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# Psychological Care as an Interdisciplinary Approach in the Management of Diabetes: A Narrative Review of Literature

## ABSTRACT

**Objective:** Diabetes, a serious chronic disease, demands a lot of patients in terms of daily self-care and often complicated treatment. Psychological problems are prevalent among people with diabetes. Burden with daily restrictions to diet and activity, risks of the treatment, fear of losing metabolic control and disease progression may furthermore reduce quality of life and aggravate psychological condition. This paper provides a current overview of prevalence, screening and general psychological managements in diabetes according to the worldwide recommendations. In addition it updates the medical literature refer to Poland. **Materials and methods:** The search was conducted in Google Scholar, PubMed, Scopus, Web of Science, and ScienceDirect. The final set of 75 articles, include 33 papers that refer to psychological condition assessment tools.

**Results:** The analysis for this review has been packaged into themes in order to generate a very useful and practical tool for all health professionals. It summarized in systematic and comprehensive way all psychological states that can appear in patients with diabetes. The

most prevalent and important problems are: diabetes distress, depression, anxiety disorders, disordered eating behavior, and cognitive impairment/dementia. **Conclusions:** All worldwide guidelines strongly recommend psychological and social care as integrated part of the management of the diabetes. Healthy psychological state with proper screening, monitoring and the management could help in reaching therapeutic success and better quality of life. (Clin Diabetol 2022; 11; 6: 420-431)

**Keywords:** psychological care, management of diabetes, screening tools, guidelines

## Introduction

Diabetes is a major public health problem with rapid increase worldwide. According to estimates from the International Diabetes Federation (IDF) Diabetes Atlas at least 530 million people currently have diabetes, and this number is going to reach 700 million by 2045 [1]. The prevalence of diabetes in Poland is high and it is increasing. In 2017 it was estimated that 2.533 million of people have the disease, which is 6.58% of general population [2]. Diabetes is a strong risk factor for a series of complications such as cardiovascular disease, retinopathy, nephropathy and neuropathy, leading to greater morbidity and mortality. Findings from previous studies also demonstrated that diabetes and its complications are strongly associated with psychological and psychiatric problems [3]. The only recognition of the disease, a chronic serious illness, is a significant burden that affects individuals and their families. The challenge of diabetes self-management is usually con-

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nected with complex and long-term medications and life-style change. The achievement of the metabolic control to prevent or delay diabetes complications is the superior goal of the management; however, many individuals have difficulty with that challenge. Many problems appear during complicated treatment, such as necessity of regular medication taking, insulin self-administration, self-monitoring of blood glucose, difficulties with adherence with diet, weight loss and regular physical activity, foot self-care and visits with healthcare providers. Despite the availability of effective therapies, the proportion of patients achieving the glycated hemoglobin (HbA1c) target < 7.0% (53 mmol/mol) remains around 50% [4]. The failure with achievement goals for metabolic control including glycemic, blood pressure and cholesterol targets, leads to microvascular and macrovascular complications and further deterioration of quality of life [5]. Considering that the mental state of the individual with diabetes affects all aspects of the managements there is a need for identification some psychosocial factors and evaluation of psychological condition. All worldwide guidelines strongly recommend psychological and social care as integrated part of the management of the diabetes [6–11].

In this paper we update the medical literature review on the prevalence, screening and general psychological managements in diabetes. In addition we discuss the situation in Poland and describe available Polish-language diagnostic tools, and therefore we believed that this review could be useful for all health professionals in practice.

## Materials and methods

In this review we summarized the main psychological conditions including prevalence and available screening test. We also indicate the newest recommendations for psychological interventions. Following a structured narrative approach, we identified, reviewed, and synthesized existing literature including the newest worldwide guidelines, original and review articles covering a time period of 15 years using a combination of relevant controlled vocabulary terms and free-text terms. The diagnostic tools were presented with the lasted date of invention, validation and translation. The search was conducted on search databases, such as Google Scholar, PubMed, Scopus, Web of Science, and ScienceDirect. All described psychological conditions were selected according to their prevalence and importance following the recommendation of main diabetes associations.

As psychosocial factors including complex environmental, social, behavioral and emotional factors can

impact on living with diabetes, both type 1 and type 2, we reviewed literature on T1DM and T2DM; however, the population described as subjects with diabetes usually include far more patients with T2DM because of differences in prevalence.

Finally, we analyzed the subset of 75 articles, including 33 papers that refer to psychological condition assessment tools. Selected articles have been read by two researchers. Notes have been compared and arranged thematically. Articles and publications not pertinent to the objective of study, repetitive and very old were excluded.

## Clinical implications

### Diabetes distress

Diabetes distress is very common state “characterized by extreme apprehension, discomfort, or dejection, due to perceived inability in coping with the challenges and demands of living with diabetes” [12]. This emotional response to diabetes is similar to depression; however, it does not meet DSM-V criteria for major depressive disorder (MDD). The incidence of diabetes distress is high — even 45% of patients with diabetes had reported this state in the second Diabetes Attitudes, Wishes and Needs study (DAWN2) [13]. Living with diabetes — adherence to often complicated management, diet and regular physical activity, fear of severe complications and future disability — gives a permanent source of stress. On the other hand the high levels of stress can lead to worsen of the diabetes and is linked to higher HbA1c levels, lower self-efficacy and problems with following a diet and exercises [14]. The challenges for patients with diabetes connected to all pharmacological and non-pharmacological therapy and glucose monitoring is connected to our coping skills. Polish guidelines on the management of patients with diabetes recommend the evaluation of the ability to cope with the disease [6]. Several validated tests are used to diagnose diabetes distress. Problem Areas in Diabetes (PAID) scale is one of tools available for use in different version — for adults with type 1 (T1D) and type 2 diabetes (T2D) [15], for youth (ages 8–17 years) [16] or adolescents (ages 11–19 years) with T1D [17] and for parents of children and adolescents with T1D [18]. It is a 20-item representative self-reported instrument with high sensitivity (94%) and specificity (89%) for recognition of diabetes-related emotional distress. The scale also has short five- and one-item versions [19]. The Polish version of the scale was lastly validated and its psychometric properties were evaluated [20].

The second available validated tool to diagnose diabetes distress is the Diabetes Distress Scale (DDS) with its specific versions for use in T1D, T2D, parents

and caregivers [21]. It is a 17-item questionnaire measuring diabetes-specific distress in four domains: emotional burden, diabetes interpersonal distress, physician-related distress, and regimen-related distress. The Polish version of DDS scale is available and can be successfully used for diagnostic and clinical purposes [22]. Both scales, PAID and DDS, are recommended by the American Diabetes Association (ADA) [23]. All screening tools are presented in Table 1.

As a diabetes distress is a self-perceived insufficiency of coping skills, psychotherapy approaches to management of this state may include: the improvement self-perception and coping skills, minimization the burden that needs to be coped with the involvement other partners in coping [24].

### Depression

Depression and distress are the most common psychological disorders among the patients with diabetes. Many epidemiological data showed a bidirectional relationship between diabetes and depression [25–28]. Hence, the diagnosis of diabetes increases the risk of the development of depression, and at the same time, the presence of depression increases the risk of the development of diabetes. Depression is twice as prevalent in patients with T2D as in the general population, and negatively affects diabetes self-management [26]. Moreover, the presence of co-morbid depression in a patient with diabetes resulted in a 47.9% increase in cardiovascular mortality, 36.8% increase in coronary heart disease and 32.9% increase in stroke [27]. A recently published systematic review and meta-analysis of 44 studies showed that the prevalence of depression was significantly higher in subjects with T1D (22% vs. 13%), or T2D (19% vs. 11%) compared to those without diabetes [28].

Many guidelines recommend screening for depression with validated tools (Tab. 1). This can increase diagnosis of depression in general primary care populations as well as in secondary care. These simple and easy methods might give an overestimation of depression; therefore, positive results should be validated by a mental health provider for further evaluation and treatment [29]. ADA suggests screening of all patients with diabetes, especially those with a self-reported history of depression, with beginning at diagnosis of complications or when there are significant changes in medical status [7]. They recommend the following depression screening measures: the Patient Health Questionnaire 9 (PHQ-9) [30], the Beck Depression Inventory (BDI-II) [31], Child Depression Inventory [32], and Geriatric Depression Scale (GDS) [33]. The PHQ-9 is the most used and validated screening tool

for depression in patients with diabetes with a high sensitivity and specificity [34]. The questionnaire was developed based on the depression diagnostic criteria taken from the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The study for the validation of the PHQ-9 suggested that score < 5 is normal, 5–9 indicates mild depression, 10–14 indicates moderate depression, 15–19 indicates moderately severe depression, and 20–27 indicates severe depression. In the Polish translation, the cut-off for major depression is evaluated at  $\geq 12$  points (instead of 10 points) with 82% of sensitivity and with 89% of specificity [6, 35]. In the Polish language version, the PHQ-9 tool is made available by Pfizer Inc. at the internet address <http://www.phqscreeners.com>. One of the popular research tools used to assess prevalence of depression in general population is the BDI-II [31], adapted and translated to Polish by Parnowski and Jernajczyk [36] and validated specifically for use in patients with diabetes. BDI-II is a self-report depression inventory consisting of 21 items with four possible answers. A score above 9 indicates mild depression. Although it had been widely criticized for being outdated with respect to DSM-IV criteria, some recently published analyses suggested it could be used as Polish-language diagnostic tool with optimal (13 and higher) cut-off for detection of clinical depression with satisfied sensitivity (88.6%) and specificity (86.4%) [37].

Polish guidelines on the management of patients with diabetes recommend the screening of depression using available free online test — the World Health Organization-Five Well-Being Index (WHO-5) [38]. The 5-item version assessed on a 6-point Likert scale is a tool for the measurement of subjective well-being in the past two weeks. The raw score ranges from 0 (absence of well-being) to 25 (maximal well-being). A raw score below 13 ( $\leq 12$ ) indicates poor well-being. The Polish version is available at <https://www.psykiatri-regionh.dk/who-5/who-5-questionnaires/Pages/default.aspx>. It was recently validated and recommended as a useful instrument for screening for depression in patients with diabetes [39].

As a PHQ-9 is a valid tool for diagnosing depression in the general population aged 35–64, for older patients with diabetes GDS short form is recommended by ADA with its 15-items [11]. The GDS-15 is a simplified version of the 30-item long form and it is aimed to improve ease of use by reducing administration time of the survey. This tool has been validated to detect mild or major depression according to DSM-IV criteria [40]. The number of points that can be obtained varies from 0 to 15, with a higher score indicating more depressive symptoms. GDS-15 has been translated into various

Table 1. Psychological Condition Assessment Tools

Abbreviation	Measure	Description	Population	Freely available	Polish translation	References
<b>Diabetes distress</b>						
PAID	Problem Areas in Diabetes	20-item self-administered scale. Each item is scored from 0 (not a problem) to 4 (serious problem). The scores for each item are summed and then multiplied by 1.25 to generate a total score out of 100. A score of 40 or above is indicative of severe diabetes distress	Adults with type 1 and type 2 diabetes	Yes	Yes	[15–18, 20]
DDS	Diabetes Distress Scale	7 items (4 subscales and total score) measuring diabetes-specific distress in four domains: emotional burden, diabetes interpersonal distress, physician-related distress, and regimen-related distress	Adults with type 1 and type 2 diabetes	Yes	Yes	[21, 22]
<b>Depression</b>						
PHQ–9	Patient Health Questionnaire 9	9 items measures on a 4-point Likert scale queries for major depression (based on DSM-IV criteria). Total score range: 0–27; score < 5; normal, 5–9: mild depression, 10–14: moderate depression, 15–19: moderately severe depression, 20–27: severe depression	Adults	Yes	Yes	[30, 34, 35]
BDI-II	Beck Depression Inventory	21-question multiple-choice self-report inventory, each answer being scored on a scale value of 0 to 3. Total score range: 0–63; 0–13: minimal depression, 14–19: mild depression, 20–28: moderate depression, 29–63: severe depression	Adults	No	Yes	[31, 36, 37]
WHO-5	World Health Organization-Five Well-Being Index	The 5-item version assessed on a 6-point Likert scale is a tool for the measurement subjective well-being in the past two weeks. The total raw score, ranging from 0 to 25, is multiplied by 4 to give the final score, with 0 representing the worst imaginable well-being and 100 representing the best imaginable well-being	Children (9 years and older), adults	Yes	Yes	[38, 39]

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Table 1 (cont.). Psychological Condition Assessment Tools

Abbreviation	Measure	Description	Population	Freely available	Polish translation	References
GDS-15	Geriatric Depression Scale-15 (short form)	The 15-item version of the GDS — simple, self-administered screening tool for major depression in elderly people. Total score range: 0–15; 0–4: normal, 5–9: mild depression, 10–15: moderate to severe depression	Elderly people	Yes	Yes	[33, 40]
<b>Anxiety Disorders</b>						
BAI	Beck Anxiety Inventory	21 self-reported items (four-point scale) used to assess the intensity of physical and cognitive anxiety symptoms during the past week. Total score range: 0–63; 0–7: minimal anxiety levels, 8–15: mild anxiety, 16–25: moderate anxiety, 26–63: severe anxiety	Adults	No	No	[48]
GAD-7	Generalized Anxiety Disorder 7-item Scale	Self-reported questionnaire for screening and severity measuring of GAD. The GAD-7 items include: nervousness, inability to stop worrying, excessive worry, restlessness, difficulty in relaxing, easy irritation, fear of something awful happening. Items are rated on a 4-point Likert-type scale (0 = not at all to 3 = nearly every day). Total score range: 0–21; score < 5: normal, 5–9: mild anxiety, 10–14: moderate anxiety, > 15: severe anxiety	Adolescents and adults	Yes	Yes	[49]
STAI	State-Trait Anxiety Inventory	40 self-report items on a 4-point Likert scale. The STAI measures two types of anxiety — state anxiety and trait anxiety. Total score range: 0–63; 0–9: normal or no anxiety, 10–18: mild to moderate anxiety, 19–29: moderate to severe anxiety, 30–63: severe anxiety	Children (9 years and older)	No	Yes	[50]

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Table 1 (cont.). Psychological Condition Assessment Tools

Abbreviation	Measure	Description	Population	Freely available	Polish translation	References
<b>Disordered Eating Behavior</b>						
EDI-3	Eating Disorders Inventory 3	91 items organized into 12 subscales rated on a 0–4 point scoring system. Three items on the EDI-3 are specific to eating disorders, and 9 are general psychological scales that are relevant to eating disorders. The EDI-3 scoring is available as computer-based scoring program which reports raw scores, T scores, percentiles, and qualitative classifications	Female patients (13–53 years)	No	Yes	[56, 59]
DEPS-R	Diabetes Eating Problems Survey	16 items questionnaire. The responses are recorded on a 6-point Likert scale, ranging from 0 = never to 5 = always. Total score ranges: 0 to 80. A score > 20 indicates more disordered eating behavior and warrants in depth conversations/referrals	Youth (13–19 years) and adults with type 1 diabetes	No	No	[57]
DTSS-20	Diabetes Treatment and Satiety Scale	20-item measure used to assess hunger, satiety, and fullness in the context of food intake, insulin regimen, and blood glucose The six subscales include Uncontrollable Hunger, Remain Hungry, Low Blood Sugar, Feeling Full, Satiety, and High Blood Sugar	Youth (10–17 years) with type 1 diabetes	No	No	[58]
<b>Cognitive Impairment/Dementia</b>						
MMSE	Mini-Mental State Examination	Brief cognitive assessment tool. It consists of 30 questions that evaluate attention and orientation, memory, registration, recall, calculation, language and ability to draw a complex polygon. Total score range: 0–30; 24 and higher: normal cognition; no dementia, 19–23: mild dementia, 10–18: moderate dementia, 9 and lower: severe dementia	Adults	No	Yes	[66, 67]

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Table 1 (cont.). Psychological Condition Assessment Tools

Abbreviation	Measure	Description	Population	Freely available	Polish translation	References
MoCA	Montreal Cognitive Assessment	30-question test that evaluates short-term memory, executive functions, visuospatial abilities, phonemic fluency, attention, verbal abstraction, concentration, language, working memory and orientation to time and place. The test and administration instructions are available for professionals online. Total score range: 0–30: 0–17: normal cognition 18–25: mild cognitive impairment, 10–17: moderate cognitive impairment 10 and lower: severe cognitive impairment	Adults (55–85 years)	Yes	Yes	[68–71]
TICS	Telephone Interview for Cognitive Status	Brief, standardized 11-item test of cognitive functioning performed by telephone. The TICS Total score can be interpreted by means of four qualitative impairment ranges: Unimpaired, Ambiguous, Mildly Impaired, and Moderately to Severely Impaired	Adults (60–98 years)	No	No	[72, 73]
	Cognitive assessment toolkit	Designed for use during a medical office visit to screen for cognitive impairment in older adults and contains three validated patient assessment tools: the General Practitioner Assessment of Cognition (GPCOG), the Memory Impairment Screen (MIS) and the Mini-Cog	Adults	No	No (except GPCOG)	[74]

languages including Polish and is being widely used in many different populations all over the world.

It is obvious that using self-description tools is recommended as first step in the process of diagnosis of depression. The positive screening evaluation should be followed by psychiatric consultation and require an appropriate treatment. ADA recommends that referrals for treatment of depression should be made to mental health providers with experience using cognitive behavioral therapy, interpersonal therapy, or other

evidence-based treatment approaches in conjunction with collaborative care with the patient's diabetes treatment team [11]. They strongly suggest that integrating mental and physical health care may improve outcomes. Also Polish guidelines underline the importance of cooperation of the whole therapeutic team with effective communication between members [6]. They suggest that clinical psychologist could be helpful in more complex cases and he is necessary in diabetes clinic. Psychotherapy interventions which

predominantly used cognitive behavior therapy may be delivered by a primary care physician or a specialist. Other psychosocial support may include problem solving, cognitive-behavioral, motivational interviewing, family-based approaches, and technology-assisted behavioral approaches [41].

### Anxiety disorders

Anxiety disorders are defined by fear, nervousness or feelings of worry that highly influence social and occupational functioning of subjects [42]. The prevalence of anxiety disorders in patients with medical illness is high, with 47% among in individuals with diabetes [43]. Previous research indicates that people with diabetes have a greater likelihood of being diagnosed with an anxiety disorder and having elevated anxiety symptoms [44]. These can be presented as generalized anxiety disorder (GAD), panic disorder, post-traumatic stress disorder, social anxiety disorder, obsessive compulsive disorder, and specific phobias [44]. There are some hypotheses about the way that diabetes is associated with development of anxiety disorders. First the diagnosis with diabetes may induce worries connected with burdensome lifestyle changes, lead to losing control over their health and fear regarding complications [45]. Second the daily burden associated with often complicated self-management of diabetes can lead to exhibition of anxiety. This includes systemic blood glucose monitoring, smoking cessation, systemic physical activity and dietary restrictions.

Another problem is a fear of hypoglycemia (FOH), especially in people with hypoglycemia unawareness. The most common symptoms of this state are: discomfort and anxiety, with concomitant feelings of shortness of breath palpitations or hand tremors. FOH disturbs normal functioning, lead to worsening metabolic control of diabetes and reduction the patient's quality of life [46]. People with FOH are willing to change their dietary behavior by increased caloric intake, lower the intensity of physical activity and insulin dosing. When hypoglycemic episodes repeat regularly the patient doesn't experience symptoms of hypoglycemia despite low blood glucose levels. This state named hypoglycemia unawareness can lead to occurrence and intensification of FOH [46]. There are several tools for measuring the FOH such as: Hypoglycemia Fear Survey modified version (HFS-II), Quick Screening for Fear of Hypoglycemia (QSFH), the Fear of Hypoglycemia 15-item scale (FH-15), and the Children's Hypoglycemia Index (CHI) used in pediatric patients [46].

In the treatment of FOH, ADA recommends Blood Glucose Awareness Training, delivered in routine clinical practice. It can help reestablish awareness of hypogly-

cemia, improve HbA1c level and improve psychological well-being [11]. Other psychoeducational interventions which are common worldwide include: hypoglycemia anticipation, awareness and treatment training (HAATT), blood glucose awareness training II (BGAT-2), and the hypoglycemia treatment program (HyPOS) [46]. These should be implemented by a qualified behavioral practitioner if they are not available within the practice setting [11].

Other common worries are related to not reaching blood glucose targets, hyperglycemia, fear of injections, insertion of subcutaneous insulin infusion devices (i.e., insulin pumps) and continuous glucose monitors [11]. The consequences of diabetes co-morbid anxiety disorders are associated with poorer glycemic control, increased rates of diabetes-related complications, increased pain, lowered quality of life, higher incidence of depression and greater disability [47]. On the other hand there is growing evidence that anxiety itself increases the risk of developing diabetes, due to sharing the same risk factors for diabetes such as obesity, cardiometabolic and sleep disturbances, or unhealthy lifestyle [47]. The Polish guidelines only mention the importance of evaluation of anxiety symptoms, however ADA recommends some available screening tools such as Beck Anxiety Inventory (BAI), Hypoglycemia Fear Survey-II (HFS-II), State-Trait Anxiety Inventory for Children (STAIC) and Children's Hypoglycemia Index (CHI) [11].

The BAI is a self-report inventory for measuring the severity of anxiety in psychiatric populations and it is validated in a number of languages [48]. The total score is calculated by finding the sum of the 21 items each describing a common symptom of anxiety. The respondent is asked to rate how much he or she has been bothered by each symptom over the past week on a 4-point scale.

Anxiety could be measured also by easy-to-use self-administered patient questionnaire — Generalized Anxiety Disorder 7-item Scale (GAD-7) [49]. The Polish version is available at the MAPI Research Institute: [www.phqscreeners.com](http://www.phqscreeners.com).

Another scale that may be used for screening anxiety is the State-Trait Anxiety Inventory (STAI) with the Polish adaptation [50]. The STAI is a 40-item self-assessment scale measuring the presence and severity of current symptoms of anxiety and a generalized propensity to be anxious.

ADA strongly recommends the inclusion of behavioral health services into the diabetes treatment team. That collaborative care model seems to be the most effective for supporting physical and behavioral health outcomes [11]. Some nonpharmacological therapies



may be useful in the therapy for comorbid diabetes and anxiety including a brief health coaching sessions, consisting of diabetes education and self-management training, psychoeducation, mindfulness-based cognitive therapy including brief deep breathing exercise [45]. The most severe anxiety symptoms may demand the psychotropic medication management.

### Disordered eating behavior

Eating disorders are defined according to DSM-IV criteria as anorexia nervosa, bulimia nervosa, binge eating disorder and atypical eating disorders (eating disorders not otherwise specified) [50]. Disordered eating behavior (DEB) usually refer to maladaptive behaviors such as restricting food intake, distorted body image, binge eating, purging behaviors such as using laxatives, vomiting or performing intense physical exercise in order to lose body weight [51]. The prevalence of DEBs and eating disorders varies and depend on the type of diabetes and based on the criteria used. In individuals with T1D one of the most common DEB is insulin omission causing glycosuria in order to lose weight [7]. These patients often reported symptoms of subclinical DEB such as binge eating, self-induced vomiting, excessive caloric restriction, and intense exercise for weight control [52]. The prevalence of subclinical DEB ranged from 3–26% depending on the behavior. The prevalence of diagnosable eating disorders and DEB in adolescent and young adult females with type T1D is estimated of 3.8–27.5% for patients classified as bulimic or having binge eating disorder, and 38–40% when insulin omission is considered purging [52]. The patients with T1D also have other psychological problems as diabetes distress and fear of hypoglycemia. Some studies have reported the association between the presence of diagnosable eating disorders and behavior and increase in neuropathy, retinopathy, transient lipid abnormalities, hospitalizations due to diabetes and worsening of metabolic control [52].

In T2DM patients the most common condition of DEB is the binge eating — excessive food intake with an accompanying sense of loss of control [7]. The prevalence of this disorder varies from 5.3% to 14% in patients with T2DM [53, 54]. Higher BMI is associated with occurrence of DEB — in one study only 3% of normal-weight women with diabetes have DEB, whereas 7% of overweight and 10% of obese patients were diagnosed with DEB [55].

Many factors can contribute to DEB in diabetes such as restrictions of the diet, carbohydrate counting and disturbed control over satiety, excessive hunger due to hypoglycemia. DEB is also associated with other comorbid psychiatric disorders such as depressive symptoms or anxiety disorders [7].

The diagnosis of DEB should be preceded by detailed medical interview including: etiology and motivation for the behavior, adjustment to illness and treatment, BMI assessment, diet restrictions, weight loss recommendations, the use of the medications that can influence on satiety or insulin treatment that can lead to hypoglycemia. ADA recommends some questionnaires which are appropriate for screening DEB [23]: Eating Disorders Inventory-3 (EDI-3) [56], Diabetes Eating Problems Survey (DEPS-R) [57], Diabetes Treatment and Satiety Scale (DTSS-20) [58]. The EDI-3, the most widely used to screen DEB, consists of 91 items organized into 12 primary scales: Drive for Thinness, Bulimia, Body Dissatisfaction, Low Self-Esteem, Personal Alienation, Interpersonal Insecurity, Interpersonal Alienation, Interoceptive Deficits, Emotional Dysregulation, Perfectionism, Asceticism, and Maturity Fears. There is also an abbreviated version of the EDI-3 (The EDI-3 Referral Form) which allows patients to be quickly screened for eating disorder risk. The EDI-3 has been validated in multiple languages and countries including Poland. The Polish version has been adapted and normalized and revealed a high reliability in most of the subscales [59].

The DEPS-R is a questionnaire comprising 16 items and it is widely used as a tool capable of rapidly screening for DEB in a pediatric population with T1D; however, it hasn't been validated in Poland yet [57].

DTSS-20 is a 20-item self-report measure used to assess hunger, satiety, and fullness in the context of food intake, insulin regimen, and blood glucose and it is also directed to youth with T1D [58]. This questionnaire hasn't been validated in the Polish population yet.

The treatment for DEB may include cognitive behavior therapy, interpersonal therapy and integrative cognitive therapy. The adjunctive medication such as glucagon-like peptide 1 receptor agonists can also regulate hunger and satiety and influence for food intake [23].

The Eating Disorder Examination Questionnaire (EDE-Q) is a one of the most widely used self-report instruments in ED clinical practice, not included in recommendation of ADA [51]. The tool provides four subscale scores: Restraint, Eating Concern, Shape Concern, and Weight Concern. The Global score is calculated by averaging the four subscale scores. and higher scores reflect greater eating- or body-related concerns or behaviors.

### Cognitive impairment/dementia

Cognitive impairment and dementia frequently coexist with diabetes in elderly population. Dementia according to DSM-IV criteria is defined as acquired

objective cognitive impairment affecting multiple cognitive domains, severe enough to affect activities of daily life, whereas mild cognitive impairment (MCI) refers to acquired objective cognitive impairment affecting one or more cognitive domains with largely preserved activities of daily life [60, 61]. People with MCI are in higher risk of progression to dementia with annual rate 5–10% [62]. The systematic review and meta-analysis of observational studies show the prevalence of MCI in T2D patients was estimated to be 45.0% [63]. Diabetes is associated with increase in the risk for all type of dementia [RR: 1.73 (1.65–1.82)]; for Alzheimer's disease (AD) [RR: 1.53, (1.42–1.63)]; and for vascular dementia [RR: 2.27 (1.94–2.66)] compared to people without diabetes [64]. ADA recommends the monitoring of cognitive capacity understood as memory, attention, logic and reasoning, and auditory and visual processing, which are associated with diabetes self-management behavior [23]. They have proposed that the screening should be particularly done in elderly patients, very young children, in those, who have documented cognitive disabilities, or those who experience severe hypoglycemia [23]. The cognitive assessment for older population may include the following tools: Mini-Mental State Examination (MMSE), Telephone Interview for Cognitive Status (TICS), Cognitive assessment toolkit [23]. Another questionnaires commonly used for cognitive screening are: Montreal Cognitive Assessment (MoCA), and Addenbrooke's Cognitive Examination-III (ACE-III) [65].

The MMSE is one of the most widely used brief cognitive assessment tools [66]. It consists of 30 questions that evaluate attention and orientation, memory, registration, recall, calculation, language and ability to draw a complex polygon. Although the advantages of the MMSE are rapid administration and availability of multiple language translations, this questionnaire is not the best tool to identify early stages of dementia or distinguish between different types of dementia. MMSE has recently been subject to copyright restrictions [67].

A systemic meta-analysis showed that MoCA meets the criteria for screening tests for the detection of MCI in patients over 60 years of age better than MMSE [68].

The MoCA was developed in 2005 for screening diagnosis of MCI [69] and it was adopted to Polish version by Gierus et al. [70]. The MoCA test is a short, one-page, paper-and-pencil screening tool which consist of questions that evaluates short-term memory, executive functions, visuospatial abilities, phonemic fluency, attention, verbal abstraction, concentration, language, working memory and orientation to time and place. The Polish authors have proposed an optimal

cut-off score of 24 for MCI screening and cut-off score of 19 for dementia [71].

The TICS is 11-item measure that can either be administered over the telephone or face-to face [72]. This test has high sensitivity (94%) and specificity (100%) in differentiating individuals with Alzheimer's disease (AD) from people without dementia [73]. Tele-diagnostic tests have many advantages as simple and easy method for screening cognitive disturbances.

Cognitive assessment toolkit was designed for use during a medical office visit to screen for cognitive impairment in older adults and contains three validated patient assessment tools: the General Practitioner Assessment of Cognition (GPCOG), the Memory Impairment Screen (MIS) and the Mini-Cog [74]. GPCOG is available in Polish; however, MIS and Mini-Cog hasn't been validated in Poland yet. All tests can be easily administered in 5 minutes or less by medical staff members who are not physicians. The kit contains also three validated informant assessment of patient tools: the Short Form of the Informant Questionnaire on Cognitive Decline in the Elderly (Short IQCODE), the Eight-item Informant Interview to Differentiate Aging and Dementia (AD8) and the GPCOG. The Alzheimer's Association recommends easy algorithm for the assessment of cognition and suggests refer to specialist for full dementia evaluation for individuals who fail any of these test.

The diabetes-related cognitive dysfunction may affect social or occupational functioning or diabetes self-management. The key issue in the management is whether the patient is able to collaborate with the whole therapeutic team and can achieve optimal metabolic control [23]. Deficits in executive function, memory, and learning lead to poor diabetes self-management in individuals with cognitive dysfunction and dementia, and thus result in greater risk of diabetes complications, higher frequency of hospital admission and occurrence of severe hypoglycemic episodes, and with an increased occurrence of major cardiovascular events [75]. Worldwide guidelines suggest including to therapeutic team a lay care provider, when the cognitive capacity decreases with day-to-day monitoring [23]. Some cognitive training can improve cognitive skills or performance of daily activities and effective diabetes education with alternative teaching approaches may also help in better self-management.

## Conclusions

The interdisciplinary approach in the management of the diabetes and comorbid psychological disorders should be based on cooperation of the whole therapeutic

tic team that include the patient, and his family, diabetologist, or endocrinologist, diabetes educator and dietitian with diabetes training. Mental health providers have a key role in the diagnosis and the treatment of common psychological problems and they should be constantly incorporated into daily diabetes care settings. Effectiveness of the diabetes self-management, regimen and care provision should be enhanced by psychotherapeutic interventions. The Polish guidelines underline the importance of effective communication with the patients and regular evaluation of the mental condition and compliance to treatment [6]. The authors have proposed some psychological interventions which can help to develop the sense of control over the disease and to maintain diabetes coping skills focused on solving disease-related problems. Current guidelines recommend patient-centered approaches and focus on the achievement of the metabolic control and lower the risk of complications. Healthy psychological state with proper screening, monitoring and management could help in reaching therapeutic success and better quality of life.

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### Conflict of interest

None declared.

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