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Review

The Promising Role of Self-Compassion in Managing Type 1 Diabetes

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Abstract: Given the demanding daily regimen for type 1 diabetes (T1D) and emphasis on personal responsibility for self-management, people with T1D can experience self-criticism and diabetes distress. How an individual responds to and copes with diabetes-related feedback may influence self-care, health outcomes, and overall well-being. Self-compassion in the context of diabetes has limited but promising research on its ability to alleviate distress in people with T1D. This narrative review captures relevant, existing literature on self-compassion, compassion-based interventions, and T1D and describes four topic areas where diabetes-specific self-compassion and compassion-based interventions may be particularly relevant: (1) diabetes technology use; (2) relationship with eating and body image; (3) social interactions; and (4) healthcare interactions. Compassion-based interventions have the potential to enhance positive coping skills and to alleviate diabetes distress; more research is needed to understand the role of diabetes-specific self-compassion and to develop high-quality evidence-based interventions.

Keywords: type 1 diabetes; self-compassion; mindfulness; self-management; diabetes distress

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1. Introduction

Type 1 diabetes (T1D) is a chronic condition, the treatment for which requires burdensome self-care behaviors including frequent glucose checks, careful carbohydrate counting, and insulin administration, all with the goal of increasing time spent within a target glucose range (i.e., 70–180 mg/dL) and attempting to minimize the duration and severity of hyper- and hypoglycemia. Less than a quarter of adults with T1D meet the recommended glycemic target of having an HbA1c of less than 7% [1,2]; elevated HbA1c over time increases the risk of developing both short- and long-term complications.

The behavioral tasks and cognitive load of managing T1D are unrelenting. Many adults with T1D experience diabetes distress (DD), which can negatively affect glycemic outcomes [3–5]. Sources of DD, as measured by the validated Diabetes Distress Scale for Adults with Type 1 Diabetes (T1-DDS), include powerlessness; management distress; hypoglycemia distress; negative social perceptions; eating distress; physician distress; and friends/family distress [3]. More than half of adults with T1D will experience elevated DD in a 9-month period [4]. Distress related to managing diabetes may be associated with a sense of falling short of treatment goals, and along with this, a host of negative emotions including self-criticism, guilt, embarrassment, shame, and isolation [6–8]. If left untreated, DD may lead to diabetes burnout [9–11], characterized by exhaustion and detachment from self-management over time. DD and burnout are associated with less engagement in self-care, poorer glycemic outcomes, and increased prevalence of diabetes comorbidities, complications, hospitalizations, and emergency department visits [9,10,12,13].

Living with T1D necessitates receiving and acting upon copious amounts of feedback from multiple sources including continuous glucose monitors (CGM); glucose meters;

insulin administration devices (insulin pumps and smart pens); bodily responses to changes in glucose; lab results; recommendations from healthcare providers; and feedback from social relations (e.g., friends, family, classmates, and coworkers). This feedback has the potential to contribute to distress and may be viewed (by the person with T1D and/or by the healthcare team) as a judgment on themselves as individuals and on their ability to manage diabetes. Consider an individual whose glucose is currently above the recommended range. They may receive multiple alerts from their CGM and from their insulin administration device, and they may recall provider recommendations and consequences of "uncontrolled" diabetes, all while experiencing uncomfortable symptoms of hyperglycemia (e.g., nausea, fatigue, headache, polydipsia, and polyuria). How an individual responds (emotionally, cognitively, and behaviorally) to these experiences can influence their diabetes management behaviors and subsequent health outcomes.

Self-criticism that arises from diabetes management challenges may amplify distress and contribute to the development of diabetes burnout. In contrast, self-compassion presents a promising avenue for strengthening coping with daily diabetes challenges and building resilience. The general construct of self-compassion encompasses responding to perceived inadequacies and challenges with kindness and acknowledgment of one's own suffering [14,15]. When applied in the context of T1D, diabetes-specific self-compassion can introduce kindness toward oneself in the face of diabetes-specific challenges.

The general construct of self-compassion includes three main components that each have an opposing concept: mindfulness (versus over-identification); self-kindness (versus self-judgment); and common humanity (versus isolation) [16]. Mindfulness brings non-judgmental attention to the present moment where it is possible to acknowledge negative emotions rather than suppressing them or being overly consumed by them [14]. Self-kindness entails a gentle response to suffering and failure as opposed to self-judgment. With common humanity, a self-compassionate individual recognizes that personal inadequacy, mistakes, and suffering are all elements of a shared human experience rather than a unique and isolating struggle. These facets are measured using the Self-Compassion Scale (SCS), a validated self-report measure [16]. A diabetes-specific self-compassion measure has also been validated for adults with T1D and parents of youth with T1D [17,18].

Enhancing diabetes-specific self-compassion has the potential to alleviate DD and, in turn, improve diabetes management [19]. Figure 1 demonstrates an example of a diabetes management situation (hyperglycemia after eating a carbohydrate-dense meal) and a self-critical versus self-compassionate thought that may follow. Diabetes-specific self-compassion can encourage mindful acknowledgment of challenges that arise in living with diabetes; bring in self-kindness; and lessen feelings of isolation through acknowledging shared struggles experienced by others with T1D [17,18]. Compassion-based interventions for individuals with T1D may prove valuable in increasing engagement in self-care behaviors and improving glycemic outcomes (HbA1c and time-in-range), psychological wellbeing, and quality of life. Given the potential benefits of compassion-based interventions on mental health and on glycemic outcomes for individuals with T1D, the aims of this narrative review are twofold: (1) to summarize research to date on existing self-compassion interventions in the context of diabetes and (2) describe four examples of areas in which self-compassion can play a helpful role for those living with T1D. These areas, which were chosen based on potential clinical relevance, include (1) diabetes technology use; (2) relationship with eating and body image; (3) social interactions; and (4) healthcare interactions. These topics are not intended to be an exhaustive list; rather, we will discuss them as a starting point to contextualizing the potential benefit of introducing diabetes-specific self-compassion as it relates to each area. Further, it should be noted that DD and self-criticism are not unique to T1D; however, sources of distress and self-criticism may differ between T1D and type 2 diabetes (T2D). The objective of this review is to highlight the role of diabetes-specific self-compassion in a T1D context.

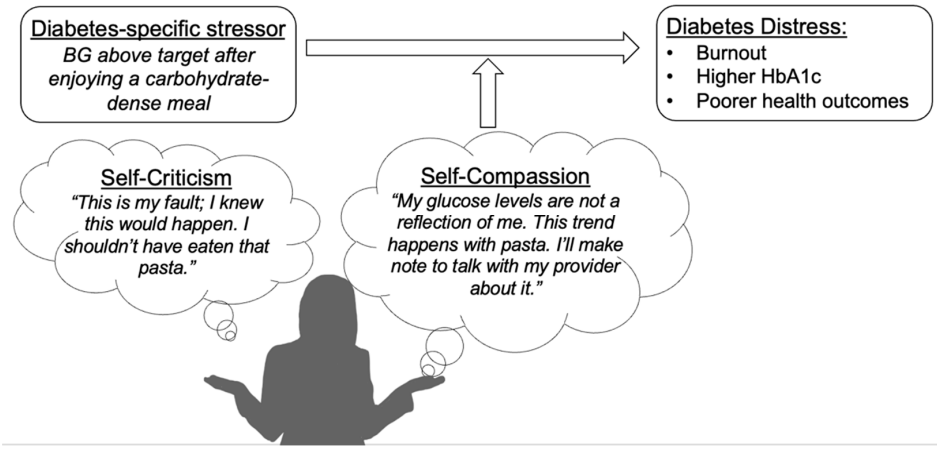

Figure 1. The potential role of diabetes-specific self-compassion, as opposed to self-criticism, that can contribute to diabetes distress.

2. Self-Compassion and T1D: A Review of Existing Literature

A small but growing body of evidence from cross-sectional and intervention studies has begun to demonstrate the beneficial role of self-compassion for people living with T1D. Table 1 summarizes key relevant studies described below and includes both cross-sectional and intervention studies. Not all included studies measured self-compassion as an outcome.

Table 1. Characteristics of studies reviewed.

Study	Participants	Study Design	Intervention	Control	Follow-Up	Outcome Measures	Results
Friis et al. [20]	n = 110; M_{age}, 47 ± 15; 65% female; Clinic T1D (n = 67) and T2D (n = 43)	Cross-sectional	n/a	n/a	n/a	Self-Compassion Scale (SCS); depression (PHQ9); and diabetes-specific distress (Diabetes Distress Scale-2)	Self-compassion buffered the effect of distress on HbA1C ($R^2\Delta$ = 11%, $p < 0.05$) and correlated with distress ($r = -0.58$, $p \leq 0.001$) and depression ($r = -0.57$, $p \leq 0.001$).
Ferrari et al. [21]	n = 310; M_{age}, 37 ± 15; 81.3% female; community members with T1D (65.5%), T2D (23.5%), and gestational diabetes (11%)	Cross-sectional	n/a	n/a	n/a	Self-Compassion Scale-Short Form (SCS-SF); self-management and health behaviors (Diabetes Self-Management Questionnaire); and psychological well-being (Well-Being Questionnaire)	Self-compassion significantly and independently predicted better well-being (r^2 = 55.1%) and physical activity (r^2 = 9.2%) as well as self-management (r^2 = 10.5%), A1C levels (r^2 = 5.1%), glucose management (r^2 = 1.9%), and health-care use (r^2 = 4.1%).
Ventura et al. [22]	n = 1907; M_{age}, 53 ± 14.94; 49.8% female; participants of the Australia MILES-2 study with T1D (n = 889) or T2D (n = 1018)	Cross-sectional	n/a	n/a	n/a	Self-Compassion Scale-Short Form (SCS-SF); healthy eating and physical activity (SDSCA subscales); self-reported hemoglobin A1c (HbA_{1c}); depressive symptoms (PHQ-8); anxiety symptoms (GAD-7); and diabetes distress (PAID)	In both adults with T1D and T2D, self-compassion was associated significantly and independently with all behavioral (diet [β = 0.21, $p < 0.001$], physical activity [β = 0.17, $p < 0.001$]), clinical (A1C levels in adults with T1D [β = −0.16, $p < 0.001$] and T2D [β = −0.13, $p < 0.05$]), and emotional (depression [β = −0.51, $p < 0.001$], anxiety [β = −0.53, $p < 0.001$], and diabetes-specific distress [β = −0.50, $p < 0.001$]) outcome variables.

Table 1. *Cont.*

Study	Participants	Study Design	Intervention	Control	Follow-Up	Outcome Measures	Results
Charzyńska et al. [23]	n = 112; M_{age}, 28.29 ± 7.6; 80.4% female; individuals with T1D	Cross-sectional	n/a	n/a	n/a	Self-Compassion Scale (SCS); Satisfaction with Life Scale (SWLS); diabetes duration; and HbA1c	HbA1c values exceeding the threshold of 7% were associated with lower self-compassion (b = −3.62; p = 0.049) and there was a significant indirect effect of diabetes duration on life satisfaction through self-coldness (b = 0.08, 95% CI [0.01, 0.16]).
Nagel et al. [24]	n = 423; M_{age}, 25.0 ± 3.2; 59.3% female; young adults (19–31 years) with T1D receiving outpatient care from a diabetes specialty clinic	Cross-sectional	n/a	n/a	n/a	HbA1c; dispositional mindfulness via the 12-item Cognitive and Affective Mindfulness Scale-Revised (CAMS-R); and adverse childhood experiences (ACEs)	Within the older age groups, those with high mindfulness had HbA_{1c} levels that were 8 mmol/mol [0.7%] lower (95% confidence interval, 2–13 mmol/mol [0.2–1.2%]) than counterparts with low mindfulness; this association was stronger in those with ≥1 ACEs.
van Son et al. [25]	n = 666; $M_{age,}$ 55 ± 14; 47% female; persons with diabetes (45% T1D; 55% T2D)	Cross-sectional	n/a	n/a	n/a	Mindfulness (Five Facet Mindfulness Questionnaire short form); emotional distress (Patient Health Questionnaire and Generalized Anxiety Disorder assessment); stressful life events and the presence of comorbidity; and demographic and clinical variables	Mindfulness explained an additional 26% of the variance in both anxiety and depression, after controlling for demographic and clinical variables) and adverse life events. Greater mindfulness was associated with lower emotional distress (depression and anxiety) in adults with either T1D or T2D. Correlations between the mindfulness subscales and anxiety/depression (median r = −0.30; range r = −0.19 to −0.52, all p's < 0.001), except for the observing facet which showed small negative correlations with depression and anxiety (r = −0.13, p < 0.01 and r = −0.08, p < 0.05, respectively).
Tak et al. [26]	n = 666; $M_{age,}$ 55 ± 14 years; 53% female; persons with diabetes (45% T1D; 55% T2D)	Cross-sectional	n/a	n/a	n/a	Eating behavior (Dutch Eating Behaviour Questionnaire); dispositional mindfulness (Five Facet Mindfulness Questionnaire-Short Form); depressive symptoms (PHQ-9); symptoms of anxiety (GAD-7); diabetes-specific distress (Problem Areas in Diabetes scale); and demographics and clinical variables	Increased levels in dispositional mindfulness were associated with eating behaviors that were more restrained (β = 0.10), less external (β = −0.11), and less emotional (β = −0.20).

Table 1. *Cont.*

Study	Participants	Study Design	Intervention	Control	Follow-Up	Outcome Measures	Results
Iina et al. [27]	n = 65; M_{age}, 13.51 ± 1.19 years; 63.1% female; adolescents with elevated HbA1c	Cross-sectional	n/a	n/a	n/a	HbA1c from chart review; Children and Adolescents Mindfulness Measure (CAMM); Diabetes Acceptance and Action Scale for Children and Adolescents (DAAS), depression (RBDI); and Health-Related Quality of Life Scale (KINDL-R)	Diabetes-related psychological flexibility associated with improved quality of life and mediated relationship between HbA1c and depressive symptoms (explained 86% of relationship); and between HbA1c and quality of life (explained 69% of relationship).
Friis et al. [19]	n = 63; M_{age}, 42.87 ± 14.30; 68% female; T1D and T2D	RCT	Mindful SC training (n = 32); 8-week; weekly 2.5-h, in-person; formal meditation + formal and informal practice to foster SC	Control (n = 31); received medical treatment per usual	3 month	Self-Compassion Scale (SCS); depression (PHQ-9); and diabetes-specific distress (17-item Diabetes Distress Scale)	SC intervention group demonstrated higher self-compassion, lower depression, and lower distress from baseline (T1) to T2 (all $p < 0.001$) and from T1 to T3 (all $p < 0.001$) when compared to the control group.
Karami et al. [28]	n = 20; M_{age}, 44.38 years (experimental) and 43.57 (control); T2D	Quasi-experimental	Self-compassion training over eight 90-min sessions (n = 10)	No intervention (n = 10)	1 month	Mean blood glucose values	Intervention group had significant change in mean blood glucose from pre- to post-test, with values reduced by 56.25 (T = −12.61 at $p < 0.05$).
Rafiee et al. [29]	n = 20; M_{age}, 43.47 ± 6.726; people with T2D referred to diabetes center	Quasi-experimental study	Self-compassion training, eight 90-min sessions, held twice weekly (n = 10)	No intervention (n = 10)	1 month	Miller Hope Scale	Mean values of the post-test and follow-up hope in the intervention group were greater than the control group.
Rafiee and Karami [30]	n = 20; M_{age}, 44.37 ± 6.726 (intervention) and 44.38± 5.521 (control)	Quasi-experimental study	Self-compassion training, eight 90-min sessions, held twice weekly (n =10)	No intervention (n = 10)	1 month	Depression Anxiety Stress Scales (DASS)	Self-compassion intervention group showed greater reduction in emotional distress as demonstrated by statistically significant differences in means between the post-test and follow-up for depression, anxiety, and stress in the treatment group compared to the control.
Ellis et al. [31]	n = 48; M_{age}, 18.20 ± 1.43; 50% female; community members, 16–20 years old, diagnosed with, and with poor metabolic control as defined by a current HbA1c ≥ 9% and ≤14%	Pilot randomized controlled trial	Intervention groups: (1) MSBR, (2) cognitive-behavioral stress management (CBSM), and (3) diabetes support group	n/a	3 month	Self-reported stress (Perceived Stress Scale); depressive symptoms (Center for Epidemiologic Studies Depression scale); diabetes management (diabetes management scale); and HbA1c	Mindfulness-based stress reduction was found to decrease self-reported stress at end of treatment (p = 0.03, d = −0.49) and 3-month follow-up (p = 0.01, d = −0.67). Diabetes support group participants showed improved glycemic control at the end of treatment (p = 0.01, d = −0.62) as well as reduced depressive symptoms at 3-month follow-up (p = 0.01, d = −0.71).

Table 1. *Cont.*

Study	Participants	Study Design	Intervention	Control	Follow-Up	Outcome Measures	Results
Ellis et al. [32]	n = 10; M_{age} 18.6 ± 1.2; 90% female; community members between 16 and 20 years old, diagnosed with T1D, and with poor metabolic control as defined by a current hemoglobin A1c (HbA1c) ≥9% and ≤14%	Mixed method approach	Modified version of MBSR developed for use with urban youth consisting of nine weekly, 90-min sessions	n/a	n/a	Stress (Diabetes Stress Questionnaire); regimen adherence (Diabetes Management Scale); HbA1c; and intervention satisfaction	Participant satisfaction with MBSR interventions was high according to both quantitative and qualitative data, and preliminary evidence demonstrated that MBSR reduced stress and improved blood glucose levels
Armani Kian et al. [33]	n = 30, M_{age}, 53.48; 90% female; patients with T2D from an outpatient clinic at Imam Hospital in Iran	RCT	8 sessions of MBSR	medical treatment as usual	3 month	Glycemic control (fasting blood sugar and HbA1c); overall mental health (General Health Questionnaire); depression (Hamilton Depression Rating Scale (HDRS); and anxiety (Hamilton Anxiety Rating Scale (HARS)	Compared to control group, MBSR intervention group demonstrated significant reduction on all measured outcomes including fasting blood sugar, HbA1c, HARS, and HDRS scores (p's < 0.05).
Shukla et al. [34]	n = 32; M_{age}, 23.8 ± 6.6; 53.1% female; people with T1D	RCT	Mindful meditation (MM) education with skilled coach; 20 min daily practice; weekly phone calls and monthly in-person visits	n/a	n/a	Diabetes Distress Scale (DDS)	Improvement in mean blood glucose level observed in control group (222.4 ± 77.8 versus 182.6 ± 52; p = 0.007) and intervention group (215.3 ± 50.1 versus 193.2 ± 31.8; p = 0.008); significant reduction in DDS in the intervention group (1.6 ± 0.3 versus 1.3 ± 0.3; p = 0.003); and no DDS change in the control group.
Merwin et al. [35]	n = 21; older adolescents (≥17) and adults with T1D with clinically significant eating disorder (ED) symptoms	Acceptability and feasibility pilot study	Young adults with T1D who met criteria for an eating disorder completed 12 sessions of ACT	n/a	n/a	Height/weight; HbA1c; Eating Disorder Examination (EDE); diabetes eating problems survey; diabetes self-management questionnaire; Diabetes Distress Scale (DDS); and Patient-Reported Outcomes Measurement Information System (PROMIS)	Participants reported an increase in psychological flexibility with diabetes-related thoughts/feelings. Large effects were noted for change in ED symptoms, diabetes self-management, and diabetes distress from baseline to completion (Cohen's d = 0.90–1.79). HbA_{1c} decreased, not statistically significant (p = 0.08).
Davoudi et al. [36]	n = 40; M_{age}, 58.6 ± 9.32 (intervention) and 56.03 ± 9.7 (control); 52.5% female; people living with diabetes with pain admitted to hospital	RCT	eight 90-min weekly sessions of Acceptance and Commitment Therapy	eight 90-min weekly sessions of psychoeducation	3 month	Depression (Beck Depression Inventory); and sleep quality (Pittsburg Sleep Quality Index)	Intervention group demonstrated improved depressive symptoms (F = 6.81, p < 0.05) and improved sleep compared to control.

Note: HbA1c, glycated hemoglobin; M_{age}, mean age; n/a, not available; RCT, randomized controlled trial; T1D, type 1 diabetes; T2D, type 2 diabetes.

A review of studies of self-compassion and diabetes showed that many self-compassion studies in the context of diabetes have involved a mixed sample of participants with T1D and T2D or have focused on T2D exclusively [37]; this review also found greater general self-compassion was linked to decreased negative affect, greater well-being, improved glycemic outcomes, and greater self-management engagement. Another recent review examining self-compassion research across multiple chronic conditions found similar relationships between enhanced self-compassion and mental and physical health benefits [38]. Cross-sectional studies with adults with diabetes (majority T1D) have found that higher levels of general self-compassion were associated with lower DD, greater psychological well-being and life satisfaction, greater engagement in diabetes management, and improved medical outcomes [20,21,23].

The Second Diabetes MILES-Australia (MILES-2) study, which included 889 adults (18–75 years old) with T1D in its total sample of 1907 participants with diabetes, found greater self-compassion to be linked with lower levels of DD, depression, and anxiety; increased self-management; and lower HbA1c [22]. MILES-2 results also demonstrated that general self-compassion was significantly lower in participants experiencing severe DD [22]. Notably, MILES-2 participants with T1D endorsed significantly lower levels of general self-compassion compared with study participants with T2D. Due to the small magnitude of difference in self-compassion and lack of corroborating evidence from other studies, authors recommended interpreting this finding with caution. More research is needed to understand differences in levels of self-compassion by diabetes type. If confirmed that individuals with T1D have lower levels of self-compassion than those with T2D, this would suggest a need for intervention development specifically tailored to foster self-compassion in adults with T1D. The aforementioned studies assess general self-compassion rather than diabetes-specific self-compassion; thus, less is known about the potential overlap between these two constructs and whether enhancing general self-compassion also increases diabetes-specific self-compassion. An adapted measure of diabetes-specific self-compassion has shown preliminary evidence that greater levels of self-compassion are linked to lower DD and lower HbA1c [17,18,39].

Studies in T1D that examined relationships between health outcomes and mindfulness alone, rather than the full construct of self-compassion, have found mixed results. One cross-sectional study found greater mindfulness in young adults with T1D was linked to lower HbA1c but only in the older age group of young adults; this relationship was stronger in those with history of at least one adverse childhood events [24]. Further, cross-sectional data from the Diabetes MILES study in the Netherlands found greater mindfulness to be associated with lower emotional distress (depression and anxiety) in adults with either T1D or T2D [25] and with healthier, more mindful eating [26]. Another cross-sectional study of adolescents with T1D in Finland showed a similar relationship between mindfulness and lower emotional distress [27].

There are limited studies that evaluate the impact of compassion-based interventions on adults with T1D. In one study, which included a mixed sample of 73% adults with T1D and the remainder with T2D, a randomized controlled trial of an 8-week Mindful Self-Compassion (MSC) program [40,41] demonstrated clinically meaningful improvements for the intervention group immediately post-intervention and again at a 3-month follow-up: decreased depressive symptoms, decreased DD, and lower HbA1c [19]. In a T2D small intervention study, an 8-week group-based self-compassion program led to lower mean blood glucose in the intervention group [28] as well as increased hope, decreased symptoms of anxiety and depression, and improved sleep [29,30]. Similar to cross-sectional studies, most existing intervention studies deliver a general compassion-based intervention rather than one aimed at enhancing diabetes-specific self-compassion.

Other intervention studies have aimed to enhance aspects of self-compassion (e.g., mindfulness) in individuals with T1D using existing evidence-based intervention protocols, while not explicitly aiming to enhance self-compassion overall. Such existing interventions include Mindfulness-Based Stress Reduction (MBSR) and Acceptance and Commitment Therapy (ACT). A review identified a small number of intervention studies that aimed to enhance mindfulness in individuals with T1D [42]. MBSR, emphasizes developing a nonjudgmental approach to being aware of the present moment through exercises such as mindfulness meditations; practice observing the present moment mindfully; learning to respond to stressful situations with mindfulness; and incorporating small mindfulness practices into daily life [31]. A study of an MBSR program delivered in a community sample (non-diabetes) found increases in self-compassion following participation [43]. In T1D, a small (n = 10) MBSR pilot group intervention with older adolescents and young adults with T1D showed preliminary evidence of improvement in DD and glucose levels [32]. MBSR has been found to have glycemic benefits for adults with T2D [33,44]. However, a follow-up pilot RCT comparing an MBSR group with other conditions found that participants in the

MBSR group endorsed decreases in distress, while participants in a separate diabetes peer group condition displayed improvements in HbA1c [31]. Finally, a small (n = 32) RCT conducted in India introduced a brief mindfulness meditation exercise to adults with T1D and found improvements in mean glucose level and DD in the intervention group at the 6-month follow-up [34].

ACT emphasizes adjusting how someone responds to and tolerates distressing thoughts and emotions, aiming to promote behaviors that align with someone's values, and encouraging a flexible and compassionate approach toward oneself [35]. Limited existing studies of ACT with individuals with T1D have demonstrated preliminary benefits for HbA1c, anxiety, depression, sleep, and psychological flexibility [35,36,45]. These studies did not assess general or diabetes-specific self-compassion, so it is unknown whether ACT's benefits are also associated with increases in self-compassion. Further, as both MBSR and ACT encompass multiple components, it is unknown whether or to what extent mindfulness, self-kindness, or common humanity become enhanced through participation in these interventions and whether enhancing those areas would be a key driver of other emotional or health benefits.

In sum, current evidence is limited but suggests that interventions including a compassion-based component have the potential to improve both the mental and physical health of individuals with T1D. However, the number of existing interventions that aim to enhance self-compassion in individuals with T1D remains limited, and to our knowledge, none have aimed to enhance diabetes-specific self-compassion specifically.

3. Relevant Areas for Introducing Diabetes-Specific Self-Compassion

Below, we describe how self-compassion may be relevant in four distinct areas of a person's life with T1D: (1) diabetes technology use; (2) body image and the relationship with food/eating; (3) social interactions; and (4) healthcare interactions. These areas were selected based on their likely clinical relevance and opportunity for future research and intervention development. From the perspective of the Social Ecological Model [46], which identifies factors that can influence someone's health and wellbeing at multiple levels—individual, interpersonal, community, and societal—the first two topics discussed (diabetes device use and body image) fall into the individual level, while the second two topics (social interactions and healthcare interactions) involve the relevance of self-compassion and compassion-based approaches within the interpersonal level.

3.1. Diabetes Device Use

Continuous glucose monitoring (CGM) devices can contribute to significant improvements in T1D management. CGM use is now recommended for most individuals with T1D [47]. This technology provides copious diabetes-related feedback in the form of glucose readings every 5 min in addition to alerts and alarms about high and low glucose levels. Increased information allows more real-time decision making which can prevent hypoglycemia and increase time-in-range. Although deemed useful for treatment decisions and reassurance, many CGM users describe the constant influx of information as stressful and overwhelming [48]. Receiving and responding to continuous glucose data may elicit negative feelings including self-criticism, guilt, powerlessness, and self-blame. These feelings may compound with other sources of DD, magnifying the burden of diabetes management and contributing to burnout. Even low levels of DD can negatively affect glycemic outcomes. Burnout may manifest as suboptimal CGM use (e.g., decreased wear time and muting alarms) or disengagement from self-management behaviors (e.g., not administering insulin in context of high glucose alerts).

CGM devices provide frequent glucose updates and notifications, depending on alert settings and glucose ranges. The constant flow of information, particularly when numbers are out-of-range, can generate feelings of guilt, frustration, and self-blame [6]. Repeated alarms serve as an unrelenting reminder, further exacerbating a negative emotional response. Mental and emotional reactions to glucose values can then influence

self-management behaviors that may result in overcompensating with treatments and dramatic shifts out of range in the opposite direction. For example, someone who receives a "high glucose" alert may take an accurate corrective insulin dose, then receive another high alert 15 min later that glucose remains high, prompting an additional corrective dose even though the insulin activation period from the first dose has barely begun. This phenomenon, known as insulin stacking, occurs when additional rapid-acting insulin is administered while previous doses are still active in the body; insulin stacking is a known cause of hypoglycemia [49]. In a similar sense, a CGM user may observe their glucose rapidly trending down, which may induce anxiety and fear of hypoglycemia [50], resulting in overconsumption of carbohydrates and subsequent hyperglycemia.

Interventions promoting diabetes-specific self-compassion have the potential to mitigate the psychological burden and emotional reactions to CGM use which, in turn, may maximize benefits for overall diabetes management. Because CGM use has only become increasingly widespread in the past 5–10 years, there is limited research to date that aims to provide support for those adopting and learning to use CGM in a way that is not only effective for diabetes management but also does not add significant emotional burden. Existing CGM education interventions have not included a component that addresses the emotional distress that may arise from adopting a new device or from learning to interact with large quantities of glucose data and frequent alerts [51]. A pilot study of a four-session multicomponent behavioral intervention delivered one-on-one to CGM-using adults with T1D and covering main user-related barriers that device users face related to wearing and trusting devices, responding to data, and using devices in social settings, found clinically significant decreases in DD post-intervention [52] indicating the potential need for increased support in this area. However, this study did not assess diabetes-specific self-compassion or aim to enhance it. Little is known about interventions that aim to enhance diabetes-specific self-compassion while directly targeting the experience of CGM use, indicating a valuable direction for future research.

3.2. Body Image and the Relationship with Food/Eating

Optimal management of T1D includes focused attention to meal planning, food portions, food composition, and carbohydrate counting. While these behaviors are important for accurate insulin dosing, some have observed that this heightened attention to carbohydrate intake necessary for diabetes management has the potential to increase risk of disordered eating behavior [53,54]. Thus, providers may have a difficult time detecting eating disorders and disordered eating within the attention to food intake that is required for optimal diabetes management [55,56]. One study identified the estimated prevalence of disordered eating behavior in adolescents with T1DM is 50% in females and 18% in males; of note, the true prevalence is likely higher, particularly in males, given the under-identification of disordered eating behavior and eating disorders in this population [57,58]. Disordered eating in T1D may manifest in several ways including restrictive behaviors of limiting calorie or carbohydrate intake to avoid insulin usage; or compensatory behaviors to lose or maintain weight including laxative use, self-induced vomiting, insulin restriction, and/or excessive exercising.

A main predictor for the development of disordered eating behavior in both the general population and individuals with T1DM is body-image dissatisfaction [59–61]. Likewise, a higher body mass index (BMI) and higher HbA1c have also been linked to disordered eating behaviors [62]. In general, people with T1D weigh more than their counterparts without T1D [60], which is often attributed to weight gain from insulin therapy. Many T1D individuals express frustration trying to balance the management of both weight and glucose levels, with some stating they feel like weight gain is inevitable, exacerbating the sense of powerlessness in living with diabetes [61]. Along with disrupting views of food and body-image concerns, living with T1D and challenges conducting recommended self-care behaviors can produce feelings of failure, self-blame, and self-criticism [19,59].

Although there is limited work specifically investigating relationships between general or diabetes-specific self-compassion and eating disturbances in the context of T1D, recent works in the general population have demonstrated that self-criticism is positively associated with disordered eating and dysfunctional body image behaviors, while a higher level of general self-compassion is linked to decreased body image dissatisfaction and lower rates of disordered eating behavior [63]. Recent work has already identified general self-compassion as a promising, feasible, and acceptable therapeutic approach for treating comorbid disordered eating behavior in adolescents with T1D [64]. Further, incorporating mindfulness—in the form of mindful eating—has been shown to be beneficial for people living with diabetes [26,65]. Thus, self-compassion may serve as a conceptual match to combat this self-criticism. Given the value of self-compassion interventions for individuals with eating disorders and the risk of disordered eating behavior in people with T1D, compassion-based interventions have the potential to restore a balanced relationship with food without compromising diabetes care.

3.3. Social Interactions

The impact of social relationships on diabetes management and DD is complex. Social situations may be a driver of DD due to concerns about being judged by others; receiving unwanted attention around diabetes; and perceived lack of understanding by others. Managing T1D involves engaging in management tasks such as monitoring blood glucose, injecting insulin, wearing visible medical devices on the body (continuous glucose monitoring and insulin pumps), treating hypoglycemia, and other tasks that may be visible to others and may draw unwanted attention to the person with T1D. Worries about being judged by others, about appearing different than others, and about drawing attention from others may lead to increased anxiety and may negatively impact diabetes management. Particularly during adolescence, individuals with T1D have endorsed higher levels of social anxiety when compared with same-age individuals without T1D [66,67]. Experiencing T1D-related social anxiety and worries about potential judgment from others may increase reluctance to perform diabetes management tasks in front of others, which in turn may add burden and barriers to working toward optimal glycemic outcomes [68–72]. In a qualitative study, young adults with T1D identified aspects of social contexts and relationships that could be overwhelming and unhelpful including social context barriers (e.g., trying to fit diabetes management into the schedules of others) and the lack of understanding and T1D-specific knowledge in others [73].

The same qualitative study also identified aspects of social relationships that can be supportive for young adults with T1D. These included giving reminders, instrumental support, and acceptance/emotional support [73]. Being able to advocate for oneself in social contexts; being able to educate others about diabetes; and being able to harness social support are important skills for navigating T1D in social contexts [73–77]. Introducing a compassionate lens may be valuable while building these skills. General self-compassion has been linked with less social anxiety [78] and may enable someone to prioritize their diabetes self-care as an act of self-kindness, with mindful awareness of current challenges, and a sense that they are not alone in their struggles (common humanity).

Promoting diabetes-specific self-compassion may serve to alleviate DD in the context of social situations for individuals with T1D. One possible pathway to developing diabetes-specific self-compassion may be through group-based interventions with peers with T1D. Enhancing connections with peers with T1D has been shown to have both emotional and glycemic benefits for youth and adults [79–84]. However, the evidence on the benefits of peer support groups is somewhat mixed [85,86]. While not aiming explicitly to enhance diabetes-specific self-compassion, peer support groups can directly convey a greater sense that one is not alone in their experiences and challenges in living with T1D—core to developing a sense of common humanity. More research is needed in group-based settings with interventions that aim to increase diabetes-specific self-compassion to understand whether a group or individual format is more effective, and whether certain formats are

more effective based on the individual. More recently, research on the value of virtual peer support, including through shared virtual clinic appointments as well as the use of social media, has highlighted increasing avenues for building common humanity between individuals in different geographic locations [87,88]. Finally, the increasing presence of social media (e.g., via the diabetes online community) may be a second potential source of cultivating common humanity by increasing access to and visibility of the stories of others with T1D [89–92]. The relationship between engagement with diabetes-specific social media and self-compassion is not yet known, however. Whether diabetes-specific self-compassion may be enhanced through participation in social media or a digital intervention is an area worthy of further investigation.

3.4. Healthcare Interactions

Healthcare appointments can be a source of stress for many individuals with and without chronic diseases. As noted previously, living with T1D necessitates receiving frequent diabetes-related feedback from not only one's own body and individual management tools (CGM, glucose meter, and insulin pumps/pens) but also from one's healthcare providers and lab results. Feedback from providers can be a source of distress and may be received as a personal judgment. Physician-related distress, a component of DD, has been shown to be strongly associated with HbA1c, even more so than depressive symptoms [93,94]. Physician-related distress includes the perception that one's doctor is not fully educated about diabetes, may not provide clear direction on management, may not comprehend the full emotional impact of diabetes, and/or does not take the person's concerns seriously [3]. Thus, the relationship between a person with T1D and their provider may be perceived as a source of distress and has the potential to set the tone for an individual's overall attitude toward their condition.

Research has demonstrated that individuals with diabetes benefit from better provider communication. Two key components of patient-centered care are (1) compassionate care and (2) shared decision-making [95]. Compassionate listening and high-quality patient-centered communication can foster a collaborative provider relationship and increase engagement in clinic visits [96–100]. In young adults with T1D, one study applied user-centered design to integrate shared decision-making into the health record system and facilitate improved patient–provider communication [101]. Collaborative goal setting is recommended in healthcare interactions with people with diabetes; a qualitative study developed a conceptual model of collaborative goal setting and one key aspect of this model was a "caring relationship" in which patients perceived their clinicians to be "compassionate and sensitive to patient needs" [102].

However, it is unknown whether visits with a clinician who is perceived to be compassionate have the capability of enhancing a person's own self-compassion. One cross-sectional study found that greater self-compassion was linked to greater engagement in healthcare use for adults with diabetes [21]; however, this study did not investigate provider-specific variables or the nature of the patient–provider relationship. Future research could explore whether the positive impact of a compassionate, patient-centered clinical interaction could extend beyond the visit to model and increase patient diabetes-specific self-compassion. Interventions geared toward enhancing compassion and mindfulness among health care professionals have been found not only to reduce clinician burnout and stress but also to contribute to improvements in patient treatment outcomes and patient-centered care [103,104]. Relationships between increased provider self-compassion and decreased burnout have also been found in cross-sectional studies [105,106]. Specifically, the Self-Compassion for Healthcare Communities program, an adapted 6-week version of the MSC program tailored to healthcare providers and without a meditation component, has been shown to increase provider self-compassion and reduce burnout [107]. More research is needed into possible pathways for increasing compassionate healthcare interactions, including interventions to support clinicians as well as their patients.

Provider use of language represents another opportunity to introduce compassion-based approaches to patient–provider communication. Discussions of HbA1c and other glycemic indicators of diabetes management, a routine component of the evaluation of diabetes management, carry the risk of being perceived as evaluative or judgmental. Using appropriate person-centered, nonjudgmental language for communicating with people with diabetes (as urged by a position statement by Diabetes Australia) can serve to decrease DD among numerous other benefits [108]. For example, replacing "good/bad" wording and judgmental labels (e.g., "non-adherent"; "non-compliant"; and "poor control") with less value-laden words can have a powerful effect on many aspects of a person's life with diabetes, and is likely an important aspect of developing a compassionate provider relationship.

If a person is experiencing self-criticism, judgment, embarrassment and/or hopelessness, that may arise around their diabetes management, they may be less likely to disclose to their provider about what has been working and what has been challenging. Particularly when modeled by one's healthcare team, diabetes-specific self-compassion may counter self-criticism and foster an environment of open communication during clinical encounters. If someone is expecting to be met with compassionate understanding rather than judgment, they may be more likely to communicate honestly and to disclose difficult subjects. Interventions designed to facilitate diabetes-specific self-compassion skills may result in individuals feeling better equipped to handle difficult interactions with clinicians and choose compassionate language despite the use of value-laden speech by others. By promoting a compassionate perspective in diabetes care from as early as the point of diagnosis, providers have the opportunity to encourage separation between morality (good/bad) and glycemic outcomes, which as a result, may promote resilience during challenging times.

4. Discussion

Self-compassion is a construct that is becoming increasingly recognized as associated with positive coping, resilience, and improvements in health outcomes. In this review, we aimed to characterize the relevance of diabetes-specific self-compassion, and its three facets of mindfulness, self-kindness, and common humanity, within the context of living with T1D. We then aimed to describe the research in this area to date and highlight the specific relevance of diabetes-specific self-compassion in several topic areas that have an impact on the daily life of people with T1D: interactions with healthcare providers; social relationships; interactions with diabetes technology; and relationships with eating and body image. These topic areas overlap somewhat in their content with several subscales of the T1-DDS (physician distress, eating distress, and friend/family distress). In each area discussed, we aimed to describe relevant sources of distress and opportunities for the potential benefit of introducing diabetes-specific self-compassion as an intervention.

Self-compassion has been linked to improved health outcomes across various chronic physical health conditions, including diabetes [109]. To date, few studies have been conducted that explicitly aimed to enhance self-compassion among individuals with T1D and evaluated outcomes, and fewer have assessed diabetes-specific self-compassion. Existing studies have suggested that self-compassion may contribute to both physical and emotional benefits. More research is needed to understand the role and potential benefit of diabetes-specific self-compassion in the discussed topic areas and to develop interventions that incorporate compassion-based approaches to healthcare delivery and build diabetes-specific self-compassion practices among individuals living with T1D which may have promise in aiding with adjusting to using new diabetes devices; with preventing the development of disordered eating; and/or with building skills for managing diabetes and advocating for ones diabetes-related needs in social contexts.

The topic areas described in this review are intended as starting points for further inquiry and understanding of the role that compassion-based approaches may play. They are suggestions to open the door for further inquiry and further development of the construct of diabetes-specific self-compassion. We hope that this review has highlighted the

multifaceted construct of self-compassion as it relates to living with T1D while highlighting relevant research and areas where more research is needed. While the focus of this review was on T1D management, findings from this review and related investigations may prove applicable to the management of other chronic illnesses, including T2D. Future works may identify additional aspects of living with T1D that could benefit from compassion-based interventions. Two such examples are one's relationship with their T1D diagnosis and the experience of managing and living with complications from T1D, and their associated impacts on overall diabetes management, DD, engagement with one's healthcare team, and other impacts. Greater acceptance of T1D has been associated with better quality of life and lower HbA1c [110,111]. Further, the extent to which someone incorporates T1D into their identity has been linked to similar positive health and quality of life outcomes [112,113]. Future research should explore the relationships between illness acceptance, illness identity, and diabetes-specific self-compassion to understand whether greater acceptance is linked to greater compassion. Individuals experiencing complications may fear judgment from their healthcare team and may experience shame and self-criticism, which may contribute to overall coping as well as delays in seeking treatment and routine screenings [114]. Studies have found that the experience of neuropathy contributes to greater levels of distress, depression, and diminished quality of life [115,116]. In a piece in the journal PLAID: People Living with And Inspired by Diabetes, writers Chris Aldred and Renza Scibilia advocate for increased open, nonjudgmental communication about complications and state: "If people felt comfortable sharing stories about complications, it would reduce feelings of isolation. Because few people write or speak about living with diabetes complications, many believe they are the only ones going through the experience and don't know where to turn" [114]. To our knowledge, no studies exist that evaluate the relationship between self-compassion (general or diabetes-specific) and the presence of complications, or that aim to apply compassion-based approaches specifically among those experiencing complications.

The proposed benefits of diabetes-specific self-compassion are not without limitations. First, the intent of this review was to focus on the relevance of compassion in the context of T1D; more work is also needed to continue to enhance compassion-based approaches within T2D. Second, while this review's sole focus is on self-compassion, it is important to note that this construct does not exist in isolation. Rather, more research is needed to understand how self-compassion interacts with other constructs relevant to the experience of DD, such as social support, fear of hypoglycemia, quality of relationships with healthcare providers, and others. Third, the focus of self-compassion, and on individual and interpersonal levels of the Social Ecological Model [46], may imply that one's ability to manage diabetes and associated distress is up to each individual and their coping skills, and may risk deprioritizing other important contextual factors and social determinants of health in community and societal levels that can play significant roles in one's self-management and coping. Specifically, it is critical for people living with T1D to have continuous access to basic needs including medication, insurance coverage, food, housing, and other resources [117]. Self-compassion interventions on their own will not address these needs but may still provide a useful set of coping tools in the face of these challenges. In considering the design of interventions to enhance diabetes-specific self-compassion, it would be critical to take these factors into account.

Finally, self-compassion interventions may be limited by an individual's interest in and dedication to the development of diabetes-specific self-compassion skills. Studies of the general population have demonstrated that some individuals resist the concept of self-compassion generally, often due to equating self-compassion with being self-centered or selfish, and due to beliefs that being self-compassionate means being unmotivated, performing poorly, and demonstrating a lack of conscientiousness [14,118,119]. These beliefs about self-compassion among the general population are potential barriers to willingness to explore the concept further and would be important myths to dispel in the context of a diabetes-specific self-compassion interventions for people with T1D. For example, someone with T1D may believe that their diabetes management will suffer if they are not hard on

themselves about out-of-range glucose levels. From a self-compassionate lens, it is possible to motivate oneself with compassion and to decouple engagement in self-care behaviors from self-criticism.

Given the limited existing literature on diabetes-specific self-compassion interventions in T1D, it is not fully understood what the optimal form(s) such an intervention could take. As noted above, group-based interventions may have added benefits for enhancing common humanity in addition to the other two facets of self-compassion. However, there may be other advantages of individual formats. Similarly, it will be important for future research to investigate whether online compassion interventions are as effective as in-person programs; given the proliferation of virtual care delivery, the ability to deliver compassion-based programs virtually may expand access. Mobile apps geared toward enhancing self-compassion have shown promise in adolescents and young adults without T1D [120–122] but this avenue has not yet been explored in the T1D context. It will be valuable to investigate the effect of varying durations of compassion interventions (e.g., a single session versus a multi-week program). A 3-week brief self-compassion program was developed as a shortened, more easily accessible version of a full 8-week Mindful Self-Compassion (MSC) program and demonstrated positive results for a sample of female college students [123]. Developing brief diabetes-specific self-compassion protocols tailored for individuals with T1D, that could potentially be integrated into routine clinical care, may be worthwhile. In addition to exploring the formal delivery of self-compassion interventions with people with T1D, it may be valuable to explore other avenues for enhancing compassion-based care delivery, whether through language providers use in clinical interactions, through applying a lens of compassion to the design of diabetes technology, or other avenues. As Dr. Kristin Neff, the psychologist who operationalized the construct of self-compassion and co-created MSC, noted in a recent review, rather than lead to weakness or complacency, self-compassion can contribute to greater strength, resilience, and motivation for pursuing one's health goals [124]. In Dr. Neff's words, "When people care about themselves, they will care for themselves, and this leads to greater health" [124]. It is worthwhile to explore efforts to enhance diabetes-specific self-compassion as a pathway to supporting diabetes management and reducing distress in people living with T1D.

5. Conclusions

In sum, the construct of self-compassion has growing evidence of utility and value in the context of living with T1D and represents a series of potential avenues for future investigation. Opportunities exist to incorporate compassion-based approaches into clinical care; to support the development of diabetes-specific self-compassion skills among those living with T1D; and to explore the possible benefits for the emotional and physical sides of living with T1D.

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