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Narrative Review

A scoping review exploring the role of the dietitian in the identification and management of eating disorders and disordered eating in adolescents and adults with type 1 diabetes mellitus

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SUMMARY

Background: Eating disorder diagnoses and disordered eating behaviours are more prevalent in people living with Type 1 Diabetes Mellitus, in particular in adolescents. The role of the dietitian in this setting is not clearly outlined in the literature.

Aim: This scoping review aims to outline the available information for the role of the dietitian in identifying and managing eating disorders in adolescents and adults with co-occurring Type 1 Diabetes Mellitus (T1DM) in a clinical setting.

Methods: The Johanna Briggs Institute was utilised to guide this scoping review and to develop a search strategy for relevant databases. Relevant organisations and societies websites and professional magazines were reviewed as part of the grey literature search.

Results: 38 peer reviewed journal articles, 5 professional articles, 5 book chapters and 11 clinical guidelines were included in this scoping review. Roles for the dietitian in identification, prevention and screening for eating disorders in Type 1 Diabetes Mellitus were identified and outlined in a visual workflow. The role of the dietitian in the management of eating disorder in both the outpatient/community and inpatient setting and as core member of the multidisciplinary team was detailed in the literature.

Conclusion: This scoping review mapped the available information in the current literature on the role of the dietitian in the identification and management of eating disorders and disordered eating in adolescents and adults with a dual diagnosis of T1DM. The reviewed literature suggests there is a strong reliance on expert opinion and practice to inform the role of the dietitian. Further research is required in order to ensure more robust evidence-based practice in this area.

1. Introduction

Type 1 Diabetes Mellitus (T1DM) is characterised by chronic immune-mediated destruction of pancreatic β-cells that leads to insulin deficiency [1]. In 2022, there were 8.75 million people living with T1DM globally [2]. In Ireland, the reported childhood incidence was 27.1/100,000/year [3].

The literature suggests eating disorders (ED) may be twice as common in people living with a T1DM diagnosis [4]. While there is a general consensus that ED and disordered eating are over-represented in populations with T1DM, the prevalence reported varies from 1 % in pre-adolescence, up to 30%–39 % in the adolescence and adults living with T1DM population [4,5]. There is reported increased prevalence of disordered eating behaviours in

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females with T1DM compared to males with T1DM (37.9 % vs 15.9 %) [87]. This varying prevalence could be due to variations in study design or participants characteristics (for example, gender and age) and the lack of diagnostic consistency (e.g. over-representation in non-diabetes specific screening) [6].

A number of significant complications present in the context of co-occurring T1DM and ED. Insulin restriction, as a purging behaviour unique to T1DM, is associated with a tripling of mortality risk [7]. A recent review highlighted that women are more likely to use insulin omission as a weight loss tool [8]. Other signs, symptoms and red flags are detailed elsewhere [13,14]. A dual diagnosis of T1DM and ED/disordered eating can lead to increased rate of both short-term (such as keto-acidosis and impaired awareness of hypoglycaemia) and irreversible long term diabetes related complications (such as retinopathy, neuropathy, heart conditions and nephropathy) [9,10]. Cerebral oedema is also recognised as a dangerous complication of hyperglycaemia [8]. A recent population-based cohort study of adolescents and young people with T1DM and ED highlighted a threefold increased risk of diabetic ketoacidosis (DKA) and six-fold increased risk of death compared with those without ED [11].

The complexities of recognising and managing a dual diagnosis of T1DM and eating disorder as well as the importance of cross-working between diabetes and mental health services are highlighted by a recent qualitative research exploring health care professionals experience [12]. The literature suggests that a shared-care model between the diabetes and mental health service is best practice [13]. In recent publications from the UK and Australia, dietitians are recognised as key members of the multidisciplinary team in management of T1DM and disordered eating [13,14].

The role of the dietitian is well defined in the management of eating disorders [15,16]. The role of the dietitian is also well defined in the management of T1DM [17–19], however there are no defined role of the dietitian in the recognition and management of a dual presentation. As far as may be ascertained within the scope of this paper, there currently exists no specific systematic review or scoping review for the role of the dietitian in this area. For the purpose of this scoping review, the terminology disordered eating and ED will be used to refer to the range of sub-clinical to clinical presentations for T1DM.'

The aim of this scoping review is to map out the information available for the role of the dietitian **(Concept)** in recognising and managing ED and disordered eating in adolescents and adults with T1DM **(Population)** in a clinical setting **(Context)**. The objective of this scoping review is to systematically search relevant databases for research evidence and grey literature on the role of the dietitian and to map out the evidence available on how dietitians can best support this patient group in the cycle of care. The final objective of this review is to highlight any identified gaps in the available research.

2. Materials and methods

A scoping review was undertaken. A scoping review is a systematic approach to identifying and mapping out the breadth of available evidence in an area [20]. The proposed scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) Methodology for scoping reviews [21].

2.1. Eligibility criteria

Table 1 outlines the inclusion and exclusion criteria. The search strategy for the databases was conducted to include articles from 1997 to 2022 and in the English language only. The rationale for this timeframe was based on a recent review of the research in this field over the past 25 years [6]. While the definition for EDs changed in 2013 for DSM-V [22], there is relevant research for this scoping review in area of disordered eating/subclinical ED (see Table 2).

2.2. Information sources

Databases were searched on 11/11/2022, including CINAHL, Complete, Medline, PsycInfo and Cochrane Review. Key medically endorsed societal webpages (listed below) were searched for relevant clinical guidelines on T1DM and/or ED. The reference lists of all included sources of evidence were manually screened for any additional studies for potential inclusion.

2.3. Search strategy

A three step search strategy was conducted in line with JBI [21]. A preliminary search was carried out on Medline and CINAHL. This initial search identified key words in use in this area and index terms for each database. Using the agreed keywords and index terms, a second search was carried out on databases CINAHL, Complete, Medline, PsycInfo and Cochrane Review. To complete the search, the reference list from key identified articles and guidelines were reviewed and any relevant sources were searched and screened. The search strategy is found in Supplementary material I (Table 7).

The key professional societies websites in the areas of ED and/or T1DM were hand searched to source the most up to date guidelines. Guidelines International Network [23] was also searched. Records were identified from the National Institute for Health and Care

Table 1
Eligibility criteria based on PCC (population/concept/context) framework [21].

	Inclusion	Exclusion
Population	- Adolescents and Adults - Diagnosed with T1DM - With diagnosed ED (based on DSM V definition) or disordered eating behaviour - Any gender	- Younger than 12 years old - Not diagnosed with T1DM - Diagnosed with Type 2 Diabetes/Gestational Diabetes or other - Other co-morbid mental health conditions
Concept	- Role of dietitian or person providing medical nutrition therapy (includes nutritionist or other professional)	- Medical/nursing/psychology/psychiatrist/other profession role
Context	- Any clinical setting (e.g., Inpatient and outpatient setting)	- School setting
Type of Studies	- Systematic and narrative reviews - Randomised control trials (RCT) - Observational studies (case- control, cohort, cross sectional) - Clinical guidelines - Professional magazines articles - Professional Books	- Case study - Case series - Abstracts only - Journal letters - Briefs/shorts/summaries in Journals - Pre-prints - Articles for patients

Table 2
Level of evidence, abridged from JBI Levels of Evidence [36].

Level of Evidence	Type of Study Designs	Included Relevant Study Designs
Level 1	Experimental Designs	- Systematic review of RCTs - RCT
Level 2	Quasi-experimental Designs	- Systematic review of quasi-experimental and other lower study designs - Quasi-experimental prospectively controlled study
Level 3	Observational (Analytic)	- Systematic review of cohort and other lower study designs - Cohort study with control group - Case control study - Observational study without a control group
Level 4	Observational (Descriptive)	- Systematic review of descriptive studies - Cross-sectional study - Case series/study
Level 5	Expert Opinion and Bench Research Level	- Systematic review of expert opinion - Expert consensus - Bench research/single expert opinion

Excellence (NICE) [24–26], the Scottish Intercollegiate Guidelines Network (SIGN) [27], the Royal College of Psychiatrists [13], American Academy of Nutrition and Dietetics [28], Australia and New Zealand Academy for Eating Disorders [16,29], National Health Service [30], British Dietetic Association (BDA) [15,18], International Society for Paediatric and Adolescent Diabetes (ISPAD) [19,31], American Diabetes Association (ADA) [32,33], Diabetes UK [34] and Queensland Health [14].

2.4. Screening process

For the database search, all identified citations were collected and uploaded into Endnote Online (Clarivate Analytics, PA, USA). Source selection against eligibility criteria was performed by the first and second authors. Any disagreements were discussed to reach agreement and consensus. Duplicates were firstly removed using automation and then completed by hand. All citations were screened by title initially. Then, all remaining citations were screened by abstract using the eligibility criteria. All remaining citations were retrieved in full and screened against the eligibility criteria and against relevance to the research question. The results of the search and the study inclusion process is presented in the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram (see Fig. 1) [35].

2.5. Data charting process

Data was extracted from papers included in the scoping review using a data extraction table. This table was developed based on the

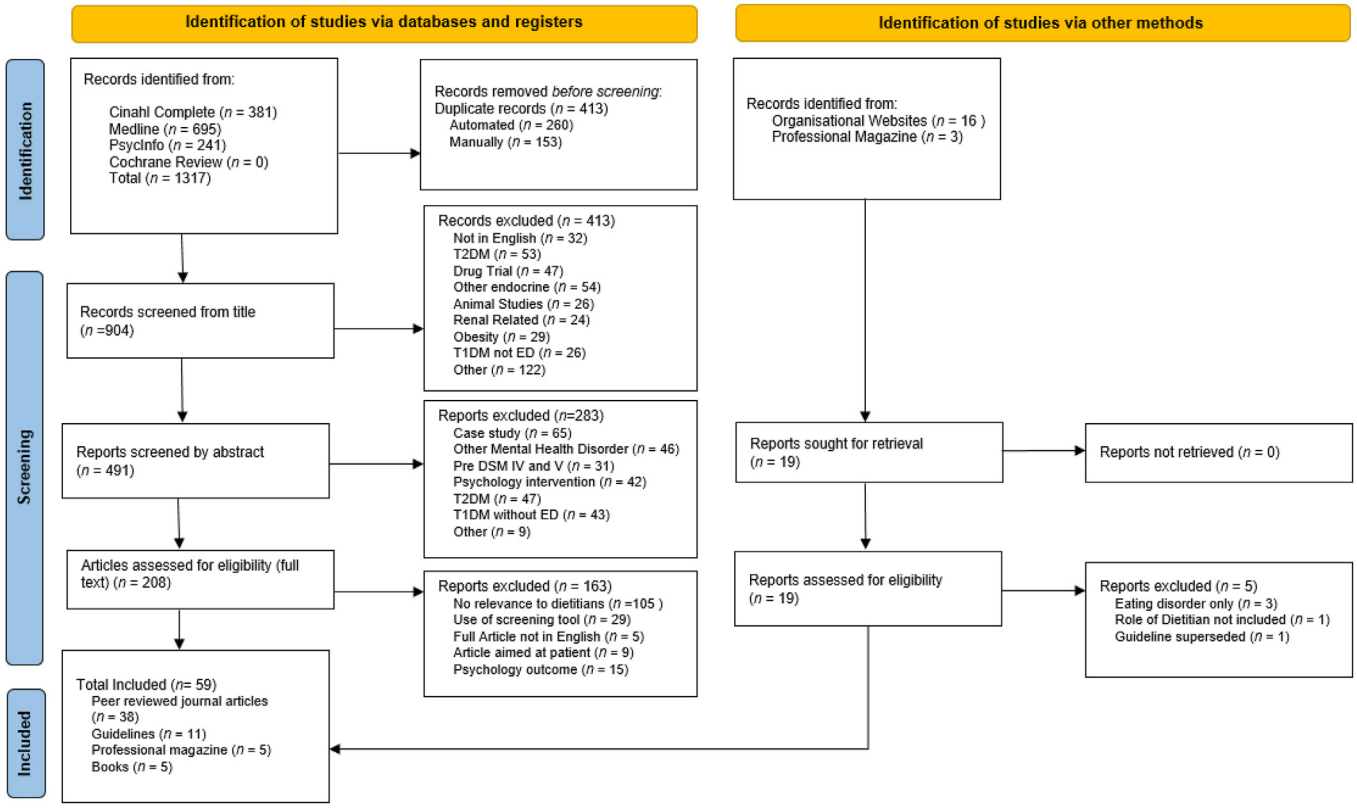

Fig. 1. PRISMA flow chart for scoping review.

template provided by JBI [21]. In line with JBI, critical appraisal of individual sources of evidence was not required for this scoping review [20].

2.6. Type and level of evidence

For the identified peer-reviewed journal articles, where applicable, each study was categorised to a level of evidence based on JBI Levels of Evidence [36].

3. Results

A search of the literature (databases and grey literature) yielded a total of 1331 records. For the database search, 826 records were excluded based on title ($n = 413$) and duplicates ($n = 413$), resulting in 491 abstracts being screened for relevance. From this abstract screen, a total of 208 records were identified for full text review. Overall, 59 records were included in the scoping review. Further details are outlined in the PRISMA flow chart (Fig. 1). The articles were categorised as clinical guidelines ($n = 11$), peer reviewed articles ($n = 38$), professional magazines articles ($n = 5$) and book chapters ($n = 5$).

3.1. Data charting

Data charting tables for professional magazine articles (Table 3) and book chapters (Table 4) are found below. There are summary data charting tables for peer-reviewed journal articles (Table 5) and clinical guidelines (Table 6). Detailed results tables for clinical guidelines (Table 8) and peer-reviewed journal articles (Table 9) are available under Supplementary material II and III.

3.2. Quality assessment

38 peer reviewed journal articles were included in this scoping review. 6 of the studies included were based on a qualitative study design and 1 was a study protocol for an RCT. Based on the JBI Level of Evidence [36], it was found that 22 studies were Level 5 Evidence (Expert Opinion) (Fig. 2).

3.3. Summary of focus areas

Six focus areas were identified in the scoping review (Figs. 3 and 4). The key findings are discussed based on these focus areas.

3.4. Area I: prevention

There is evidence to support the role of the dietitian in preventing eating disorders and disordered eating behaviours. The approach to nutrition for patients with newly diagnosed T1DM should be flexible and focus on a whole diet approach for the family [19]. A recently published clinical guideline from Australia highlighted that the principles of 'healthful eating' should be adopted by all health care professionals (HCP) in T1DM and to consider a 'weight neutral' approach [14]. An 18 month family-based behavioural nutrition intervention did not impact disordered eating

Table 3
Data charting table for articles from professional magazines.

Author/Year	Country	Context	Key findings	Focus Area
Turner, 2020 [37]	USA	Article based on interview with dietitians	- Dietitian should be aware of clinical and behavioural signs of ED and disordered eating. - Dietitian should ask open-ended questions, listen carefully and provide information but also affirmations. Dietitian should ensure not to assume feelings, and refer to mental health professional if person struggling to cope. - Dietitian should avoid stigmatising language and use person-first language. - Dietitian should not use 'scare tactics' to encourage certain behaviours. - A strong working relationship with a parent and family can be equally important as ED expertise.	Screening KAP
Today's Dietitian 2015 [38]	USA	Article based on Diabetes educators conference presentation (including one dietitian)	- A treatment team should include both a diabetes educator and an ED specialist. - Diabetes educator should be aware of signs and symptoms for ED.	Screening MDT
Pigott and Gallimore, 2022 [39]	UK	Article written by two dietitians	- SEREN diabetes education programme introduces concepts of mindful eating and building healthy relationship with food at diagnosis. - Considerations for future dietetic practice include considering the impact of regular weighing for young people with T1DM. - Early screening and intervention are important for positive outcomes.	Prevention Screening
Dada, 2012 [40]	USA	Article based on interview with dietitians	- Dietitian is an important member of MDT. - Creation of a contract with patient that includes recommended carbohydrate and insulin doses can be considered as part of dietetic care. - A good working knowledge of both diabetes and EDs is recommended. - Motivational interviewing and cognitive behavioural therapy can be strategies to consider for patients with ED. - The role of the dietitian as an educator for patient education is highlighted.	OP KAP
Mathieu et al., 2008 [41]	USA	Article based on interview with dietitians	- Dietitian should be educated on EDs in all forms, including in T1DM. - Dietitian should understand the biological, behavioural and emotional aspects to inform practice. - Dietitian is encouraged to embrace a MDT approach. - Main goal of eating component is to regulate and normalise the eating pattern and dietitian need to ensure they are not reinforcing the depravation mind-set.	KAP OP

Abbreviations: ED: eating disorder, KAP: knowledge, attitudes and practices, MDT: multidisciplinary team, OP: outpatient.

Table 4
Data charting table for book chapters.

Author/Year	Country	Key findings	Focus area
Costin et al., 2017 [42]	USA	- Outlines common pump insulin manipulations e.g. entering an incorrect and reduced amount of carbohydrate at meal into pump in order to administer less insulin, 'riding the basal' (only administering background insulin and not inputting carbohydrate intake), techniques to impair insulin absorption (e.g. heat or light exposure). - It is recommended that all clinicians and educators continually assess for signs of an ED and outline possible risk factors including dietary restraint due to management of blood glucose and learning to eat based on external cues and warning signs. - Recommend MDT approach to include a registered dietitian with experience and training in both the treatment of T1DM and ED for any level of care. Inpatient recommendations: - Dietitian should monitor carbohydrate counts. - Advises all staff to be understanding but firm about weight gain for patients. Be aware of possible insulin manipulation and prepare the client for weight gain associated with reinsulinization and insulin oedema. - General principles for managing patient with T1DM and ED that could be applicable to dietitian: structure and monitoring, educate on diabetic exchanges rather than grams of carbohydrate.	OP IP KAP
Dayte and Jaser, 2020 [43]	USA	- Outlines important points to consider when starting treatment including: being treated by MDT including a dietitian, patient should be made aware that weight and hypoglycaemia may occur when restarting insulin, and that the diabetes team should set realistic starting glycaemic goals.	OP IP MDT
Francisco, 2022 [44]	Switzerland	- Dietitian not mentioned specifically. - All needs, including adherence to insulin administration and normalisation of eating behaviours, should be met during treatment and recovery. - MDT (members not specifically outlined) and joint work between diabetes and mental health teams are needed. - Using a motivational interview with emphasis on affirmations and avoiding conflict are useful when treating patients with T1DM and ED. - Screening using screening tool such as DEPS-R, which takes less than 10 min to perform.	OP MDT KAP
Goebel-Fabbri, 2020 [45]	Switzerland	- Health Care Professionals working with adolescent with T1DM should be alert to pattern that might indicate disordered eating behaviours. It has been advocated for early and routine screening for ED risk (e.g. DEP-S, mSCOFF, or Screen for Early Eating Disorder Signs in Persons with T1D (SEEDS)). Mental health professional should do further screening and evaluation. - Based on clinical practice, MDT approach should be standard of care, including a nutritionist with ED and/or diabetes training, - Once medically stable, treatment should include monthly OP appointments with the nutritionist. - Intensive glycaemia management of diabetes is not an appropriate early treatment goals and if reduced quickly, can lead to treatment-induced complication. - Agree small but clinically meaningful gaols with patient and team - Pre-empt issue such as weight gain associated with improved glucose control, insulin oedema and appropriate hypoglycaemia management	OP Screening MDT
Singer et al., 2018 [46]	UK	- NICE recommends structured education courses like DAFNE however no clear evidence as intervention for ED- likely one to one support recommended initially. - The most effective and compassionate diabetic clinicians use principles of motivation interviewing. - Nutrition management is vital part of both management of T1DM and of ED. - Dietitian should adapt the usual ED approach for the individual with T1DM. ED dietitian should liaise with T1DM dietitian on individual treatment. - Establishing regular eating using varied meal plan is key for recovery for all patient with ED, including those with T1DM - Basic dietetic assessment the same as without T1DM (includes list of suitable questions to ask), then dietitian can assess patient knowledge of T1DM, use of question from DEPS-R. - Then the dietitian develops an eating plan. If patient is underweight, not eating or at high medical risk, an nasogastric feeding plan will be developed, usually based on fibre feed, combined with appropriate insulin regimen. As treatment progress, the patient may transition to oral diet, with or without supplementary nasogastric feeding. Vitamins and mineral are prescribed as per ED guidance. - When oral plan started, the goal is to support the patient to meet nutritional needs and to maintain blood glucose levels as close to agreed goals as possible. - Later in treatment, the dietitian and patient can decide on the effectiveness of carbohydrate counting. - Dietitian will need to provide education about food, weight and diabetes education, challenging food rules and beliefs. - The chapter outline similarities, difference and compromises for education patient with ED and T1DM. For example, reading food labels and weighing foods for carbohydrate counting. - The chapter discusses importance of MDT work and communication between ED and T1DM team.	IP OP KAP

Abbreviations: KAP: knowledge, attitudes and practices, MDT: multidisciplinary team, ED: eating disorder, OP: outpatient, IP: inpatient, DEPS-R: diabetes eating problem survey revised, DAFNE: Dose Adjustment For Normal Eating, mSCOFF: modified SCOFF.[1]

behaviour [52]. A feasibility study for an online prevention program, facilitated by a dietitian and other HCP, for young females with T1DM, found it was associated with reductions with ED risk factors and symptoms (e.g. body dissatisfaction and diabetes specific ED psychopathology) [80]. In a study protocol, diabetes dietitians were involved in a co-design of a future psycho-education program for prevention of development of disordered eating [62].

3.5. Area II: screening

Highlighted across a wide range of clinical guidelines was the important role of the dietitian in being alert for potential red flags

[1] The SCOFF questions: Do you make yourself **S**ick because you feel uncomfortably full? Do you worry you have lost **C**ontrol over how much you eat? Have you recently lost more than **O**ne stone in a 3 month period? Do you believe yourself to be **F**at when others say you are too thin? Would you say that **F**ood dominates your life?

Table 5
Data charting table (summary) for peer-reviewed journal article.

Author/Year	Country	Type of Study	Summary of key findings	Level of Evidence	Focus area
Alloway et al., 2001 [47]	Canada	RCT	- A registered dietitian with experience in diabetes and ED provided the six week program on psychoeducation for women with T1DM and subclinical disordered eating.	1	OP
Bermudez et al., 2009 [48]	USA	Narrative Review (based on practice and research)	- Role of dietitian in management inpatient setting, highlight possible challenges and inpatient dietetic goals.	5	IP
Brewster et al., 2020 [5]	UK	Cross-sectional	- Dietitian in HCP survey. - Dietitians reported similar levels of confidence ('very confident' or 'fairly confident') in recognising disordered eating behaviours and T1DM compared to specialist diabetes nurses however lower confidence compared to diabetes specialty doctor and psychiatrists.	4	KAP MDT
Cainer, 2022 [10]	UK	Narrative Review	- Dietitian as HCP should be aware of risk factors. - Dietetic assessment and education as part of MDT. - Highlighted refeeding risk should be managed by dietitian.	5	Screening OP MDT
Candler et al., 2018 [49]	UK	Narrative Review (based on practice and research)	- Dietetic approach: be flexible, intuitive and non-restrictive. - Consideration in dietetic care in OPD. - MDT goal setting approach.	5	KAP MDT
Chelvanayagam and James, 2018 [50]	UK	Narrative review	- Dietitian to screen for risk and consider use of screening tool. - Dietitian as member of MDT.	5	Screening MDT
Clery et al., 2017 [51]	UK	Systematic Review	- Dietitian role in OPD psychoeducation intervention for women. - MDT approach as inpatient.	1	IP OP
Colman et al., 2018 [52]	USA	RCT	- Family-based behavioural nutrition intervention had no adverse effect on disordered eating behaviour.	1	Prevention
Dickens et al., 2015 [53]	USA	Quasi intervention	- Role of dietitian in MDT residential treatment, weekly meeting with dietitian and used intuitive eating as part of MDT approach.	2	Inpatient KAP
Gallagher et al., 2019 [54]	USA	Narrative Review	- Dietitian to be aware of possible risk of carbohydrate restrictive diets for disordered eating.	5	KAP
Goddard and Oxlad, 2022 [55]	USA	Qualitative research and guideline	- Developed 'clinical guidelines flow chart for managing appropriate insulin use among patients with T1DM' for all healthcare staff based on patient and HCP perspective.	NA	KAP OP MDT Screening
Goebel- Fabbri, 2009 [56]	USA	Narrative Review (research and expertise)	- Dietitian in OPD approach, non-restrictive approach, monthly reviews. - Importance of screening. - Need for MDT approach.	5	OP KAP MDT Screening
Goebel- Fabbri et al., 2009 [57]	USA	Narrative review, research and clinical practice	- Dietitian as part of MDT. - MDT approach. - Dietitian in OPD.	5	OP MDT KAP Screening
Gottesman and Parker, 2015 [58]	USA	Narrative Review	- Dietitian role in screening and observing signs and signals. - Individualised Dietetic plan on OP.	5	Screening OP MDT
Hanlan et al., 2013 [59]	USA	Narrative Review	- Dietitian involved in identifying risk factors and misuse of technology. - Consideration for dietetic assessments in OP. - MDT approach involving dietitian.	5	Screening MDT
Hart, Pursey and Smart, 2021 [60]	Australia	Narrative Review	- Dietitian knowledge about risks associated with low carbohydrate diets in ED and T1DM.	5	OP KAP
Hart et al., 2005 [61]	Australia	Narrative Review (research and expertise)	- Practical outline of the role of the dietitian in a specialist in-patient unit.	5	IP MDT KAP
Jones et al., 2022 [62]	UK	Study feasibility protocol for an RCT	- Dietitian stakeholder in co-design of psycho-education intervention for prevention of development of disordered eating.	NA	Prevention KAP
Kelly et al., 2005 [63]	USA	Narrative Review	- Dietitian as key member of MDT. - Goals for dietetic assessment nutritional counselling at different treatment stages. - All HCP have role in early detection.	5	MDT OP
Larrañaga et al., 2011 [64]	Spain	Narrative Review	- Importance of dietitian in MDT approach. - Approaches for nutrition therapy in OP.	5	MDT OP
MacDonald et al., 2018 [65]	UK	Qualitative Study	- Two Dietitians provided perspective on role in managing T1DM and ED.	NA	KAP MDT
McCarvill et al., 2012 [66]	Canada	Narrative Review	- Consideration for dietetic physical focused assessment in T1DM and ED.	5	OP KAP
Merwin et al., 2018 [67]	USA	Ecological Momentary Study	- Dietitian role in assessing insulin restriction and timing in day.	3	KAP OP
Oldham–Cooper and Semple, 2021 [68]	UK	Narrative Review		5	Screening

Table 5 (*continued*)

Author/Year	Country	Type of Study	Summary of key findings	Level of Evidence	Focus area
			- Dietitian role in screening and alert to risk factors as part of MDT.		
Partridge et al., 2020 [69]	UK	Narrative Review (research and expertise)	- Role of dietitian outlined in pilot MDT service. - Outlines dietetic assessment in service.	5	OP MDT KAP
Schneider et al., 2022 [70].	UK	Narrative Review	- Dietitian to be aware limited research on ketogenic diet.	5	KAP
Simmons et al., 2021 [71]	UK	Narrative Review (research and expertise)	- Role of dietitian as part of MDT approach in OP service. - MDT training.	5	OP
Tan and Spector Hill, 2021 [72]	UK	Cross- sectional	- Dietitian as a member of allied health professional group for a HCP survey on level of knowledge and confidence.	3	KAP
Tierney et al., 2009 [73]	UK	Qualitative Study	- Two dietitian involved in interviews to explore attitude and practices of HCP.	NA	KAP
Tokatly et al., 2018 [74]	Israel	Cross-sectional	- HCP to be aware of increased risk of developing disordered eating among developing DEBs among adolescents and young adults with both T1DM and coeliac disease/	3	Screening KAP
Toni et al., 2017 [75]	Italy	Narrative Review	- Dietitian role as part of MDT. - Nutritional counselling to complement psychological therapy.	5	OP
Tse et al., 2012 [76]	USA	Cross-sectional	- HCPs should give attention to healthful weight management, particularly about youth with T1DM who are overweight.	3	Prevention
Urbanski et al., 2009 [77]	USA	Narrative Review (research and expertise)	- Role of Diabetes Educator (either nurse or dietitian) in detecting ED. - Dietitian in MDT approach.	5	OP Screening
Wagner and Karwautz, 2020 [78]	Austria	Narrative Review	- Role of dietitian in detecting risk factors. - Need for HCP to be skilled in both ED and T1DM.	5	KAP Screening
Winston, 2020 [79]	UK	Narrative Review	- Dietetic treatment approaches and considerations for OP.	5	OP
Wisting et al., 2021 [80]	Norway	Feasibility study	- Dietitian facilitated an online group prevention program for young females with T1DM.	NA	Prevention
Zaremba et al., 2020 [12]	UK	Qualitative Study	- Two dietitian included in focus group to identify challenges in clinical management.	NA	OP KAP
Zaremba et al., 2022 [81]	UK	Qualitative Study	- Dietitians involved in workshops to develop a cognitive behavioural therapy-based intervention for people with T1DM and disordered eating.	NA	OPD KAP

Abbreviations: KAP: knowledge, attitudes and practices, MDT: multidisciplinary team, ED: eating disorder, OP: outpatient, OPD: outpatient department, IP: inpatient, T1DM: type 1 diabetes mellitus, HCP: health care professionals, RCT: randomised control trial. For more detailed table, see Supplementary Material III.

or signs for disordered eating [13,18,19,24,25,32] and/or using appropriate screening tools to assess for the presence of EDs [14,19,27,34]. ISPAD (2022) mentions a screening tool, the Diabetes Eating Problems Survey Revised (DEPS-R) [19]. The ADA suggests screening to begin from 10 to 12 years old and propose using the DEPS-R [33]. SIGN recommends that assessment for the presence of EDs should be part of routine diabetes care by healthcare professionals and also mention use of DEP-S [27].

3.6. Area III: inpatient management

Evidence for the role of the dietitian for inpatient management is found in expert based articles and practice guidelines. A quasi-interventional study in an MDT residential treatment centre reported that weekly input from the dietitian and an 'intuitive eating' approach were essential components of MDT treatment [53]. An American review published in 2005 detailed local practice of an experienced MDT team (including a dietitian) in a specialist inpatient unit – of note, dietetic practice included ensuring adequate caloric intake and education of other staff to ensure a diet that can include sugar as well as wide variety of foods [61]. In the book chapter by Singer et al., practical dietetic inpatient assessment and management was outlined, including management of enteral feeding and transition to an oral meal plan [46]. Recently published UK guidelines provided practical advice on managing refeeding risk in medically unstable patients and specific knowledge for refeeding syndrome and nasogastric tube feeding guidance for dietitians to follow [13]. NICE ED Guideline identified the role of the dietitian as delivering education as requiring and outlined general approaches to inpatient care such as a gradual approach to increasing carbohydrate in diet [25].

3.7. Area IV: outpatient/community management

Goebel-Fabbri highlighted the role of the dietitian during treatment in OPD and advocated a non-restrictive eating approach as well as monthly appointments with the dietitian or nutritionist initially [56]. The role of the dietitian as an educator on a six week psycho-education program for women with T1DM and ED was highlighted in a randomised control trial [47]. A recent Australian guideline discussed dietetic approaches in OP, and advocated for 'concurrent integration of diabetes knowledge, dietary and psychology interventions' [14].

3.8. Area V: multidisciplinary team

The role of the dietitian as key member of MDT in preventing [14], identifying [55] and managing [10,13,14,19,24,25,27,34,43,45,46,49,51,53,55–57,59,61,63,64,69,71,75,77] disordered eating and ED in T1DM were mentioned across the types of literature in this scoping review. The importance of sharing knowledge between the diabetes team and eating disorder teams was highlighted [13],

Table 6
Data charting table (summary) for clinical guidelines and position papers.

Organisation/Year	Country	Aim	Summary of key findings	Focus area
NICE, 2017 [25]	UK	Guideline for assessment, treatment, monitoring and inpatient care for children, young people and adults with ED.	- Dietitian as part of ED and diabetes teams. - Approach to dietetic management as IP, including gradual increase in amount of carbohydrate. - Provide diabetes educational interventions. - Outlines key signs of ED to consider during dietetic assessment.	IP Screening
NICE, 2015 [24]	UK	Guideline for diagnosis and management of T1DM in children and young people	- Dietitian aware of risk factors and red flags for ED in T1DM - Joint management involving their diabetes team and child mental health professionals.	Screening MDT
ISPAD, 2022 [19]	International	Nutritional guidelines for children and adolescence with Diabetes	- The dietitian should adapt nutritional advice to the psychosocial needs and involve all relevant family members. - Very low carbohydrate diet and food insecurity can result in disordered eating behaviours - Weight monitoring is routinely recommended, weight loss or not gaining weight may indicate disordered earing behaviour. Overweight and obesity can be risk factors of disordered eating behaviours. In person with high HbA1c, regardless of weight status, further assessment of disordered eating should considered. - The dietitian should be aware of range of screening questionnaires including DEPS-R, mSCOFF test, structured clinical interviews, and single question '"Have you ever been overweight?" - Clinicians should consider the following when planning interventions for young people with T1DM and ED: 'insulin regimen and potential for omission, glycaemic targets, energy requirements, potential for food and insulin manipulation, body dissatisfaction, family functioning, exercise type and frequency, binge eating behaviours, potential laxative abuse and sleeping patterns.' - Interdisciplinary approach required and close working with ED team	Prevention Screening OP MDT
ISPAD, 2022 [31]	International	Psychological care guidelines for children and adolescence with Diabetes	- 'Screening for […] disordered eating in children aged 12 and above using validated tools should be done at the initial visit, at periodic intervals and when there is a change in disease, treatment, or life circumstance '	Screening
Diabetes UK, 2018 [34]	UK	Guidelines for adults with Diabetes	- Use suitable screening tools to identify possible EDs at the earliest. - In absence of screening tool, be aware of signs to prompt further assessment. - Ensure that the focus is on food, rather than nutrients, and an individualized, flexible approach to nutritional management is recommended. - MDT approach	Screening Prevention MDT
The Royal College of Psychiatrists, 2022 [13]	UK	Guideline on recognition and management in T1DM and EDs	- Alert to the potential red flags for disordered eating. - A shared care model. - In acute hospital settings the EDs dietitian should liaise with the treating dietitian over the nutrition care plan. - Counselling and pre-empting diabetes related issue in ED. - Outlines dietetic approach for refeeding risk. - Outlines dietetic management of nasogastric tube feeding as part of MDT. - Consideration for developing a meal plan for the refeeding starter plan.	IP OP MDT Screening
Queensland Health, 2022 [14]	Australia	Guideline for Disordered Eating and EDs in Children, Adolescents and Adults with T1DM	- Role of the dietitian in preventing and general diabetes treatment strategies - Be aware of the signs and symptoms of DE and routine screening is recommended (such as the DEPS-R for those with T1D over 10 years old). - Dietitian should be part of MDT for prevention. - Consider referral (for those aged ≥17 years) to an evidenced-based structured education program - Detailed outline of considerations for assessment of disordered eating. - The dietitian should ensure the following principles are followed during treatment: 'prompt response with sensitivity, a multidisciplinary team approach, family-centred or person-centred approach, individualised care pathway, concurrent integration of diabetes knowledge, dietary and psychology interventions, early collaboration with specialist ED services/clinicians'. - Outlines suggested role of dietitian within MDT, including dietary goals of treatment and consideration for various settings.	Prevention Screening OP IP
SIGN, 2022 [27]	Scotland	Guideline for management of people with EDs	- Integrated intensive specialist care with both diabetes and mental health professionals. - There are screening tools, for example the DEPS-R. - Assessment for the presence of EDs should be considered by the dietitian as part of the routine review of patients with T1DM.	MDT Screening
BDA, 2021 [18]	UK		- At an advanced level, diabetes dietitian should be able to identify EDs	Screening

Table 6 (*continued*)

Organisation/Year	Country	Aim	Summary of key findings	Focus area
		Framework document for dietitians working area of diabetes		
ADA, 2018 [32]	USA	Position statement on management of T1DM in children and adolescents	- Consider screening for disordered eating behaviours using validated screening measures.	Screening
NICE, 2015 [24]	UK	Guideline for T1DM diagnosis and management in adults	- Modify nutritional recommendations to take account of associated features of T1DM and disordered eating. - Be alert to signs for the possibility of ED and disordered eating in adults with T1DM.	Screening
ADA, 2021 [33]	USA	Standards of care for T1DM in children and adolescents	- Begin screening youth with T1DM for EDs between 10 and 12 years of age, e.g. The DEPS-R.	Screening

Abbreviations: KAP: knowledge, attitudes and practices, MDT: multidisciplinary team, ED: eating disorder, OP: outpatient, IP: inpatient, T1DM: type 1 diabetes mellitus, HCP: Health Care Professional, RCT: randomised control trial, DKA: diabetic ketoacidosis, DEPS-R: diabetes eating problem survey revised, mSCOFF: modified SCOFF.
For more detailed table, see Supplementary Material II.

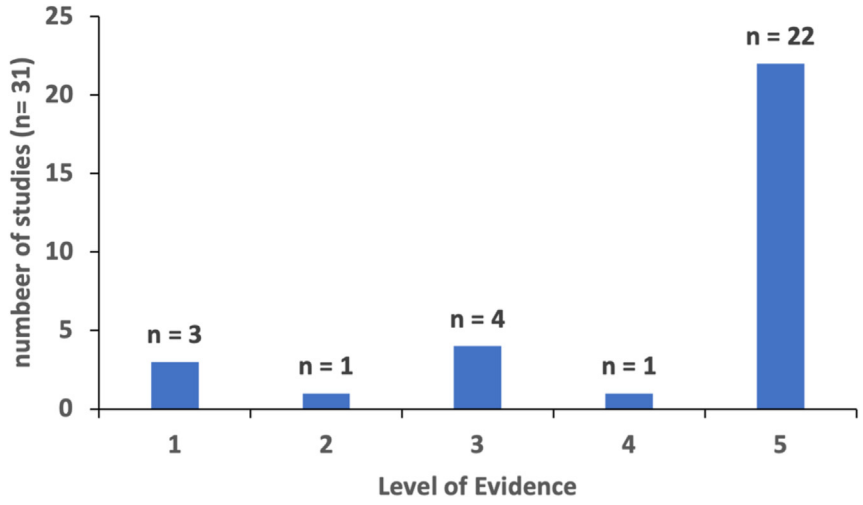

Fig. 2. Bar chart for level of evidence for peer reviewed journal articles.

including the sharing of knowledge between the T1DM and ED dietitian [46].

3.9. Area VI: knowledge, attitudes and practices

The need to adapt nutritional advice based on the psychosocial needs of individual and the individualised nature of the nutrition care plan was mentioned throughout the literature [19,26,34]. There were a number of types of nutritional approaches mentioned – a flexible approach to nutrition [34], non-restricitve [56], intuitive [49,61], "Health at Every Size' principles [14] and 'Healthful eating' [14]. There is expert consensus that effective clinicians in T1DM and ED use motivational interviewing [40,46]. An individualised meal plan approach was recommended to meet the nutritional need of this specific patient and a variety of diets can be used by the dietitian in meal planning including Mediterranean diet, plant based, and low glycaemic index [58]. However, restrictive diets such as low carbohydrate [60] and ketogenic diet [70] pose risks for this vulnerable group of people.

It was suggested that the dietitian be skilled in both ED and T1DM [42,45]. In a HCP staff survey, dietitians reported similar levels of confidence ('very confident' or 'fairly confident') in recognising disordered eating behaviours and T1DM compared to specialist diabetes nurses however lower confidence compared to specialty doctors [5]. In another HCP survey, training, education and the publication of guidelines were identified as strategies to build staff confidence [72].

Dietitians were involved as stakeholders in the development of future interventions, for example, a co-design of cognitive behavioural therapy intervention [81] and preventive programme [62]. Dietitians also participated in research by partaking in surveys and semi-structure interviews to obtain the views of perspectives of HCPs working in this field [5,12,65,72].

4. Discussion

This scoping review identified and mapped the role of the dietitian in the recognition and management of ED and disordered eating in adolescents and adults with T1DM in a clinical setting. Information on the role of the dietitian was identified in six focus areas: prevention, identification and screening, inpatient dietetic management, outpatient/community dietetic management, knowledge, attitude and practices and member of MDT.

This scoping review has identified the wide and varied role of the dietitian in this area. The role of the dietitian varies depending on location (outpatient and inpatient management, in diabetes

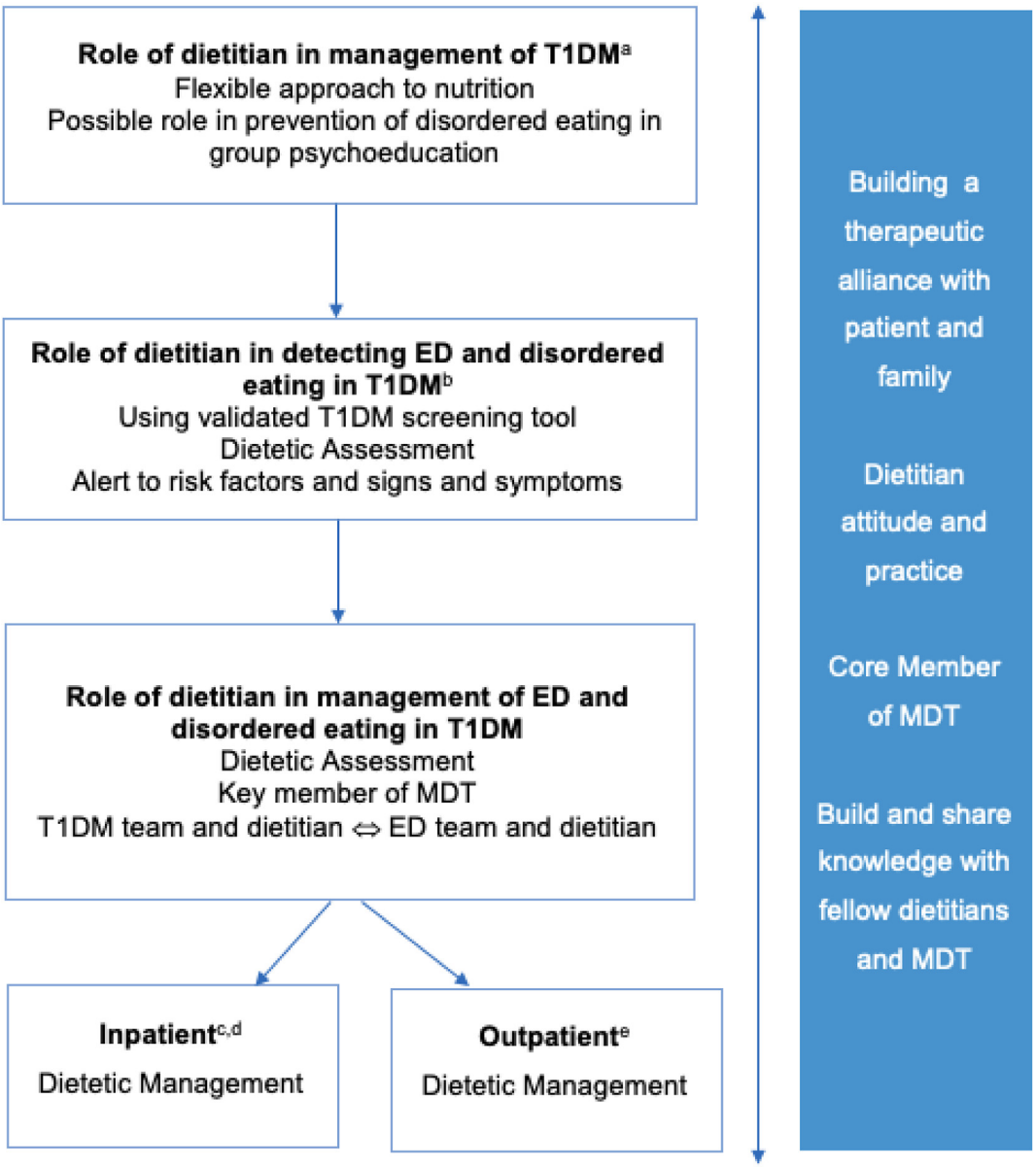

Fig. 3. Flowchart for role of the dietitian based on identified focus areas.[2] [a] ISPAD, 2022 (clinical guideline) [19]. [b] Goddard et al., 2022 (clinical guideline) [55]. [c] Royal College of Psychiatrists, 2022 (clinical guideline) [13]. [d] Singer et al., 2018 (book chapter) [46]. [e] Queensland health, 2022 (clinical guideline) [14].

service or mental health service), demographics (for example, the research highlights that adolescents with T1DM are a particularly at risk group [82,83]) and the degree of disordered eating (from disordered eating behaviours, subclinical ED, diagnosed ED and those in recovery from ED). There may be scenarios where the dietitians may take on a role as lead clinician within diabetes [14] or mental health services [13]. The results have highlighted the need for agreement at dietetic and MDT level on who is taking the lead throughout the patient journey to ensure a joined up clinical approach.

Merging two specialty areas (T1DM and ED), each with their own underpinning theory and approach, presents challenges in defining a consistent role for the dietitian. It would be beneficial in dual diagnosis cases for dietitians involved in treatment to be experienced in both ED and T1DM [42,47], to ensure a coherent dietetic approach. The typical goals and outcomes of both speciality treatment areas can seem very different, however as the literature indicates, there are compromises and agreements that may be feasible when seeking to achieve outcomes and goals common to both [46,57].

Over the past 25 years, the available evidence concerning the study of T1DM and ED/disordered eating behaviours has evolved from case studies, to prevalence and observational studies and, more recently, to interventional studies [6]. With regard to dietetic specific guidance, more recent guidelines and practice reviews have given substance to role of the dietitian and are beginning to offer more detail on the practical role of the dietitian within the MDT [13,14]. As outlined in the results section using the JBI levels of evidence [36], most of the available literature is based on expert practice and most peer-reviewed journal articles were narrative reviews, lacking a systematic approach and relying on expert and

[2] Suggested key document for each focus area.

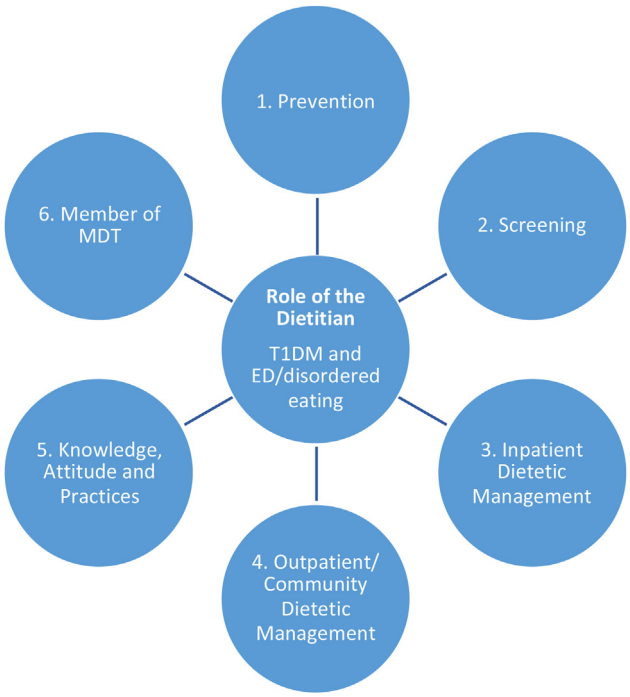

Fig. 4. Focus areas for role of dietitian in T1DM and ED/disordered eating.

current practice. Therefore, most guidelines and practical documents are context specific, making them challenging to apply to various clinical settings. Due to small population in studies and reliance on expert opinion, it was not possible to stratify guidance for age or gender.

While the role of the dietitian is mentioned, none of the literature is dedicated solely to the role of the dietitian in this area. As a result, a wide search strategy was required which is evidenced by the PRISMA flow chart. Initial searches that included key words, such as 'dietitian' or 'nutrition', retrieved less than 20 records on databases.

Issues including definition of ED/disordered eating and lack of specific training impact all HCPs globally in this field [5,73,75]. Research has acknowledged that HCPs in this area can feel undertrained [5,73]. From a dietetic point of view, without a clear training path or competency framework, less experienced dietitians may need peer support and training from both T1DM and ED dietitians [14]. There is no recognised consensus on the diagnostic nomenclature for EDs and disordered eating in T1DM and there is a spectrum of presentations in T1DM from diagnosed EDs to subclinical EDs and disordered eating [75]. However, diagnostic criteria were recently proposed for T1DM and disordered eating in the MEED guideline [13]. Similarly, while not identified as unique ED, the inclusion of insulin omission as a clinical symptom in both anorexia nervosa and bulimia nervosa in DSM- V is also a step in right direction in identifying and diagnosing ED in T1DM [22]. Nevertheless, a broadly inconsistent approach remains and, as a result, this patient group runs the risk of delayed early specialist input.

A scoping review methodology was chosen for this study as preliminary searches highlighted a lack of specific research evidence in this area. To the authors knowledge, this is the first scoping review of the role of the dietitian in recognising and managing patients with both T1DM and ED/disordered eating. In order to maintain a systematic and transparent approach to identifying and extracting data from information sources, the author utilised JBI guidance [21] and PRISMA checklist [35]. However, a limitation of a scoping reviews is the exclusion of the risk of bias [84]. As result, the implications for practice can often be limited. The JBI Levels of Evidence [36] was included to highlight the variation in different types of evidence.

4.1. Gaps in research and looking to the future

It is important for dietitians to be represented as key stakeholders among healthcare professionals and to conduct meaningful research on the role of the dietitian in order to influence and ensure evidence-based practice. A recent systematic review examining the types of interventions available for people with T1DM and disordered eating behaviours further highlighted the lack of practical detail on the role or approach of the dietitian [51]. Future interventional studies that include dietitians would benefit from inclusion of outline on the dietetic approach and practices.

Future research to assess current dietetic knowledge, attitudes and practices would also be useful to identify current dietetic practices and elicit where dietitians draw their evidence from. Similar to other highly specialised areas with limited research base, clinical expertise should supplement available research to inform evidence-based practice [15].

Co-production between health care professionals and people with lived experience is important and should be considered. A recent paper demonstrated how a meta-synthesis of qualitative research on the perspective of patients and HCP in disordered eating in T1DM could contribute effectively to evidence based guidelines [55], an approach that could be replicated in the area of dietetics. The anticipated STEADY project (Safe management of people with Type 1 diabetes and EAting Disorders studY) included both patients and HCPs in the co-design of the programme, ensuring the voice of the patient will be at the centre of intervention [81]. Future research, guidelines and interventions should include outcomes important to both the patient and the dietitian.

There is a paucity of evidence in the literature relating to the scope for advanced practice in dietetics in recognising and managing ED and disordered eating in people with T1DM. It could be postulated that future areas for advanced practice in this field include diabetes educators [77], insulin prescription [18], diabetes technology [85], motivational interviewing [14] and cognitive behavioural therapy [81]. Promising feasibility studies on internet-based prevention programmes for adolescent girls [86] and young women [80] have been recently published. In one programme, a dietitian was included as a facilitator (i.e. person who led the group) [80], demonstrating an area of growth for role of the dietitian.

5. Conclusion

This scoping review identified the role of the dietitian in the recognition and management of ED and disordered eating in adolescents and adults with T1DM in a clinical setting. A visual workflow was developed to outline the varied role of the dietitian in T1DM and ED. Available literature suggests there is a strong reliance on expert opinion and practice review to inform the role of the dietitian and further research is required in order to ensure more robust evidence based practice in this area.

CRediT author statement

Ruth Martin: Writing-original draft preparation; Visualisation. **Amanda Davis:** Writing-reviewing and editing. **Aisling Pigott:**

Writing-reviewing and editing. **Alexandra Cremona:** Conceptualization; Writing-reviewing and editing; Supervision; Methodology.

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Declaration of competing interest

No conflicts of interest to be declared by all authors.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.clnesp.2023.10.038.

References

[1] Mayer-Davis EJ, Kahkoska AR, Jefferies C, Dabelea D, Balde N, Gong CX, et al. ISPAD Clinical Practice Consensus Guidelines 2018: definition, epidemiology, and classification of diabetes in children and adolescents. Pediatr Diabetes 2018;19(S27):7–19.
[2] International Diabetes Federation. IDF diabetes atlas. Brussels, Belgium. 10th ed. 2021. Available at: https://www.diabetesatlas.org.
[3] McKenna A, O'Regan M, Ryder K, Fitzgerald H, Hoey H, Roche E. Incidence of childhood type 1 diabetes mellitus in Ireland remains high but no longer rising. Acta Paediatr 2021;110(7):2142–8.
[4] Jones JM, Lawson ML, Daneman D, Olmsted MP, Rodin G. Eating disorders in adolescent females with and without type 1 diabetes: cross sectional study. BMJ 2000;320(7249):1563–6.
[5] Brewster S, Partridge H, Cross C, Price H. Healthcare professional awareness of eating disorders in people with type 1 diabetes: a staff survey. Br J Diabetes 2020;20(2):122–9.
[6] Broadley MM, Zaremba N, Andrew B, Ismail K, Treasure J, White MJ, et al. 25 years of psychological research investigating disordered eating in people with diabetes: what have we learnt? Diabet Med 2020;37(3):401–8.
[7] Goebel-Fabbri AE, Fikkan J, Franko DL, Pearson K, Anderson BJ, Weinger K. Insulin restriction and associated morbidity and mortality in women with type 1 diabetes. Diabetes Care 2008;31(3):415–9.
[8] Hall R, Keeble L, Sünram-Lea SI, To M. A review of risk factors associated with insulin omission for weight loss in type 1 diabetes. Clin Child Psychol Psychiatr 2021;26(3):606–16.
[9] Takii M, Uchigata Y, Tokunaga S, Amemiya N, Kinukawa N, Nozaki T, et al. The duration of severe insulin omission is the factor most closely associated with the microvascular complications of type 1 diabetic females with clinical eating disorders. Int J Eat Disord 2008;41(3):259–64.
[10] Cainer A. Recognising and managing type 1 disordered eating in children and young people with diabetes. Nurs Child Young People 2022;34(2):28–32.
[11] Gibbings NK, Kurdyak PA, Colton PA, Shah BR. Diabetic ketoacidosis and mortality in people with type 1 diabetes and eating disorders. Diabetes Care 2021;44(8):1783–7.
[12] Zaremba N, Watson A, Kan C, Broadley M, Partridge H, Figuereido C, et al. Multidisciplinary healthcare teams' challenges and strategies in supporting people with type 1 diabetes to recover from disordered eating. Diabet Med 2020;37(12):1992–2000.
[13] The Royal College of Psychiatrists. Medical emergencies in eating disorders (MEED) Guidance on recognition and management. Annex 3: type 1 Diabetes and eating disorders (TIDE). London: The Royal College of Psychiatrists; 2022 (Clinical guideline [CR233]). Available from: https://www.rcpsych.ac.uk/docs/default-source/improving-care/better-mh-policy/college-reports/college-report-cr233–annexe-3.pdf?sfvrsn=c45bd860_14.
[14] Queensland Diabetes Clinical Network. Disordered eating (DE) and eating disorder. In: In children, adolescents and adults with type 1 diabetes. Queensland: Quennsland Health; 2022 (Document No. D5.01- V2-P22-R25). Available at: https://clinicalexcellence.qld.gov.au/.
[15] British Dietetic Association. Clinical guidelines for dietitians treating young people with anorexia nervosa: family focused approach. London: BDA; 2019.
[16] Heruc G, Hart S, Stiles G, Fleming K, Casey A, Sutherland F, et al. ANZAED practice and training standards for dietitians providing eating disorder treatment. J Eat Disord 2020;8(1):77.
[17] Frohock AM. The role of a specialist paediatric diabetes dietitian in the children's diabetes multidisciplinary team. Paediatr Child Health 2021;31(4):141–5.
[18] British Dietetic Association Diabetes Specialist Group. Dietetic competency framework for dietitians working in the area of diabetes. London: BDA; 2021. Available from: https://drive.google.com/file/d/1xfYpI1EuWyc_vrElaB-oFCQVrfTdkXde/view.
[19] Annan SF, Higgins LA, Jelleryd E, et al. ISPAD clinical practice consensus guidelines 2022: nutritional management in children and adolescents with diabetes. Pediatr Diabetes 2022:1-25.
[20] Munn Z, Pollock D, Khalil H, Alexander L, Mclnerney P, Godfrey CM, et al. What are scoping reviews? Providing a formal definition of scoping reviews as a type of evidence synthesis. JBI Evid synth 2022;20(4):950–2.
[21] Peters MDJ, Godfrey C, Mclnerney P, Munn Z, Tricco AC, Khalil H. Chapter 11: scoping reviews (2020 version). In: Aromataris E, Munn Z, editors. JBI manual for evidence synthesis; 2020 [Internet]. JBI. Available from: https://synthesismanual.jbi.global.
[22] Call C, Walsh BT, Attia E. From DSM-IV to DSM-5: changes to eating disorder diagnoses. Curr Opin Psychiatr 2013;26(6):532–6.
[23] Guidelines International Network. GIN international guideline library and registry of guidelines in development. Perthshire; GIN; 2022. available from: : https://g-i-n.net/international-guidelines-library. [Accessed 11 November 2022].
[24] National Institute for Health and Care Excellence. Diabetes (type 1 and type 2) in children and young people: diagnosis and management. London: NICE; 2017 (Clinical guideline [NG18]). Available from: https://www.nice.org.uk/guidance/ng18.
[25] National Institute for Health and Care Excellence. Eating disorders: recognition and treatment. London: NICE; 2017 (Clinical guideline [NG69]). Available from: https://www.nice.org.uk/guidance/ng69.
[26] National Institute for Health and Care Excellence. Type 1 diabetes in adults: diagnosis and management. London: NICE; 2015 (Clinical guideline [NG17]). Available from: https://www.nice.org.uk/guidance/ng17.
[27] Scottish Intercollegiate Guidelines Network (SIGN). Eating disorders. Edinburgh: SIGN; 2022 (SIGN publication no. 164) Available from: http://www.sign.ac.uk.
[28] Hackert AN, Kniskern MA, Beasley TM. Academy of nutrition and dietetics: revised 2020 standards of practice and standards of professional performance for registered dietitian nutritionists (competent, proficient, and expert) in eating disorders. J Acad Nutr Diet 2020;120(11):1902–1919.e54.
[29] Heruc G, Hurst K, Casey A, Fleming K, Freeman J, Fursland A, et al. ANZAED eating disorder treatment principles and general clinical practice and training standards. J Eat Disord 2020;8(1):1–63.
[30] Wessex ComPASSION Team. A guide to risk assessment for type 1 Diabetes and disordered eating; medical, psychiatric, psychological and psychsocial consideration. Wessex: NHS; 2021.
[31] de Wit M, Gajewska KA, Goethals ER, et al. ISPAD Clinical Practice Consensus Guidelines 2022: psychological care of children, adolescents and young adults with diabetes. Pediatr Diabetes 2022:1-17.
[32] Chiang JL, Maahs DM, Garvey KC, Hood KK, Laffel LM, Weinzimer SA, et al. Type 1 diabetes in children and adolescents: a position statement by the american diabetes association. Diabetes Care 2018;41(9):2026–44.
[33] American Diabetes Association. Children and adolescents: standards of medical care in diabetes 2021. Diabetes Care 2021;44(1):S180–99.
[34] Dyson PA, Twenefour D, Breen C, Duncan A, Elvin E, Goff L, et al. Diabetes UK evidence-based nutrition guidelines for the prevention and management of diabetes. Diabet Med 2018;35(5):541–7.
[35] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med 2018;169(7):467–73.
[36] The Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party. JBI levels of evidence. USA: The Joanna Briggs Institute; 2013. Available from: https://jbi.global/sites/default/files/2019-05/JBI-Levels-of-evidence_2014_0.pdf.
[37] Turner H. Diabetes: eating disorders in type 1 diabetes: a primer on what they are, why they happen, and how RDs can help. Today's Dietitian 2020;22(2):14–7.
[38] Today's Dietitian. Dynamics of diabetes- diabetes-eating disorder combination requires integrated treatment. Today's Dietitian. 2015;17(10):24.
[39] Pigott A, Gallimore K. Type 1 diabetes and disordered eating. Dietetics Today 2022:40–2.
[40] Dada JH. Understanding diabulimia: know the signs and symptoms to better counsel female patients. Today's Dietitian 2012;14(8):14–7.
[41] Mathieu J. For your information. What is diabulimia? J Am Diet Assoc 2008;108(5):769–70.
[42] Costin C, Prosser G, Jacque M. Eating disorders and type 1 diabetes. In: Fries J, Sullivan V, editors. Eating disorders in special populations: medical, nutritional, and psychological treatments. Florida: CRC Press/Routledge; 2017. p. 247–76.
[43] Datye KA, Jaser SS. Eating disorders in youth with diabetes. In: Delamater AM, Marrero DG, editors. Behavioral diabetes: social ecological perspectives for pediatric and adult populations. Cham: Springer Nature Switzerland AG; 2020. p. 67–77.
[44] Francisco R. Type 1 diabetes and disordered eating behavior. In: Manzato E, Cuzzolaro M, Donini LM, editors. Hidden and lesser-known disordered eating behaviors in medical and psychiatric conditions. Cham: Springer Nature Switzerland AG; 2022. p. 253–9.

[45] Goebel-Fabbri AE. Eating disorders in type 1 and type 2 diabetes. In: Delamater AM, Marrero DG, editors. Behavioral diabetes: social ecological perspectives for pediatric and adult populations. Cham: Springer Nature Switzerland AG; 2020. p. 353–63.
[46] Singer J, Allen J, Morris J, Gold A. Management of eating disorders in patients with type 1 (insulin dependent) diabetes. In: Morris J, McKinlay A, editors. Multidisciplinary management of eating disorders. Cham: Springer Nature Switzerland AG; 2018. p. 189–207.
[47] Alloway SC, Toth EL, McCargar LJ. Effectiveness of a group psychoeducation program for the treatment of subclinical disordered eating in women with type 1 diabetes. J Can Diet Assoc 2001;62(4):188–92.
[48] Bermudez O, Gallivan H, Jahraus J, Lesser J, Meier M, Parkin C. From research to practice/eating disorders and diabetes: inpatient management of eating disorders in type 1 diabetes. Diabetes Spectr 2009;22(3):153–8.
[49] Candler T, Murphy R, Pigott A, Gregory JW. Fifteen-minute consultation: diabulimia and disordered eating in childhood diabetes. Arch Dis Child Educ Pract Ed 2018;103(3):118–23.
[50] Chelvanayagam S, James J. What is diabulimia and what are the implications for practice? Br J Nurs 2018;27(17):980–6.
[51] Clery P, Stahl D, Ismail K, Treasure J, Kan C. Systematic review and meta-analysis of the efficacy of interventions for people with Type 1 diabetes mellitus and disordered eating. Diabet Med 2017;34(12):1667–75.
[52] Colman MHE, Quick VM, Lipsky LM, Dempster KW, Liu A, Laffel LMB, et al. Disordered eating behaviors are not increased by an intervention to improve diet quality but are associated with poorer glycemic control among youth with type 1 diabetes. Diabetes Care 2018;41(4):869–75.
[53] Dickens YL, Haynos AF, Nunnemaker S, Platka-Bird L, Dolores J. Multidisciplinary residential treatment of type 1 diabetes mellitus and co-occurring eating disorders. Eat Disord 2015;23(2):134–43.
[54] Gallagher KAS, DeSalvo D, Gregory J, Hilliard ME. Medical and psychological considerations for carbohydrate-restricted diets in youth with type 1 diabetes. Curr Diabetes Rep 2019;19(6):1–8.
[55] Goddard G, Oxlad M. Caring for individuals with type 1 diabetes mellitus who restrict and omit insulin for weight control: evidence-based guidance for healthcare professionals. Diabetes Res Clin Pract 2022;185 [N.PAG-N.PAG].
[56] Goebel-Fabbri AE. Disturbed eating behaviors and eating disorders in type 1 diabetes: clinical significance and treatment recommendations. Curr Diabetes Rep 2009;9(2):133–9.
[57] Goebel-Fabbri AE, Uplinger N, Gerken S, Mangham D, Criego A, Parkin C. From research to practice/eating disorders and diabetes: outpatient management of eating disorders in type 1 diabetes. Diabetes Spectr 2009;22(3):147–52.
[58] Gottesman K, Ziegler J, Parker A. Insulin omission for weight control in adolescents with type 1 diabetes mellitus. Top Clin Nutr 2015;30(4):314–23.
[59] Hanlan ME, Griffith J, Patel N, Jaser SS. Eating Disorders and disordered eating in Type 1 Diabetes: prevalence, screening, and treatment options. Curr Diabetes Rep 2013;13:909–16.
[60] Hart M, Pursey K, Smart C. Low carbohydrate diets in eating disorders and type 1 diabetes. Clin Child Psychol Psychiatr 2021;26(3):643–55.
[61] Hart S, Twigg S, Abraham S, Russell J. The practical management of patients with type 1 diabetes requiring in-patient care due to an eating disorder. Pract Diabetes Internat 2005;22(5):165–70.
[62] Jones CJ, O'Donnell N, John M, Cooke D, Stewart R, Hale L, et al. PaRent intervention to prevent disordered eating in children with type 1 diabetes (PRIORITY): study protocol for a feasibility randomised controlled trial. Diabet Med 2022;39(4):1–8.
[63] Kelly SD, Howe CJ, Hendler JP, Lipman TH. Disordered eating behaviors in youth with type 1 diabetes. Diabetes Educat 2005;31(4):572–83.
[64] Larrañaga A, Docet MF, García-Mayor RV. Disordered eating behaviors in type 1 diabetic patients. World J Diabetes 2011;2(11):189–95.
[65] Macdonald P, Kan C, Stadler M, De Bernier GL, Hadjimichalis A, Le Coguic AS, et al. Eating disorders in people with type 1 diabetes: experiential perspectives of both clients and healthcare professionals. Diabet Med 2018;35(2):223–31.
[66] McCarvill R, Weaver K. Primary care of female adolescents with type 1 diabetes mellitus and disordered eating. J Adv Nurs 2012;68(1):2005–18.
[67] Merwin RM, Moskovich AA, Honeycutt LK, Lane JD, Feinglos M, Surwit RS, et al. Time of day when type 1 diabetes patients with eating disorder symptoms most commonly restrict insulin. Psychosom Med 2018;80(2):222–9.
[68] Oldham-Cooper R, Semple C. Prevention and early help for eating disorders in young people with type 1 diabetes. Clin Child Psychol Psychiatr 2021;26(3):656–68.
[69] Partridge H, Figueiredo C, Rouse L, Cross C, Pinder C, Ryder J, et al. Type 1 diabetes and disordered eating (T1DE): the ComPASSION project – wessex. Practical Diabetes Int 2020;37(4):127–32.
[70] Schneider S, Biggerstaff DL, Barber TM. Helpful or harmful? The impact of the ketogenic diet on eating disorder outcomes in type 1 diabetes mellitus. Expet Rev Endocrinol Metabol 2022;17(4):319–31.
[71] Simmons A, McMahon L, Crosbie V, Carlson L. A multidisciplinary team approach to screening, assessment and early intervention for young people with type 1 diabetes and disordered eating behaviour. Clin Child Psychol Psychiatr 2021;26(3):629–42.
[72] Tan JOA, Spector-Hill I. Identifying and managing eating disorders in type 1 diabetes mellitus: an all-Wales study. Clin Child Psychol Psychiatr 2021;26(3):617–28.
[73] Tierney S, Deaton C, Whitehead J. Caring for people with type 1 diabetes mellitus engaging in disturbed eating or weight control: a qualitative study of practitioners' attitudes and practices. J Clin Nurs 2009;18(3):384–90.
[74] Tokatly Latzer I, Rachmiel M, Zuckerman Levin N, Mazor-Aronovitch K, Landau Z, Ben-David RF, et al. Increased prevalence of disordered eating in the dual diagnosis of type 1 diabetes mellitus and celiac disease. Pediatr Diabetes 2018;19(4):749–55.
[75] Toni G, Berioli MG, Cerquiglini L, Ceccarini G, Grohmann U, Principi N, et al. Eating disorders and disordered eating symptoms in adolescents with type 1 diabetes. Nutrients 2017;9(8):906.
[76] Tse J, Nansel TR, Haynie DL, Mehta SN, Laffel LMB. Disordered eating behaviors are associated with poorer diet quality in adolescents with type 1 diabetes. J Acad Nutr Diet 2012;112(11):1810–4.
[77] Urbanski P, Goebel-Fabbri AE, Powers M, Taylor D. From research to practice/eating disorders and diabetes: the diabetes educator's role in managing eating disorders and diabetes. Diabetes Spectr 2009;22(3):159–62.
[78] Wagner G, Karwautz A. Eating disorders in adolescents with type 1 diabetes mellitus. Curr Opin Psychiatr 2020;33(6):602–10.
[79] Winston AP. Eating disorders and diabetes. Curr Diabetes Rep 2020;20(8):1–6.
[80] Wisting L, Haugvik S, Wennersberg AL, Hage TW, Stice E, Olmsted MP, et al. Feasibility of a virtually delivered eating disorder prevention program for young females with type 1 diabetes. Int J Eat Disord 2021;54(9):1696–706.
[81] Zaremba N, Robert G, Allan J, Harrison A, Brown J, Konstantara E, et al. Developing a novel intervention for type 1 diabetes and disordered eating using a participatory action design process: safe management of people with Type 1 diabetes and EAting Disorders studY (STEADY). Diab Med 2022;39(4):1–13.
[82] Meltzer LJ, Johnson SB, Prine JM, Banks RA, Desrosiers PM, Silverstein JH. Disordered eating, body mass, and glycemic control in adolescents with type 1 diabetes. Diabetes Care 2001;24(4):678–82.
[83] Takii M, Uchigata Y, Kishimoto J, Morita C, Hata T, Nozaki T, et al. The relationship between the age of onset of type 1 diabetes and the subsequent development of a severe eating disorder by female patients. Pediatr Diabetes 2011;12(4pt2):396–401.
[84] Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol 2018;18(1):143.
[85] Priesterroth L, Grammes J, Clauter M, Kubiak T. Diabetes technologies in people with type 1 diabetes mellitus and disordered eating: a systematic review on continuous subcutaneous insulin infusion, continuous glucose monitoring and automated insulin delivery. Diabet Med 2021;38(7):1–14.
[86] Trojanowski PJ, Frietchen RE, Harvie B, Mehlenbeck R, Fischer S. Internet-delivered eating disorders prevention program for adolescent girls with type 1 diabetes: acceptable and feasible. Pediatr Diabetes 2022;23(7):1122–32.
[87] Margo E, Hanlan ME, Griffith J, Patel N, Jaser SS. Eating disorders and disordered eating in type 1 diabetes: prevalence, screening, and treatment options. Curr Diabetes Rep 2013;13:909–16.