

Article

Glycosylated Haemoglobin and Quality of Life: A Moderated-Mediation Model for Emotional Intelligence and Affect

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Abstract: Previous research has shown that higher glycosylated haemoglobin (HbA1c) levels are related to poorer quality of life. The objective was to analyse the moderating role of emotional intelligence (EI) in the relationship between HbA1c levels and quality of life through both positive (PA) and negative affect (NA) in individuals with Type 1 diabetes (T1D). A total of 72 participants with T1D (mean age = 41.10, SD = 10.73) were assessed on HbA1c. Psychological constructs were measured through the following questionnaires: MSCEIT (EI), PANAS (affect), and EsDQOL (quality of life). Higher levels of HbA1c and NA were related to a worse quality of life. In contrast, higher PA was related to a better quality of life. In addition, higher EI was associated with lower NA and worries about diabetes. In individuals with low EI scores, EI had a positive moderating effect on the relationship between HbA1c and NA. The moderated mediation analysis revealed a significant positive indirect effect of HbA1c on quality of life through NA moderated by EI for these individuals with low EI scores. This study shows how higher HbA1c levels have a negative impact on the quality of life of individuals with T1D and low EI levels by increasing their NA.

Keywords: type 1 diabetes; HbA1c; emotional intelligence; negative affect; quality of life



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1. Introduction

Type 1 diabetes (T1D) is a metabolic disorder characterized by deficient insulin production, the treatment of which requires daily administration of this hormone [1].

Medical professionals monitor the blood glucose levels of individuals with diabetes using the glycosylated haemoglobin (HbA1c) test, which reflects the average blood sugar level of the past 3 months. A higher HbA1c value indicates elevated blood sugar levels and, therefore, poorer disease management [2]. According to the guidelines of the American Diabetes Association (ADA) [3], individuals with T1D should aim to maintain a HbA1c < 7%.

T1D has been associated with various psychological problems, such as distress [4], anxiety [5], and depression [6]. In addition, micro and macrovascular complications associated with T1D substantially affect their quality of life [7]. Particularly important for this study is that previous works have shown that higher levels of HbA1c are related to a worse quality of life [8].

According to the World Health Organization (WHO) [9], quality of life refers to how an individual perceives their place in the world in relation to their culture, values, and norms, as well as their personal goals, expectations, and concerns. In a similar vein, but from a more clinical perspective, health-related quality of life (HRQOL) is a construct used to refer

to an individual's perceived physical, psychological-cognitive, and social functioning [10]. It is evident that T1D is associated with an impaired HRQOL [7], a relationship that is potentially bidirectional. Thus, while diabetes-associated problems influence HRQOL, the decline in HRQOL can negatively impact the self-management of the disease [11].

The interest of healthcare specialists in understanding the mechanisms and variables that influence the relationship between T1D, through HbA1c, and quality of life is reflected in the increasing number of studies on this topic. Two variables that have particularly attracted attention recently are affect and emotional intelligence (EI). Affect is usually negatively impacted in individuals with diabetes [12,13]. This construct has two broad dimensions: positive affect (PA) and negative affect (NA). PA refers to the level at which a person reports feeling excited, active, alert, or energized. In contrast, NA refers to the level at which a person reports feeling upset or unpleasantly aroused [14]. Affect can be understood as a state that is activated depending on each situation. Consequently, facing an unpleasant situation, such as higher levels of HbA1c, is more likely to trigger NA than a more enjoyable situation. Previous studies have demonstrated a relationship between HbA1c and affect in individuals with T1D. Specifically, poorer levels of this measure have been associated with higher NA, while more optimal levels have been associated with higher PA [12,13].

Consequently, this emotional state could impact other variables, such as satisfaction with life. In the general population, the literature shows that lower NA and higher PA are correlated with greater life satisfaction [15,16]. Previous studies have already established a connection between affect and quality of life in people with diabetes. In particular, PA has been linked to higher quality-of-life scores [13], while NA has been associated with lower scores [17].

Regarding EI, Mayer and Salovey (1997) [18] have defined this construct as “the ability to perceive accurately, appraise, and express emotion; the ability to access and generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and regulate emotions to promote emotional and intellectual growth” (p. 10). According to this definition, EI consists of four ordered branches: perceiving, facilitating, understanding, and managing emotions [18]. Researchers typically examine this construct using two primary forms of evaluation: self-report tests and ability- or performance-based tests [19]. Self-report tests involve presenting individuals with a series of brief statements, which they must rate on a graded scale to provide a subjective assessment of their emotional competencies. In contrast, performance tests offer a more objective measure of an individual's emotional abilities. These tests typically involve presenting individuals with emotional scenarios or problems and then comparing their responses with predefined scoring criteria.

EI, evaluated through self-reports and performance-based instruments, has been proposed as a protective factor in various life domains. For instance, this construct has been related to better physical and mental health [20,21], greater subjective well-being [22], and PA, as well as lower NA, in the general population [23]. In people with diabetes, EI has been linked to less diabetes-related distress [24] and, especially relevant for the purpose of the present study, better HbA1c [25]. This latter result was achieved using an EI self-report instrument [26] and a performance-based test evaluating only the first branch of EI, that is, perceiving emotions [27,28].

While the literature just described has studied the relationship between these variables separately, rather less is known about the interplay between them. Therefore, the question addressed in the present study is as follows: How do EI and affect influence the relationship between HbA1c and quality of life? The main aim of this study was to analyse the model in which EI moderates the relationship between HbA1c levels and quality of life via affect (both PA and NA) in people with T1D (Figure 1). Given the previous findings, we proposed the following objectives:

Objective 1. To evaluate the relationship between the different study variables (EI, HbA1c, PA, NA, and quality of life).

Hypothesis 1. We expected that EI and PA would show a positive relationship with quality of life while NA and HbA1c would be negatively related to this variable.

Hypothesis 2. We expected that HbA1c would show a negative relationship with EI and PA and a positive relationship with NA.

Hypothesis 3. We anticipated that EI would show a positive relationship with PA and a negative relationship with NA.

Objective 2. To explore the mediating role of affect in the relationship between HbA1c and quality of life.

Hypothesis 4. We expected PA and NA to mediate the relationship between HbA1c and quality of life.

Objective 3. To analyse the moderating role of EI in the indirect relationships between HbA1c and quality of life via affect.

Hypothesis 5. We expected EI to moderate the relationship between HbA1c and quality of life via affect.

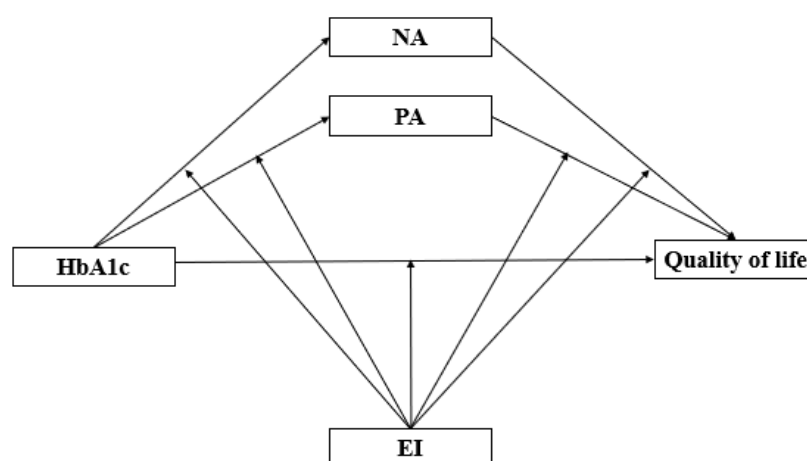


Figure 1. Representation of the moderated mediation model.

2. Methods

2.1. Participants and Procedure

The study sample comprised 72 volunteers recruited from the Diabetes Unit of the Endocrinology and Nutrition Service of the Regional University Hospital of Malaga. The age of the sample ranged between 18 and 63 years, with a mean of 41.10 years (SD = 10.73). Forty-four of the participants were men (61.11%). All volunteers accepted a written informed consent form after being informed of the details of the study, and they were always treated in accordance with the Helsinki Declaration [29]. The Provincial Research Ethics Committee of Malaga approved this study (Approval Number: 1603-N-16, Approval Date: 5 May 2017).

HbA1c levels were obtained from a blood test before the other instruments were administered. Participants completed the survey in written form with the help of a psychologist, taking approximately 50–60 min to complete the entire study. The questionnaires used are detailed below.

2.2. Measures

The Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) [30]. This questionnaire belongs to the performance-based ability models of EI and is designed for adults aged 17 years and older. It consists of 141 items that assess the four branches of EI according to the definition provided by Mayer and Salovey [18]: perceiving, facilitating, understanding, and managing emotions. In the present study, we used the Spanish version of the questionnaire [31], which shows adequate psychometric properties similar to the English version ($\alpha = 0.95$ for total score) [32]. In this research, we used the total MSCEIT score, where a higher score indicates a higher EI.

The Positive and Negative Affect Schedule (PANAS) [33]. This questionnaire is a 20-item self-report measure designed to assess both positive affect (PA, 10 items) and negative affect (NA, 10 items). Participants must rate, on a 5-point scale (1 “very little or nothing” to 5 “extremely”), the extent to which they generally feel a particular emotion. This study used the Spanish version of the questionnaire, which has shown good reliability (PA $\alpha = 0.89$, NA $\alpha = 0.91$) [34].

Diabetes Quality of Life (DQOL) [35]. In the present study, we employed the Spanish version of the scale (EsDQOL) [36], which consists of 43 items and provides a total score for the general quality of life. The questionnaire is divided into 4 subscales: life satisfaction, diabetes impact, social/vocational concerns, and diabetes-related worries. A higher score indicates a lower quality of life. The questionnaire showed adequate internal consistency ($\alpha = 0.90$).

Blood test. An objective assessment of glycaemic control was conducted using HbA1c. The HbA1c test was performed using a method certified by the NGSP (ngsp.org) and standardised according to the Diabetes Control and Complications Trial (DCCT) [37].

2.3. Data Analysis

All statistical analyses were conducted using the SPSS package (version 24.0; IBM, United States). First, descriptive statistics were calculated. Second, the relationship between age, sex, HbA1c, EI, affect, and quality of life was analysed using Pearson’s coefficients. Finally, we employed Model 59 of the PROCESS macro [38] to test the moderating effect of EI in the relationship between HbA1c and quality of life via affect. We performed five moderated mediation analyses, one for the total scale of the diabetes quality of life questionnaire and four for each of its subscales. The sex and age variables were controlled. The conditional indirect effects of bias-correlated and accelerated 95% confidence intervals (CIs) were obtained using a bootstrapping procedure with 1000 samples [38].

3. Results

Descriptive statistics and the results of bivariate correlation analyses among all study variables are shown in Table 1. HbA1c showed a significant positive correlation with the total quality of life score and all its subscales; that is, higher HbA1c was associated with a poorer quality of life. However, HbA1c was not significantly correlated with either PA or NA. EI was negatively correlated with NA and the worries about diabetes subscale of the diabetes quality of life questionnaire, but not with HbA1c. PA showed a significant negative correlation with the total quality of life score and the life satisfaction, impact, and worries about diabetes subscales. In addition, NA was positively correlated with the total quality of life score and all its subscales.

Finally, we decided not to conduct the mediation analyses corresponding to the second proposed objective since we did not find significant relationships between HbA1c and affect. Therefore, we directly detail the analyses of the moderated mediation below.

Table 1. Descriptive statistics and Pearson’s correlations among the study variables.

	Pearson’s R													
	Mean	SD	Min.	Max.	1	2	3	4	5	6	7	8	9	10
1. Sex	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Age	41.10	10.74	18	63	0.188	-	-	-	-	-	-	-	-	-
3. HbA1c	8.65	1.34	7.00	14.00	0.058	−0.178	-	-	-	-	-	-	-	-
4. Total MSCEIT	98.09	14.53	55.52	122.11	0.035	−0.077	0.049	-	-	-	-	-	-	-
5. PA	3.56	0.62	1.80	4.70	−0.030	−0.036	−0.032	0.102	-	-	-	-	-	-
6. NA	2.11	0.68	1.00	4.30	−0.033	−0.028	0.210	−0.361 **	−0.204	-	-	-	-	-
7. Total EsDQOL	91.26	23.13	49.00	164.00	−0.038	−0.021	0.370 **	−0.192	−0.299 *	0.470 **	-	-	-	-
8. Life satisfaction	35.79	9.60	15.00	62.00	0.023	0.070	0.310 **	−0.072	−0.378 **	0.308 **	0.880 **	-	-	-
9. Impact	33.61	9.34	17.00	59.00	−0.102	0.010	0.253 *	−0.184	−0.245 *	0.514 **	0.915 **	0.689 **	-	-
10. Social/Vocational concerns	12.58	5.05	7.00	31.00	−0.178	−0.304 **	0.491 **	−0.150	−0.043	0.367 **	0.755 **	0.523 **	0.625 **	-
11. Worries about diabetes	9.28	3.22	4.00	20.00	0.234 *	0.086	0.234 *	−0.398 **	−0.240 *	0.386 **	0.719 **	0.523 **	0.641 **	0.47 **

* $p < 0.05$ ** $p < 0.01$.

Moderated Mediation Effect Analyses on EsDQOL Scores

We determined the moderating effect of EI in the indirect effect of HbA1c on total quality of life via affect (Table 2). Following Model 1, the pathway between HbA1c and NA was moderated by EI ($\beta = -0.01$, $t = -2.15$, $p = 0.04$). We followed a pick-a-point approach to describe this moderating effect. Specifically, we explored the relationship between HbA1c and NA at three different levels of EI (low, medium, and high; Figure 2). For individuals with low EI scores, the relationship between HbA1c and NA was significant ($\beta = 0.26$, $SE = 0.09$, 95% $CI = [0.09, 0.43]$), while for medium and high levels, no significant effects were found (95% $CI = [-0.03, 0.20]$ and 95% $CI = [-0.24, 0.13]$, respectively). In addition, the Johnson–Neyman procedure revealed that 95.47 was the critical value below which the interaction was statistically significant ($t = 2.27$, $p = 0.027$).

Table 2. Testing the moderated mediation effect in the relationship between HbA1c and total quality of life.

Predictors	Model 1 (NA)		Model 2 (PA)		Model 3 (Total EsDQOL)	
	β	t	β	t	β	t
Sex	0.04	0.27	0.01	0.08	−0.11	−0.02
Age	0.0	−0.35	0.0	−0.37	0.02	0.10
HbA1c	0.10	1.77	−0.03	−0.48	4.69	2.47 *
MSCEIT	−0.02	−3.69 **	0.0	0.69	−0.11	−0.58
HbA1c $\times$ MSCEIT	−0.01	−2.15 *	−0.01	−1.1	−0.15	−0.89
NA					10.29	2.55 *
PA					−8.59	−2.15 *
NA $\times$ MSCEIT					−0.30	−1.01
PA $\times$ MSCEIT					−0.04	−0.14
R ²	0.24		0.03		0.37	
F	4.10 **		0.43		4.06 **	

* $p < 0.05$ ** $p < 0.01$.

Model 2 indicates that the moderating effect of EI in the relationship between HbA1c and PA was not significant ($\beta = -0.15$, $p > 0.05$). Regarding Model 3, the interaction effects of EI and HbA1c ($\beta = -0.15$, $p > 0.05$), NA ($\beta = -0.30$, $p > 0.05$) and PA ($\beta = -0.04$, $p > 0.05$) on total quality of life were not significant. Finally, the indirect effect of HbA1c on total quality of life via NA was moderated by EI for those individuals with lower MSCEIT scores ($\beta = 3.88$, $SE = 2.22$, 95% $CI = [0.17, 9.01]$).

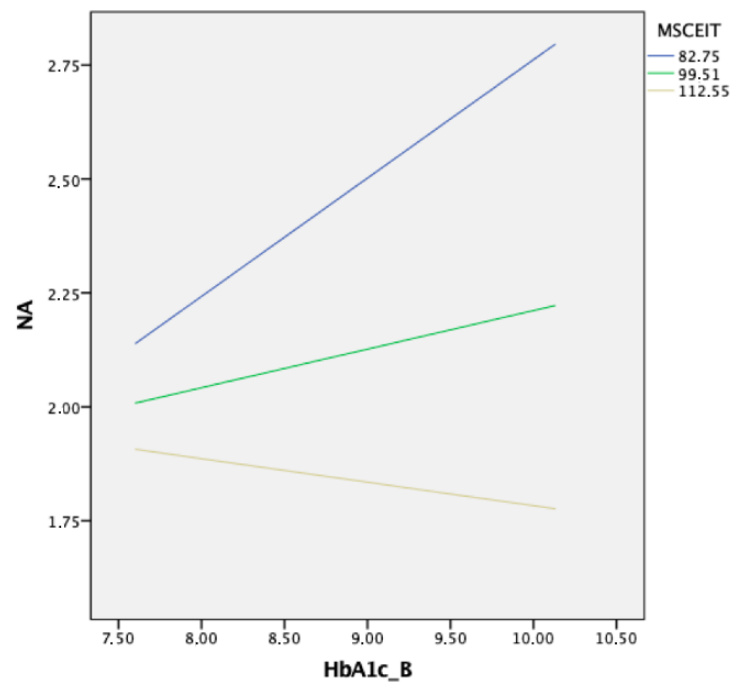


Figure 2. The moderating effect of HbA1c on NA by EI.

Additionally, we conducted moderated mediation analyses for each subscale of the diabetes quality of life questionnaire (life satisfaction, impact, social/vocational concerns, and worries about diabetes). We only describe the results of Model 3 of each analysis (Table 3) since we have already explained Models 1 and 2. We found significant moderated mediation effects for the impact and socio-vocational concerns subscales described below.

Table 3. Testing the moderated mediation effect in the relationship between HbA1c and EsDQOL subscales.

Predictors	Model 3 (Life Satisfaction)		Model 3 (Impact)		Model 3 (Social/Vocational Concerns)		Model 3 (Worries about Diabetes)	
	β	t	β	t	β	t	β	t
Sex	0.44	0.19	−1.00	−0.47	−1.17	−1.09	1.62	2.27 *
Age	0.10	0.96	0.04	0.41	−0.12	−2.35 *	0.0	0.05
HbA1c	1.83	2.21 *	0.89	1.15	1.50	3.78 **	0.47	1.78
MSCEIT	0.00	−0.05	−0.01	−0.16	−0.03	−0.66	−0.06	−2.58 *
HbA1c × MSCEIT	−0.08	−1.15	−0.06	−0.85	−0.01	−0.16	0.0	0.0
NA	2.14	1.21	5.54	3.36 **	1.65	1.96	0.95	1.71
PA	−5.68	−3.25 *	−2.62	−1.61	0.32	0.38	−0.60	−1.09
NA × MSCEIT	−0.04	−0.32	−0.16	−1.33	−0.07	−1.13	−0.03	−0.61
PA × MSCEIT	−0.08	−0.65	−0.07	−0.64	0.06	−0.96	0.06	1.53
R ²	0.30		0.36		0.42		0.38	
F	2.95 **		3.80 **		5.01 **		4.20 **	

* $p < 0.05$ ** $p < 0.01$.

The interaction effects between EI and HbA1c ($\beta = -0.06$, $p > 0.05$), NA ($\beta = -0.16$, $p > 0.05$), and PA ($\beta = -0.07$, $p > 0.05$) on the impact subscale were not significant. However, the indirect effect of HbA1c on the impact subscale via NA was moderated by EI for those individuals with lower MSCEIT scores ($\beta = 2.09$, $SE = 1.07$, 95% $CI = [0.31, 4.54]$).

On the other hand, the interaction effects between EI and HbA1c ($\beta = -0.01$, $p > 0.05$), NA ($\beta = -0.07$, $p > 0.05$), and PA ($\beta = 0.06$, $p > 0.05$) on the social/vocational concerns subscale were not significant. However, again, the indirect effect of HbA1c on the social/vocational concerns subscale via NA was moderated by EI for those individuals with lower MSCEIT scores ($\beta = 0.71$, $SE = 0.42$, 95% $CI = [0.01, 1.64]$).

4. Discussion

The previous literature has linked higher HbA1c levels with a poorer quality of life in people with diabetes. However, the mechanisms underlying this association remain unclear. Therefore, the present study aimed to analyse the role of EI and affect in this relationship. Specifically, we analysed the model in which EI moderates the relationship between HbA1c levels and quality of life through affect (PA and NA) in individuals with T1D. To this end, we proposed three specific objectives.

Our first objective was to explore the correlations among the target variables. Concerning HbA1c, correlational analyses revealed that higher levels of HbA1c were related to poorer quality of life. These findings are consistent with Hypothesis 1 and the results of a systematic review conducted by Pérez-Fernández et al. [8], which found that most studies reported a similar pattern of results. However, we did not find significant relationships between HbA1c and affect. This is contrary to Hypothesis 2 and the findings reported in previous studies with adolescents [12,13] in which they found that higher HbA1c was related to higher NA and lower PA. One possible explanation for the absence of a relationship between affect and HbA1c in our sample could be related to the methodology employed. Specifically, while Shapira et al. [12] assessed momentary affect as a direct response to blood glucose levels, the present study analysed the affect participants experienced in their daily lives. Thus, future investigations should include a more precise measurement of affect that is directly linked to diabetes management. This finding prevented us from addressing Objective 2, which aimed to assess the mediating role of affect in the relationship between HbA1c and quality of life.

Finally, we failed to find a significant correlation between EI and HbA1c. This contradicts Hypothesis 2 and the results obtained in the systematic review conducted by Pérez-Fernández et al. [25], in which several studies showed a negative association between these variables. These discrepancies may be due, in part, to the fact that of the three studies of the review employing an adult sample, two utilized a performance-based instrument that only evaluated the first branch of the EI model [27,28], while the other used a self-report questionnaire [26]. In contrast, our study evaluated the total EI score through a performance-based instrument. It is essential to consider the type of instrument used to assess EI, since previous research indicates that there are weak relationships between self-report and performance-based measures, which implies that they do not fully measure the same construct [19].

Concerning quality of life, the results supported Hypothesis 1 and were consistent with findings from previous studies [13,17]. Higher levels of this variable (worse quality of life) were related to higher NA and lower PA. However, only one part of Hypothesis 3 was supported. The results indicated that individuals with higher levels of EI showed lower NA, although this variable was not significantly related to PA. Concerning these findings, it is important to note that the few studies that have empirically addressed the beneficial effects of EI on the psychological well-being of people with diabetes have yielded promising results [39,40]. For instance, Yalcin et al. [40] demonstrated that EI training improved the quality of life in people with diabetes, and these improvements persisted over time.

Regarding the second objective and fourth hypothesis, as previously mentioned, we did not find a significant correlation between HbA1c and affect. Consequently, we decided not to conduct the mediation analysis between HbA1c and quality of life through affect and instead proceeded with the moderated mediation analysis.

Focusing on the third objective, we analysed the moderated mediation model between HbA1c and quality of life (Figure 1). The results revealed that low scores in EI positively moderated the relationship between HbA1c and NA, indicating that individuals with high levels of HbA1c and low levels of EI presented higher levels of NA. The critical value of EI at which the results were significant was 95.47. In other words, for those participants with this score or below, higher levels of HbA1c were related to higher levels of NA. This finding is consistent with the results reported by Shapira et al. [12], who found a positive relationship between NA and HbA1c. Likewise, EI appears to be a protective factor that eliminates the relationship between HbA1c and NA when the levels are moderate or high. This observation aligns with previous research demonstrating the protective role of EI in enhancing the psychological well-being of both the general population and individuals with diabetes [21,22,24].

Moreover, in line with part of Hypothesis 5, we observed a moderated mediation relationship between HbA1c and total quality of life through EI and NA. Specifically, we found that EI positively moderated the relationship between HbA1c and quality of life scores across various levels of NA (this was not the case for PA). This indicates that individuals with poor glycaemic control (higher HbA1c) and low EI showed greater NA, which, consequently, was related to a worse quality of life (higher EsDQOL scores). This is consistent with previous research demonstrating how NA is related to HbA1c and quality of life [12,17]. It is important to note that the latter relationship was only found in individuals with low EI scores. This finding provides an additional explanation for our failure to find a significant relationship between HbA1c and affect when EI was not considered. The moderated mediation analyses showed that, effectively, NA mediated the relationship between HbA1c and quality of life, but only when EI levels were low. This suggests that individuals with low EI may be more susceptible to experiencing a poor quality of life due to inadequate glucose levels, possibly because they have a reduced ability to regulate their NA. However, for individuals with moderate to high levels of EI, the mechanism underlying this relationship remains unclear.

Our analyses also revealed a moderated mediation effect for the impact and social/vocational concerns subscales of quality of life. These findings indicate that these scales seem more sensitive to an increase in NA for individuals low in EI. Thus, in those participants with low EI, elevated HbA1c is associated with increased NA, which, in turn, could lead to greater interference in various aspects of their lives, including diet, exercise, sexual health, and employment. Additionally, this may result in heightened personal and professional concerns related to their diabetes [36].

The results of the present study have practical and theoretical implications. Given the role of low EI in NA and, most importantly, in quality of life, future intervention programs could consider focusing on EI training, which could act as a protective variable in those people with T1D and low EI levels. EI training programs based on the ability to perceive, facilitate, understand, and manage emotions could help reduce NA and, in turn, improve the quality of life of people with T1D. Some studies have already shown that EI training in individuals with Type 2 diabetes can improve their quality of life [40], along with anxiety and HbA1c levels [39].

Despite the importance of our findings, the present study has certain limitations. First, the sample included only 72 participants, which makes it difficult to generalize the results to the wider population of people with T1D. Second, our study participants only included adults with T1D. Exploring the relationships found here in puberty could offer valuable insights. Thus, future research could consider developing EI programs in young people to potentially mitigate the impact of T1D on their quality of life as they enter adulthood. Third, it is worth noting that the HbA1c levels in our sample were high (7 or higher) according to the guidelines of the ADA [3]. Therefore, our sample primarily consisted of individuals with poorly controlled diabetes, with limited variability in HbA1c levels that could have potentially hindered our ability to detect associations between the target variables. Future investigations could aim to replicate these results with a more diverse

range of HbA1c levels, including participants with good metabolic control. Fourth, in our research, we only included affect as a mediating variable and found that this does not mediate the relationship between HbA1c and quality of life in people with medium or high EI levels. Thus, it would be interesting to investigate whether other psychological variables could be involved in this relationship and use momentary measures of affect connected to blood glucose measures. Finally, the relationships identified between the variables are not causal. Therefore, it is recommended that future investigations employ experimental or longitudinal designs to address these limitations.

This study suggests that HbA1c, NA, and EI could influence the quality of life of individuals with T1D, particularly those with low EI levels. The results demonstrate that higher HbA1c levels negatively affect the quality of life in individuals with T1D and low EI by increasing their NA. These findings could inform the development of intervention programs to improve the EI of people with diabetes. However, future studies are needed to replicate these findings and further explore the effects of EI on the relationships between HbA1c, affect, and quality of life.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and, approved by the Provincial Research Ethics Committee of Malaga (Approval Number: 1603-N-16, Approval Date: 5 May 2017).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The datasets generated during and/or analysed in the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare that the research was conducted without any commercial or financial relationships that could be construed as potential conflict of interest.

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