

# Psychological, Social, and Behavioral Aspects of Type 2 Diabetes: A Narrative Review

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## ABSTRACT

Type 2 diabetes is a chronic metabolic disorder that extends beyond biological factors, as it is strongly connected with psychological, social, and behavioral dimensions. This narrative review provides an overview of established findings regarding these aspects among adults with diabetes. Psychologically, diabetes is associated with distress, anxiety, depression, insomnia, Type D personality traits, and cognitive dysfunction. These conditions not only affect emotional well-being but also influence self-care behaviors and disease management. Social factors play a significant role as well. Loneliness, social isolation, and lack of social support are commonly seen among individuals with diabetes, and these challenges may even emerge in prediabetic stages. Reduced social contentedness has been linked to poorer health outcomes and lower treatment adherence. Behavioral aspects are equally critical in diabetes management. Factors such as diet, physical activity, adherence to medical advice, environmental influences, and overall quality of life directly impact blood glucose regulation. Psychological interventions, including counseling and behavioral therapies, have shown effectiveness in improving both mental health and glycemic control. Overall, the evidence underscores that diabetes management is not solely dependent on biological treatment but also deeply influenced by a combination of psychological, social, and behavioral factors. Integrating these dimensions into care models is essential for improving long-term health outcomes in adults with type 2 diabetes.

**Keywords:** Type 2 diabetes, anxiety, depression, psychological distress, social support, behavioral interventions

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Type 2 diabetes is the most common form of the disease. It typically develops in adults but is increasingly diagnosed in children and adolescents. In Type 2 diabetes, the body either does not produce enough insulin or the cells do not respond effectively to insulin. Lifestyle factors such as obesity and physical inactivity significantly contribute to the development of this condition.

The aim of this review article is to provide an update on the psychological and social aspects affected in individuals with diabetes, as well as those aspects that influence the health behaviors of people with diabetes. This review adopts a narrative approach and includes relevant articles sourced from databases such as PubMed, Google Scholar, and PsycINFO. Only articles focused on Type 2 diabetes and published after January 2015 were included. The review emphasizes psychological aspects (stress, anxiety, depression, type D personality, mental health, distress, cognitive dysfunction), social aspects (social support, social isolation, loneliness), and behavioral factors (regular exercise, diet, quality of life, lifestyle, body weight, coping styles, and psychological interventions). While many studies examine the effects of individual aspects on Type 2 diabetes, this review synthesizes their overall impact, offering a holistic understanding of the condition.

## Methodology

Literature searches spanned PubMed, Google Scholar, and PsycINFO from January 2015 to January 2026, using keywords like "Type 2 diabetes psychological

aspects," "diabetes distress social support," "T2DM behavioral interventions," and combinations (e.g., "depression AND Type 2 diabetes self-management"). Snowballing from reference lists supplemented initial yields (~500 articles). No language filters applied, prioritizing peer-reviewed studies on adults with T2DM.

Inclusion criteria included empirical studies, reviews, or meta-analyses on T2DM-focused psychological (e.g., anxiety, Type D personality), social (e.g., loneliness), or behavioral factors (e.g., exercise, diet); post-2015 publication; human participants. Exclusion criteria eliminated Type 1 diabetes focus; pre-2015 works; non-peer-reviewed sources; animal/pediatric-only studies without T2DM relevance. Approximately 80 sources met criteria after title/abstract screening and full-text review.

Key data extracted included study design, sample (n, demographics), measures (e.g., HbA1c, PHQ-9 for depression), findings, and limitations. Thematic analysis organized content into psychological, social, behavioral, and intervention domains, with narrative synthesis highlighting bidirectional relationships, prevalence rates (e.g., 52% Type D traits), and outcomes (e.g., HbA1c reductions). Critical appraisal assessed bias, generalizability, and quality via informal checklists.

## Objectives:

- To provide an updated narrative synthesis of psychological (e.g., depression, anxiety, distress, Type D personality, cognitive dysfunction), social (e.g., support, isolation, loneliness), and behavioral

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influences (e.g., exercise, diet, quality of life) on T2DM self-management and outcomes.

- Examine bidirectional associations between T2DM and psychological conditions like depression, anxiety, distress, insomnia, and personality traits, highlighting their impact on glycemic control and complications.
- Analyze social factors such as support, isolation, and exclusion, and their roles in buffering distress, predicting cognitive decline, and shaping self-care behaviors.
- Evaluate behavioral interventions (exercise, diet, lifestyle) and environmental influences on T2DM progression, adherence, and quality of life.
- Assess effectiveness of psychological interventions (e.g., CBT, mindfulness) in improving metabolic outcomes, emotional wellbeing, and holistic care.

### **Diabetes and Psychological Aspects**

Diabetes is associated not only with physical comorbidities but also with psychological conditions such as anxiety, depression, stress, and distress, which are common among patients with diabetes.

### **Depression**

The occurrence of depression is two to three times higher in people with diabetes mellitus, with the majority of cases remaining undiagnosed. Diabetes does not directly cause depression, but the nature of the disease can contribute to its development. Hypertension, coronary heart disease, and diabetes are often accompanied by a high incidence of depression, which can affect treatment and prognosis (Zhang et al., 2018). Diabetes and depression are serious chronic conditions, and their increasing prevalence, along with population growth and aging, pose significant public health concerns (Jeon, 2018). Both major and minor depression trends are increasing in patients with diabetes, where depression is often persistent and chronic. There is a bidirectional relationship between depression and diabetes. Diabetes-related distress independently increases the risk of diabetes-related complications (Mukherjee & Chaturvedi, 2019).

### **Anxiety**

Individuals with type 2 diabetes mellitus show clinical and sub-clinical symptoms of anxiety more frequently than those without diabetes. Anxiety is traditionally linked to poor metabolic outcomes and increased medical complications in type 2 diabetes (Bickett & Tapp, 2016). An association exists between baseline anxiety and incident diabetes, with high anxiety increasing the risk of developing diabetes (Smith, Deschênes & Schmitz, 2018). A cross-national study revealed that 18.0% of diabetic patients had at least one type of anxiety disorder, with generalized anxiety disorder being the most common (8.1%), followed by panic disorder (5.1%). Female sex, diabetic complications, longer disease duration, and poor glycemic control were significant risk factors for developing anxiety among diabetic patients (Chaturvedi, 2019).

### **Diabetic Distress**

Diabetes distress refers to the range of negative emotional states arising from diabetes morbidity and the self-care behaviors required to manage the disease. Diabetes distress is distinct from depression, although the two can co-occur. It largely comprises emotional responses such as fear, worry, anger, guilt, sadness, frustration, and burnout. In contrast, depression involves significant cognitive, affective, social, motivational, and physiological disturbances. Both conditions are associated with different clinical outcomes and diabetes self-care behaviors. Diabetic patients with comorbid depression are more likely to experience clinical complications compared to non-depressed patients (Hagger et al., 2016).

### **Insomnia**

Sleep disorders are linked to the development of type 2 diabetes and increase the risk of diabetes complications. Insomnia (39%), obstructive sleep apnea (55-86%), and restless legs syndrome (8-45%) are more prevalent in people with type 2 diabetes compared with the general population. Sleep disorders negatively affect health outcomes in these patients (Schipper et al., 2021). There is strong evidence supporting the relationship between sleep quality and glycemic control, although further study is required on the relationship between sleep duration and glycemic control (Zhu et al., 2017). Poor sleep habits are common among adults with type 2 diabetes and are associated with higher risk of incident diabetes and worse outcomes (Ogilvie & Patel, 2018). Sleep disturbances and type 2 diabetes in older adults are linked to cognitive decline and dementia, including Alzheimer's disease. Disturbed sleep affects insulin sensitivity and glucose metabolism and may increase the risk for diabetes and related complications (Holingue et al., 2018).

### **Personality**

Research has focused on distressed/Type D personality, characterized by higher levels of negative affectivity, social inhibition, and limited expression of negative emotions in social situations (van Dooren et al., 2016). Approximately 52% of patients with diabetes exhibit Type D traits, which significantly impact diabetes self-care and clinical outcomes (Conti et al., 2016). Type D patients struggle with treatment compliance, especially medication adherence and routine physician visits. They are less likely to adhere to recommended antidiabetic behaviors such as physical activity, healthy eating, and weight control, and are at higher risk for mental health issues including depression and anxiety. Type D personality predicts poor prognosis and adverse clinical outcomes in diabetes (Conti et al., 2017).

### **Cognitive Dysfunction**

Type 2 diabetes and cognitive dysfunction are prevalent worldwide. Diabetes increases the risk of dementia, including Alzheimer's disease and vascular dementia. However, awareness of this link is low, and

clinical guidelines for managing cognitive dysfunction in diabetic patients are limited. Diabetes is a risk factor for mild cognitive decline and dementia (Srikanth et al., 2020).

### Social Aspects of Diabetes

Low social support significantly increases the risk of depression among individuals with type 2 diabetes mellitus, with evidence indicating that social support may buffer the adverse effects of diabetes-related distress and depressive symptoms on diabetes outcomes (Azmiardi et al, 2022). Meta-analytic data suggest that people with low social support are twice as likely to experience depression compared to those with high support. Social support has also been shown to promote positive self-management behaviors and improved mental health in people with both type 1 and type 2 diabetes (Beverly, et al, 2021).

Social isolation and loneliness, forms of social disconnection, have been linked to an elevated incidence of type 2 diabetes mellitus. Recent longitudinal studies indicate that both factors are independently associated with a higher risk of developing type 2 diabetes, and their effects may be mediated by socioeconomic and lifestyle factors. Loneliness specifically confers a substantial increase in risk, underscoring the value of addressing psychosocial elements in diabetes management (Asif et al, 2025).

Among adults with type 2 diabetes, perceived social support—measured by marital status, caregiver availability, and loneliness—also predicts cognitive outcomes. Individuals experiencing frequent loneliness have nearly double the odds of cognitive impairment compared to those who do not report loneliness. These findings highlight the importance of targeted interventions that address social isolation and loneliness to mitigate the risk of cognitive decline. Prevalence studies further link social isolation and loneliness to type 2 diabetes across age groups, with potential sex-specific associations and implications for mental health maintenance in older adults (Cohn-Schwartz et al, 2023).

Finally, social exclusion in diabetes is associated with reductions in self-esteem, increases in depressive symptoms, and lower quality of life. Longitudinal evidence suggests that social exclusion typically precedes a diagnosis of diabetes and that its persistence is influenced by psychological and socioeconomic variables rather than by diabetes itself. Interventions enhancing social connectedness may thus be strategically important in diabetes prevention and management (Prell et al 2023).

### Behavioral Aspects: Exercise

Regular physical activity at moderate to vigorous intensity is an effective intervention for improving multiple parameters in type 2 diabetes mellitus (T2DM), including insulin sensitivity, glycemic control, lipid profile, blood pressure, and cardiorespiratory fitness. Structured exercise has been demonstrated to reduce glycosylated hemoglobin

(HbA1c) levels, enhance VO<sub>2</sub>peak, and lower the risk of diabetes-related complications. Both aerobic and resistance training confer significant benefits, and their combination may be more effective for optimizing metabolic outcomes than either modality alone (John P et al, 2017).

Exercise is also associated with reductions in systemic inflammation and chronic oxidative stress, contributing to the prevention and management of T2DM. Evidence indicates that regular exercise improves body composition by reducing fat mass and increasing lean muscle mass, which further augments insulin action. Additionally, minimizing sedentary time and incorporating activity breaks are endorsed for all individuals with T2DM, including those with health complications, to achieve better glycemic regulation and prevent cardiovascular disease (Jill A et al, 2022).

Despite these established benefits, rates of physical activity adherence remain suboptimal among people with diabetes, highlighting the need for individualized exercise programs and supportive interventions to maximize participation and long-term maintenance (Poblete-Aro et al, 2018).

### Dietary Aspects

Type 2 diabetes mellitus (T2DM) is closely linked to lifestyle factors, particularly diet. The traditional Mediterranean diet has demonstrated significant benefits in managing cardiovascular risk factors and improving glycemic control in T2DM patients. Its components—rich in anti-inflammatory and antioxidant compounds, glucagon-like peptide agonists, and gut microbiota modulators—contribute to diabetes homeostasis through shared physiological pathways.

Evidence consistently shows that adherence to the Mediterranean diet results in improved glycemic parameters, including reductions in HbA1c by approximately 0.3–0.47%, enhanced insulin sensitivity, and beneficial effects on lipid profiles, such as increased HDL and decreased triglycerides. Furthermore, the Mediterranean diet supports weight loss and long-term weight maintenance, critical factors in T2DM management. Key dietary components include whole grains, legumes, fruits, vegetables, nuts, seeds, olive oil as the primary fat source, moderate consumption of poultry and fish, and limited red and processed meats (Petroni et al, 2021).

Personalized nutrition strategies emphasize patient adherence and preferences, recognizing that the best dietary approach is one that patients can sustain long term. Although certain supplements (e.g., inositols, vitamin D, micronutrients) show modest insulin sensitivity improvements, their routine use is not universally recommended (Mozaffarian, 2016).

### Environmental and Lifestyle Factors in Type 2 Diabetes

Type 2 diabetes mellitus (T2DM) risk is influenced by a complex interplay of environmental and lifestyle factors. Key contributors include poor diet quality and

quantity, physical inactivity, sedentary behavior (e.g., prolonged sitting and increased screen time), exposure to air pollution and noise, disturbed or insufficient sleep, smoking, chronic stress, depression, and low socioeconomic status. These factors commonly promote increased body mass index and exacerbate  $\beta$ -cell dysfunction, which is central to the development of overt T2DM (Kolb et al,2017).

Urban environments with limited walkability, scarce green spaces, and high pollution levels tend to increase diabetes risk, while neighborhoods supportive of physical activity and social interaction are protective. Environmental stressors can trigger biological pathways involving inflammation and oxidative stress, further impairing glucose metabolism. Socioeconomic disparities limit access to healthy food, exercise facilities, and healthcare, disproportionately affecting vulnerable populations and compounding diabetes risk.

Healthy lifestyle adherence—comprising balanced diet, regular exercise, adequate sleep, and avoidance of harmful exposures—significantly reduces microvascular complications and improves biomarker profiles in T2DM (Geng et al,2023). Effective diabetes prevention strategies must integrate efforts to promote protective lifestyle behaviors while mitigating adverse environmental exposures, alongside policies enhancing socioeconomic equity and healthcare access.

### Quality of Life in Type 2 Diabetes

Quality of life (QoL) among patients with type 2 diabetes mellitus (T2DM) is influenced by the presence and type of chronic complications. QoL assessments typically encompass four domains: physical, psychological, social, and environmental functioning. Studies indicate that patients with complications such as diabetic retinopathy and neuropathy report the lowest social functioning, while those with nephropathy, diabetic foot ulcers, or multiple complications have the poorest physical functioning. Across all domains, patients without complications report the highest QoL (Kolaric et al,2022).

Multiple factors impact QoL in T2DM, including physical exercise, frequency of glucose monitoring, presence of hypertension, duration of diabetes, dietary habits, and depression. Improved QoL is linked to effective diabetes self-management practices, treatment adherence, and psychological support. The application of Self-Determination Theory (SDT) in diabetes care has shown promise in enhancing QoL by fostering patient motivation and adherence to treatment (Sarfo et al,2023).

### Psychological Interventions in Type 2 Diabetes

Psychological interventions have demonstrated benefits in improving glycemic control and diabetes self-management among patients with type 2 diabetes mellitus (T2DM) (González-Burboa et al,2019). Common approaches include cognitive behavioral therapy (CBT), counseling, motivational interviewing,

self-management training, mindfulness-based interventions, and empowerment programs.

Most studies report a modest but significant reduction in HbA1c levels following these interventions, alongside improvements in self-regulation, disease awareness, and treatment adherence. Interventions integrating social support, problem-solving, and goal-setting techniques appear particularly effective, with group formats and technology-assisted delivery enhancing outcomes.

Mindfulness-based interventions reduce psychological distress, depression, and anxiety, though evidence for long-term physiological effects remains limited. Psychological constructs such as growth mindset and self-efficacy strongly correlate with improved diabetes self-care behaviors and glycemic outcomes, highlighting their importance as targets for future interventions (Noordali et al,2017).

Overall, psychological interventions complement standard medical treatment by addressing emotional and behavioral barriers to optimal diabetes management, ultimately improving quality of life and metabolic control.

### Discussion:

#### Contributions of the Study

This narrative review makes several important contributions to the understanding of type 2 diabetes mellitus (T2DM) by highlighting the interconnected psychological, social, and behavioral dimensions of the disease. While diabetes is often approached primarily as a metabolic condition, this paper reinforces the view that effective management requires a broader biopsychosocial perspective.

1. First, the study consolidates and synthesizes recent evidence on key psychological factors associated with T2DM, including depression, anxiety, diabetes-related distress, sleep disturbances, personality traits, and cognitive dysfunction. By presenting these dimensions together, the review clarifies how psychological vulnerabilities influence self-care behaviors, treatment adherence, and long-term disease outcomes. This integrated perspective supports the need for routine psychological screening within diabetes care.

2. Second, the paper contributes to the growing literature on social determinants of diabetes by systematically discussing the roles of social support, loneliness, isolation, and social exclusion. It emphasizes that social disconnection not only worsens psychological well-being but also adversely affects glycemic control, cognitive health, and quality of life. By drawing attention to social factors that may precede diabetes onset, the review underscores their relevance for both prevention and disease management.

3. Third, the study highlights behavioral and lifestyle components—such as physical activity, dietary patterns, sleep, and environmental influences—as modifiable factors that interact closely with psychological and social conditions. The review demonstrates that lifestyle adherence is shaped not only by knowledge but also by emotional state, motivation, and social context.

4. Finally, this paper contributes to clinical and public health practice by emphasizing the value of psychological and behavioral interventions as complements to medical treatment. By synthesizing evidence on counseling, cognitive behavioral therapy, mindfulness, and self-management approaches, the review supports the integration of mental health services into standard diabetes care. Overall, the study advances a holistic framework for understanding and managing T2DM, offering valuable insights for researchers, clinicians, and policymakers.

**Comparison with Previous Systematic Reviews and Meta-Analyses**

1. Previous systematic reviews and meta-analyses on type 2 diabetes mellitus (T2DM) have predominantly focused on isolated psychological or behavioral factors and their associations with glycemic outcomes. Many meta-analytic studies have examined depression, anxiety, or diabetes distress separately, often quantifying their relationships with HbA1c levels, treatment adherence, or complication risk. While these approaches provide strong statistical evidence, they tend to narrow the analytical scope and may overlook the broader social and contextual influences shaping diabetes outcomes.

2. Systematic reviews on social determinants have similarly emphasized individual components such as social support or loneliness, frequently reporting pooled effect sizes for depression or self-management behaviors. Although these studies strengthen causal inference and generalizability, they often treat psychological, social, and behavioral factors as independent variables rather than as interrelated dimensions of a complex chronic condition. Likewise,

meta-analyses of lifestyle interventions primarily assess the effectiveness of exercise or dietary programs on metabolic markers, with limited consideration of underlying psychological readiness, motivation, or social context.

3. In contrast, the present paper adopts a narrative review approach that enables conceptual integration across multiple domains. Rather than statistically aggregating outcomes, this review synthesizes psychological, social, behavioral, environmental, and quality-of-life factors within a unified biopsychosocial framework. This integrative perspective allows for the examination of interactions among mental health, social connectedness, lifestyle behaviors, and disease progression, which are often fragmented across separate systematic reviews.

4. Another key distinction lies in the inclusion of emerging and underexplored areas such as cognitive dysfunction, sleep disturbances, personality traits, and social exclusion. These dimensions are rarely addressed collectively in prior meta-analyses due to methodological heterogeneity or limited quantitative data. By incorporating recent longitudinal and cross-national findings, this review broadens the conceptual understanding of T2DM beyond traditional biomedical and behavioral models.

5. Overall, while systematic reviews and meta-analyses offer precise effect estimates, the current narrative review contributes by integrating diverse evidence streams, identifying conceptual gaps, and informing holistic care models. This complementary role enhances theoretical understanding and supports the development of multidisciplinary, patient-centered approaches to diabetes management.

**Table: Differentiating the Present Narrative Review with Previous Systematic Reviews/Meta-Analyses**

Aspect	Previous Systematic Reviews / Meta-Analyses	Present Narrative Review
<b>Primary Focus</b>	Examine specific factors (e.g., depression, anxiety, exercise, diet) in isolation	Integrates psychological, social, behavioral, environmental, and quality-of-life dimensions
<b>Methodological Approach</b>	Quantitative synthesis using pooled effect sizes and statistical models	Qualitative narrative synthesis enabling conceptual integration
<b>Scope of Analysis</b>	Narrow and domain-specific	Broad, multidimensional, and holistic
<b>Psychological Factors</b>	Mainly depression, anxiety, or diabetes distress analyzed separately	Includes distress, depression, anxiety, sleep disorders, personality traits, and cognitive dysfunction
<b>Social Determinants</b>	Focused on individual elements such as social support or loneliness	Examines social support, isolation, loneliness, and social exclusion collectively
<b>Behavioral Components</b>	Evaluates effectiveness of exercise or dietary interventions independently	Links behavior with psychological state, motivation, and social context
<b>Cognitive Outcomes</b>	Rarely included due to heterogeneity and limited quantitative data	Explicit focus on cognitive dysfunction and dementia risk in T2DM
<b>Environmental Factors</b>	Largely excluded	Includes lifestyle environment, socioeconomic conditions, and urban context
<b>Intervention Perspective</b>	Assesses intervention efficacy through outcome measures	Highlights psychological and behavioral interventions within holistic care models
<b>Theoretical Orientation</b>	Predominantly biomedical or behavioral	Biopsychosocial and patient-centered
<b>Strengths</b>	Strong statistical precision and	Conceptual depth, integrative understanding, and

	generalizability	clinical relevance
<b>Key Contribution</b>	Establishes strength of associations between variables	Identifies interactions, gaps, and directions for holistic diabetes care
<b>Overall Role</b>	Evidence consolidation through quantification	Framework development and synthesis across domains

**Scope for Future Research**

1. Despite growing recognition of the psychological, social, and behavioral dimensions of type 2 diabetes mellitus (T2DM), important gaps remain in current research. Addressing these gaps is essential for advancing integrated and patient-centered diabetes care.
2. First, future studies should move beyond cross-sectional designs and prioritize longitudinal and prospective research approaches. Such designs are necessary to clarify the temporal and causal relationships between psychological distress, social adversity, health behaviors, and metabolic outcomes. Understanding whether these factors precede diabetes onset or arise as consequences of disease progression will improve early identification and prevention strategies.
3. Second, greater integration of psychological variables with biological and clinical markers is warranted. Combining measures such as diabetes distress, depression, personality traits, and self-efficacy with biomarkers including HbA1c, inflammatory indicators, stress hormones, and neurocognitive assessments can enhance understanding of the psychophysiological pathways influencing disease outcomes. This integrated approach may also support the development of personalized risk profiles and targeted interventions.
4. Cognitive dysfunction in individuals with T2DM represents an emerging area requiring focused investigation. Future research should examine the mechanisms linking chronic hyperglycemia, sleep disturbances, social isolation, and cognitive decline through long-term neuropsychological and clinical studies. Early screening and intervention strategies aimed at preserving cognitive health among diabetic populations should also be evaluated.
5. Social determinants of health, particularly loneliness and social isolation, require further intervention-based research. While their association with poor diabetes outcomes is well documented, fewer studies have tested structured interventions to enhance social connectedness. Future work should assess community-based programs, family-centered approaches, and technology-enabled peer support systems for their impact on psychological well-being, self-care behaviors, and glycemic control.
6. Additionally, there is a pressing need for culturally sensitive and context-specific interventions, especially in low- and middle-income countries. Research should explore how cultural norms, socioeconomic conditions, gender roles, and health literacy influence diabetes management and responsiveness to psychological and behavioral interventions.
7. The expanding use of digital health technologies presents another promising research direction. Mobile

applications, telepsychology, and wearable monitoring devices should be systematically evaluated for long-term effectiveness, accessibility, and sustainability in managing both psychological distress and lifestyle behaviors.

8. Finally, future research should consistently prioritize quality of life as a central outcome measure. Emphasizing patient-reported outcomes alongside clinical indicators can support more holistic models of diabetes care that address not only metabolic control but also emotional well-being and social functioning.

**Conclusion**

Type 2 diabetes mellitus (T2DM) extends far beyond metabolic dysfunction, entangling psychological distress, social disconnection, and behavioral challenges. This narrative review synthesizes post-2015 evidence revealing bidirectional links and calls for integrated, patient-centered care models.

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