity of meals can make peer acceptance more difficult among pre-pubertal children with diabetes. Yet, no study has examined the relationship between DRS and non-compliance with meal plans in adolescents. Among youth from Canada with T1D, feeling stigmatized was associated with higher HbA1c levels and having a severe

hypoglycemia episode in the past year (Brazeau et al., 2017, 2018). Nevertheless, researchers did not examine its relationship with multiple episodes of hypoglycemia.

Stigma, Self-Efficacy, & Aggressive Behavior

Although DRS has been related to lower general self-efficacy in adults (Kato et al., 2014), and to lower diabetes-related self-efficacy in a sample of adolescents and young adults (Brazeau et al., 2018), no study has examined its link with self-efficacy to manage emotional problems, particularly depression. On the other hand, people may experience self-control problems due to fluctuations in sugar levels (ADA, 2021). These fluctuations are common in T1D. Evidence suggests that stressful experiences may exacerbate sugar levels in T1D adolescents (Hilliard et al., 2016). DRS may hinder the self-management of glucose levels, leading to more severe hypoglycemia or hyperglycemia. In addition, given that stigmatization is a stressful experience itself, DRS may directly increase the likelihood of engaging in aggressive behavior. When problems of blood glucose fluctuation mix with the psychological traumas of social rejection, the probability of anger, defiance, and aggressiveness among people with diabetes increases (Anderson & Tulloch-Reid, 2017; Fachetti, 2017). Although facing DRS may lead to a higher frequency of aggressive behaviors, no study has documented this issue.

Diabetes-Related Stigma and Barriers to Treatment Compliance

The experience of DRS might impose additional barriers for patients to adhere to physical and mental health treatment. For example, some evidence suggests that DRS may generate or exacerbate barriers to comply with diabetes treatment (Blixen et al., 2016; Hallgren et al., 2015; Shiu et al., 2003). One barrier might be low family support with diabetes treatment, which has been associated with poor adherence in youth and worst health outcomes (Boucher et al., 2020; Hilliard et al., 2013). Otherwise, the shame, fear, and guilt stemming from stigma may hinder general help-seeking behaviors in T1D patients (Jaacks et al., 2015). For instance, stigma has been identified among the factors that lead most young people not to access the support they need to manage the emotional and behavioral challenges of T1D (Clarke et al., 2015).

Social or internalized stigma among T1D adolescents might affect their confidence in the healing effect of psychotherapy, particularly if delivered in group format. In this modality, expectations of sharing information about activities, feelings, thoughts, and daily experiences with therapists and group members and receiving feedback from others are central (Cumba-Avilés, 2017). Group therapy and support groups could help patients with diabetes to develop a sense of belonging and release feelings of isolation and stigmatization (Basinger et al., 2020; Zrebiec, 2003). However, low expectations about the healing effect of therapy (curativeness) may represent a barrier to adhere to mental health treatment and engage constructively in sessions (Meyer et al., 2002; Tambling, 2012). In group therapy, low expectations of success is a barrier to the installation of hope, which may inhibit catharsis and insight, limit cohesion, reduce curiosity about group members, and reinforce defensive behaviors, such as non-compliance with treatment or premature dropout (Yalom, 1966; Yalom & Leszcz, 2005). Among depressed youth who have faced DRS, these processes may be elicited to avoid further stigmatization, as the expectation of facing stigma may overcome their reduced hope for positive change or treatment success. Although a low perception of curativeness might adversely affect adherence to mental health treatment of youth with T1D, no study has examined the potential relationship between having experienced DRS and the perception of

psychotherapy curativeness in T1D adolescents.

Study Objectives, and Hypotheses

Identifying the correlates of DRS among Hispanic adolescents with T1D is an important step for developing strategies and interventions to target stigma and its consequences among this population. DRS may affect emotional self-efficacy, food-related self-care (including BMI problems), and propensity for aggressive behavior while increasing barriers for compliance with physical and mental health treatment. Therefore, it is essential to explore and document its potential impact on these areas among T1D Hispanic adolescents from Puerto Rico.

In this study, we assessed differences in (a) emotional self-efficacy, (b) aggressive behavior, (c) food-related self-care (including BMI), (d) perceptions of family support with insulin use, (e) perceptions of group curativeness, and (f) other barriers to comply with treatment among adolescents with (G1; n = 35) vs. without (G2; n =16) a history of DRS. We expected adolescents in G1 to show significantly higher means scores than adolescents in G2 in aggressiveness and barriers to comply with T1D treatment, but lower scores in emotional self-efficacy, family support with insulin use, and perception of group curativeness. We also assumed that a significantly higher percentage of G1 members would present poor adherence to meal plans, BMI problems, and multiple hypoglycemia episodes in the previous week, but a lower percentage would show optimal glycemic control.

Method
Participants

Participants were 51 T1D youth (29 women) aged 12-17 years old (M = 15.26; SD = 1.60) recruited for a depression treatment study conducted at a university research institute. We based this work on secondary analyses from data collected as part of that main research study (PI: Cumba-Avilés). Adolescents attended public (66.67%) and private schools. About 43.14% lived in the Metropolitan Area. Their mean score in the Children's Depression Inventory (CDI) was 19.53. Adolescents most recent glycosylated hemoglobin result (as obtained from their private laboratory test) before study enrollment yielded a mean of 9.14 (SD = 2.25; range from 5.76 - 17.70). The mean T1D duration was of 6.12 years (SD = 3.88). About 19.61% (10) of participants were using an insulin pump at intake. The mean family household size was 4.02 members (SD = 0.95). About 86.27% of caregivers (aged 32 to 58 years old) were women. The mean caregivers' age was 43.45 years (SD = 6.59). As reported by primary caregivers, most of their families (72.55%) were from low/medium-low socioeconomic status. Their mean annual family income (in US dollars) was $37,024.42 ($SD$ = 3,837.64). About 39.22% (20) of families lived under US poverty levels.

For inclusion in the main study, T1D adolescents must be 12 to 17 years old, obtain a CDI score ≥ 13 or a score ≥ 44 in the Children's Depression Rating Scale-Revised, and be willing to participate in weekly group sessions of Cognitive-Behavioral Therapy. History of psychotic symptoms, bipolar disorder, last-year substance dependence/abuse, imminent suicide risk, concurrent depression treatment, current child maltreatment, and having a non-depressive disorder that was the primary need for intervention, were exclusion criteria (see Cumba-Avilés & Sáez-Santiago, 2016). We classified the 35 participants who presented with a history of DRS into Group 1 (G1) and defined as Group 2 (G2) the 16 who did not present with such a history.

Measures

Socio-Demographic Data

We collected data about each adolescent's sex, age, ethnicity, employment status, and type of school attended. Caregivers provided much the same information (the first four items) and details about their specific job and schooling. We also asked for annual family income and perceived socioeconomic status. Adolescents provided data on their height and weight. We used this information to estimate BMI based on sex and age percentiles. We considered as "BMI problems" those values indicative of underweight, overweight, or obesity.

Adolescent Diabetes-Related Experiences Worksheet (ADREW)

This form included five self-report open-ended questions related to concerns and difficulties about living with diabetes, as well as situations or issues that had bothered youth while interacting with peers, family, and healthcare professionals because of their illness. We developed questions aiming to capture both self-referenced evaluations and reports of difficult social experiences that might be of particular interest for planning treatment according to adolescents' needs. Examples of open-ended questions included: "What worries you the most about having diabetes?", "What have been the main difficulties you have faced since you had diabetes?", and "What things (if any) have bothered you about how your friends/family/health professionals treat you for having diabetes?" We coded verbatim responses into categories of lifetime social stigma and internalized stigma experienced because of having T1D, as described by Crespo-Ramos et al. (2018). Overall kappa ($\varkappa$) coefficients (reliability of coding) ranged from .84 to .87 ($p \leq .001$). In this study, we used the presence of any stigma experience to classify participants. Kappa values for agreement between two independent raters in this classification was .87 ($p \leq .001$) with a raw agreement of 94.43%. We discussed initial disagreements to reach a consensus. The variable used to define groups included any final consensus.

Glycosylated Hemoglobin (HbA1c)

In addition to adolescents' recent test results from private laboratories about HbA1c, qualified personnel conducted tests at the University of Puerto Rico Medical Sciences Campus lab. We used the latter for analysis of glycemic control included in the Results section.

Escala de Autoeficacia para la Depresión en Adolescentes (EADA)

The 28-item EADA (Self-Efficacy for Depression Scale –Youth) was the first Spanish-language emotional self-efficacy scale developed for youth (Díaz-Santos et al., 2008). It assesses the frequency of adolescents' confidence in their ability to cope with feelings, cognitions, activities, and situations commonly faced when depressed, using a 1 (*Never*) to 5 (*Always*) rating format. In this sample, the reliability of EADA Total scores was .93 (Pagán-Torres et al., 2019).

Diabetes Social Support Questionnaire-Family Version (DSSQ-Family)

This instrument measures the frequency with which family members engage in supportive behaviors and adolescents' perceptions of family support related to five aspects of diabetes: insulin use, blood tests, meal plan, exercise, and emotions (La Greca & Bearman, 2002). Its validity and reliability with Puerto Rican youths with T1D have been documented (Piñero-Meléndez et al., 2015). For this study, we used the 8-item Insulin Use subscale ($\alpha = .72$) of the Frequency Scale. Its items are rated in a 1 (*Never*) to 5 (*At least once a day*) format.

Hypoglycemia Scale (HS)

This scale assesses the severity of hypoglycemic symptoms during the worst episode in the past 7 days. Its psychometric properties with T1D adolescents ($\alpha = .85$) are

excellent (Jiménez et al., 2016). We used the question on the number of hypoglycemia episodes presented by adolescents in the 7 days before the diagnostic interview.

Curative Climate Instrument (CCI)

It assesses group members' perception of the curative effect of group therapy (Fuhriman et al., 1986). Its 14 items are rated on a scale from 1 (*Not helpful*) to 5 (*Extremely helpful*). The CCI is a reliable (α = .94) and valid measure when used with T1D Hispanic youth from Puerto Rico (Rodríguez-Camejo et al., 2015).

Child Behavior Checklist (CBCL)

Caregivers completed the CBCL, which is a measure of childhood problems that has been widely used in Puerto Rico (Achenbach, 1991). In this instrument, items are rated on a scale from 0 (*Not true*) to 2 (*Very true or often true*). In the current study, we used the Aggressive Behavior subscale, whose internal reliability in this sample was .88 (Burgos-Weiner et al., 2018).

Barriers to Adherence Questionnaire (BAQ)

It 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).

Kovacs' Diabetes Management Information Sheet (K-DMIS)

Using this semi-structured interview, we obtained T1D-related information from parents, including youth adherence to their meal plan (Kovacs et al., 1986). We used an adapted version.

Procedures

Institutional review boards from the University of Puerto Rico (UPR), Río Piedras Campus (Approval # 1112-005) and Medical Sciences Campus (Approval # A9530112) approved the study. We shared information about the main study via T1D clinics, local media, and printed materials. We recruited participants through summer camps, educational/recreational activities, and referrals from endocrinologists, school personnel, and other participants. Caregivers completed requests for participation forms via phone call. We invited adolescents and one parent each to an in-person screening if they meet initial eligibility criteria. After obtaining consent/assent, they completed measures at this visit and a diagnostic evaluation was scheduled within 2 weeks. Responses on the ADREW were clarified as needed to assure data precision.

Data Analysis

We used SPSS 24.0 for all statistical analyses. After classifying the sample between youths with vs. without any history of DRS, we used Chi-square and Student t-tests for comparing groups in categorical and continuous socio-demographic variables. Then, we conducted a multivariate analysis of variance (MANOVA), followed by individual analyses of variance (ANOVAs) to compare group means on the continuous dependent variables, considering their stigma 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 indicator provided in the MANOVA/ANOVA analyses, and also calculated Cohen's d, to estimate the effect size of mean differences in continuous variables. To assess the effect size of differences among groups in categorical variables, we estimated Cohen's d based on a Chi-square transformation (for a 2 x 2 crosstab), following the formula

provided by DeFife (2009). BMI problems included any case meeting criteria for underweight, overweight, or obesity from at least one of the following organizations: Center for Disease Control and Prevention, World Health Organization, or International Obesity Task Force.

Table 1

Comparison on Socio-Demographic Variables by Diabetes-Related Stigma Status

Variables	History of DRS (G1; $n = 35$)	No History of DRS (G2; $n = 16$)	χ^2 / t	d
Categorical Variables				
Adolescent's Sex (Girls)	57.14% (20)	56.25% (9)	0.00	0.02
Residential Zone (Metro)	42.86% (15)	43.75% (7)	0.00	0.02
School Attended (Public)	68.57% (24)	62.50 (10)	0.18	0.12
Rural vs. Urban (Rural)	34.29% (12)	31.25% (5)	0.05	0.06
SES (Middle-low/Low)	71.43% (25)	75.00% (12)	0.07	0.07
Using an Insulin Pump (Yes)	22.36% (8)	12.50% (2)	0.75	0.24
Continuous Variables				
Adolescent's Age	15.37 (1.51)	15.01 (1.82)	0.76	0.23
T1D Duration	6.01 (3.80)	6.34 (4.16)	-0.28	0.08
Caregiver's Age	43.97 (6.66)	42.31 (6.51)	0.83	0.25
Caregiver's Education	14.80 (2.55)	14.25 (2.32)	0.73	0.22
Family Income	$38,874 (27,039)	$32,978 (28,654)	0.71	0.21
Number of Potential Caregivers	2.03 (0.75)	1.69 (0.48)	1.67	0.50
Number of Children (< 21 years)	2.20 (0.87)	1.88 (0.62)	1.35	0.41

Note. DRS = Diabetes-related stigma; T1D = Type 1 diabetes; SES = Perceived socio-economic status.

Results

Group Comparison in Socio-demographic Variables

When comparing groups defined by their report of some lifetime DRS experience, we found no differences in any socio-demographic variable (Table 1). Therefore, it was not necessary to control for their effect in subsequent statistical analyses.

Group Comparison in Continuous Dependent Variables

The MANOVA (omnibus test) aimed to examine group means in the continuous dependent variables was significant, $F(5, 45) = 3.20$, $p = .015$, Multivariate Effect Size = 0.26. As we expected, individual analyses conducted using one-way ANOVAs showed that adolescents with any history of DRS (G1) reported lower self-efficacy to manage depression, lower frequency of family behaviors to support them with insulin use, and a perception of lower therapeutic impact at the initial group psychotherapy sessions than their counterparts did (Table 2). On their behalf, caregivers of adolescents from G1 reported that their children presented significantly more aggressive behavior and faced significantly more barriers to comply with T1D treatment. The effect sizes of these differences were medium in all cases.

Table 2

Group Comparison in Continuous Outcome Variables by General Stigma Status

Variable	History of DRS (G1; *n* = 35)	No History of DRS (G2; *n* = 16)	F	η_p^2	d
Self-efficacy for Depression	100.49 (18.50)	113.06 (18.89)	5.01*	0.09	0.68
Family Support-Insulin Use	18.46 (9.07)	24.44 (8.82)	4.85*	0.09	0.66
Curativeness	48.37 (10.42)	55.16 (10.06)	4.76*	0.09	0.66
Barriers to Adherence (T1D)	44.71 (19.20)	32.94 (18.71)	4.20*	0.08	0.62
Aggressive Behavior	13.11 (7.44)	9.00 (5.03)	4.03*	0.08	0.60

Note. DRS = Diabetes-Related Stigma; T1D = Type 1 diabetes.
*$p \leq .05$

Group Comparison in Categorical Dependent Variables

Chi-square results showed that a significantly higher percentage of adolescents with any history of DRS experienced BMI problems, poor adherence to meal plans, as well as three or more episodes of hypoglycemia within the week before the diagnostic assessment, compared to those with no history of DRS (G2). On the other hand, compared with G2, a significantly lower proportion of the young people from G1 obtained HbA1c values that reflected optimal glycemic control: values lower than 7.0%, according to ADA (2021) most recent guidelines. The effect sizes of these differences were also medium (Table 3)

Table 3

Comparison on Food-Related Self-Care and Glucose-Related Categorical Variables

Variables	History of DRS (G1; *n* = 35)	No History of DRS (G2; *n* = 16)	χ^2	d
Poor Meal Plan Adherence	57.14% (20)	25.00% (4)	4.55*	0.63
Body Mass Index Problems	40.00% (14)	12.50% (2)	3.86*	0.57
Multiple Hypoglycemia Episodes	51.43% (18)	18.75% (3)	4.84*	0.65
Optimal Glycemic Control	14.29% (5)	43.75% (7)	5.30*	0.68

Note. Body Mass Index (BMI) Problems included cases with BMI values meeting criteria for the overweight, obesity, or underweight categories in at least one of the following organizations: Center for Disease Control and Prevention, World Health Organization, or International Obesity Task Force. DRS = Diabetes-Related Stigma.
*$p \leq .05$

Discussion

We aimed to examine differences in emotional self-efficacy, aggressiveness, self-care, and barriers to comply with treatment among T1D adolescents with and without any history of DRS. The results confirmed our hypothesis regarding the association of DRS with difficulties in emotional self-efficacy,

aggressive behavior, food- and glucose-related self-care, and barriers to treatment compliance. The latter included barriers related to T1D or to managing emotional problems in psychotherapy. Our findings add to the growing research literature on the correlates of DRS in children and adolescents with T1D. Still, they specifically document these correlates in a sample of Hispanic youth from predominantly low or medium-low socioeconomic status. In addition, our study is the first to report the relationship between any history of DRS and a higher frequency of aggressive behaviors in T1D adolescents of any ethnic, racial, or national origin.

The lower levels of self-efficacy for depression found in participants with any history of DRS might have some important implications. A lower self-efficacy for depression supposes a reduction in the patients' confidence in their ability to conduct efforts to manage depressive symptoms, to deal with situations commonly faced by youth when depressed, or to seek help from others for managing those symptoms and situations (Díaz-Santos et al., 2011). This means that the lower degree of this type of self-efficacy in adolescents with any history of DRS may limit their efforts to seek support from family, friends, informal counselors, or even mental health professionals to deal with their emotional problems.

In addition, the lower perceptions of family support with insulin use and group curativeness during the early stage of psychotherapy among adolescents in G1 suggest that those with any history of DRS may develop maladaptive cognitive schemas regarding their social contacts. Furthermore, they may develop interpersonal biases that conduct them to feel rejected, disconnected, unsupported, or unable to improve or receive help to improve their emotional state (Mirdrikvand et al., 2019). Actual experiences of rejection or failure in their attempts to cope with emotional problems or seek help may reinforce these schemas or biases (Downey et al., 1998). The latter highlights the need for providing education to prevent stigma in interactions with T1D children. We recommend conducting initial education efforts with peers and family members since most social stigma experiences, as reported by Crespo-Ramos et al. (2018), occurred in these interactions. However, physicians, medical and nursing students, school personnel, community resources (i.e., spiritual counselors or coaches in team sports), and even mental health professionals, should be included in the next stages of stigma awareness, prevention, and reduction interventions to increase the social impact of educational efforts (Adams & Carter, 2011; Beverly et al., 2019; Leung et al., 2020; Vaz et al., 2016). Our findings also suggest the need for stimulating therapists and group therapy members to provide social support, normalization of experiences, and unconditional acceptance as early in treatment as possible to reduce feelings of isolation, shame, and stigmatization in these adolescents (Basinger et al., 2020; Beverly et al., 2019; Nicholas et al. 2012; Warner & Hauser, 2009; Zrebiec, 2003).

Our results showed a link between DRS and facing barriers to comply with the treatment of T1D more often, as rated by parents. Avoiding the use of insulin in public, forgetting to examine glucose levels, and being "nagged" for having high glucose levels, were the barriers that accounted for most of the differences in the group means. It might be that when adolescents are worried about the possible negative reactions of peers (or other people) upon their practicing self-care in public their ability to adhere to diabetes care recommendations became diminished (Leung et al., 2020). It is also true that many adolescents with T1D experience high levels of glucose or considerable fluctuations of glucose levels even when they reasonably comply with medical self-care recommendations. High stress levels associated with academic-related issues, initiating, or keeping with a romantic relationship, family matters that are not associated with diabetes, and even hassles from daily life may increase glucose levels in a way out of the adolescents'

control. Under these circumstances, adolescents may experience being "nagged" by their family members as a particularly intensive, unfair, and painful DRS experience that could affect their self-esteem and their willingness to persist in their sincere efforts to comply with diabetes treatment.

Poor adherence to meal plans and BMI problems among G1 members may relate to reluctance to alter their diet in public because this might reveal their condition (Finucane & McMullen, 2008). Crespo-Ramos et al. (2018) found that "feeling different/self-stereotyping" was the primary form of internalized stigma among T1D Hispanic adolescents. Most participants who reported experiences coded in this category had internalized society's extreme ideas about their food intake. Consequently, adolescents with T1D may have difficulties following meal plans that could reveal their diagnosis to their peers or increase their worries about being different. However, after the revelation of their diagnosis of T1D, they also fear to elicit social critique for eating "forbidden" foods in public. These adolescents may also fear or assume as valid the negative social judgment they receive (or may receive) if gaining some weight or losing too much (Basinger et al., 2020; Crespo-Ramos et al., 2018). Ironically, while being non-compliant with dietary recommendations to gain social acceptance, or when practicing unhealthy weight control strategies, T1D adolescents may increase their likelihood of suffering BMI problems (either presenting overweight/obesity or being underweight).

On the other hand, findings of a higher percent of G1 participants presenting with multiple hypoglycemic episodes and a lower percent meeting the optimal glycemic control criterion are consistent with a pattern of large fluctuations in glucose levels that may increase their risk of long-term complications. In this sense, by targeting DRS and their emotional, behavioral, and health-related sequelae in adolescents, health service providers might reduce the risk of future complications in this group. In the long term, this should reduce medical care costs faced by families and public health systems (Beverly et al., 2019; Crespo-Ramos et al., 2018).

Our study has several limitations. Firstly, as all participants had depressive symptoms, we ignore if we would observe similar results in a general sample of T1D with no symptoms or among participants presenting with different psychiatric symptoms. As argued elsewhere (Crespo-Ramos et al., 2018), future efforts should explore the psychosocial and health-related correlates of DRS among adolescents with anxiety symptoms, behavior problems, symptoms of eating disorders, or no symptoms at all. Second, our sample size was small, which precluded analyses of subgroups defined by socio-demographic variables such as sex, age, and T1D duration. However, we did compare groups in these and other variables (including the use of an insulin pump vs. injections) and found no significant differences. Third, as our study constituted a secondary analysis of the main research project not aimed to examine the correlates of DRS, we lacked a continuous measure of stigma designed for this population. Future studies should develop and use such type of measure, which would allow examining the degree of association among the dependent variables and the severity and frequency of DRS among Hispanic adolescents.

Despite these limitations, this study represents a valuable effort that may significantly contribute to gain a deeper understanding of the correlates of DRS among Hispanic adolescents living with T1D in Puerto Rico. Public health experts have warned about the need for an agenda to increase social awareness about chronic illness stigma in Puerto Rico (PRDH, 2016). In line with recommendations by Verloo et al. (2016), our findings suggest the need for large-scale and community-based education to prevent DRS. Researchers interested in this area could develop interventions to combat its emotional, behavioral, and health-related impact among

Hispanic adolescents, as well as the barriers it poses to comply with their physical and mental health treatment. As Warner and Hauser (2009) argued, community-based intervention efforts to increase awareness of chronic illnesses may help reduce stigma and increase the consideration of the needs of these adolescents and their families in policy-making.

Compliance with research ethics standards

Conflict of Interest: The authors have no conflict of interest to disclose.

Approval from the Institutional Review Board for Human Research: The Institutional Review Board at the University of Puerto Rico, Río Piedras Campus (Approval number 1112-005) and the Institutional Review Board of the UPR Medical Sciences Campus (Approval number A9530112) approved the protocol of the study.

Informed Consent: We obtained written informed consent/assent from participants and their primary caregivers.

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