# Dietary Restrictions in Celiac Disease: Differential Diagnosis Between Eating Disorders and Disordered Eating

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## Summary

*Celiac disease requires strict adherence to a gluten-free diet, which can significantly affect eating behaviors and increase the risk of eating disorders and disordered eating. Although clinically challenging, distinguishing between these conditions is essential in the context of prescribed dietary restrictions. In this literature review, we identified an increased risk of eating disorders, particularly anorexia nervosa, in individuals with celiac disease, as well as disordered eating behaviors, including excessive restriction, food-related anxiety, and social avoidance, all of which are associated with reduced quality of life. However, current assessment tools do not adequately distinguish between pathological eating behaviors and appropriate adherence to a prescribed therapeutic diet. Although a multidisciplinary approach that includes nutritional and mental health support is recommended, evidence-based therapeutic strategies specific to celiac disease are still lacking. Overall, eating disorders in celiac disease are common and clinically relevant, highlighting the need to improve their detection and develop more appropriate diagnostic tools for both clinical practice and research.*

***Keywords.*** *Celiac disease, eating disorders, disordered eating, gluten-free diet, anorexia nervosa, avoidant/restrictive food intake disorder.*

## Restricción alimentaria en la enfermedad celíaca: diagnóstico diferencial entre trastornos de la conducta alimentaria y alimentación desordenada

### Resumen

*La enfermedad celíaca requiere una adherencia estricta a la dieta libre de gluten, lo que puede afectar significativamente las conductas alimentarias y aumentar el riesgo de trastornos de la conducta alimentaria y alimentación desordenada. Si bien resulta clínicamente desafiante, diferenciar estas entidades es fundamental en el contexto de una restricción dietética prescrita. En esta revisión de la literatura, identificamos*

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*un mayor riesgo de trastornos de la conducta alimentaria , especialmente de anorexia nerviosa, en personas con enfermedad celíaca, así como conductas de alimentación desordenada, incluyendo restricción excesiva, ansiedad relacionada con los alimentos y evitación social, todas asociadas con una menor calidad de vida. Sin embargo, las herramientas de evaluación actuales no distinguen adecuadamente entre conductas alimentarias patológicas y la adherencia adecuada a una dieta terapéutica prescrita. Aunque se recomienda un abordaje multidisciplinario que incluya apoyo nutricional y de salud mental, aún faltan estrategias terapéuticas específicas basadas en evidencia para la enfermedad. En conjunto, la patología alimentaria en la enfermedad celíaca es frecuente y clínicamente relevante, lo que resalta la necesidad de mejorar su detección y desarrollar herramientas diagnósticas más apropiadas tanto para la práctica clínica como para la investigación.*

***Palabras claves.*** *Enfermedad celíaca, trastornos de la conducta alimentaria, alimentación desordenada, dieta libre de gluten, anorexia nerviosa, trastorno evitativo/restrictivo de la ingesta alimentaria.*

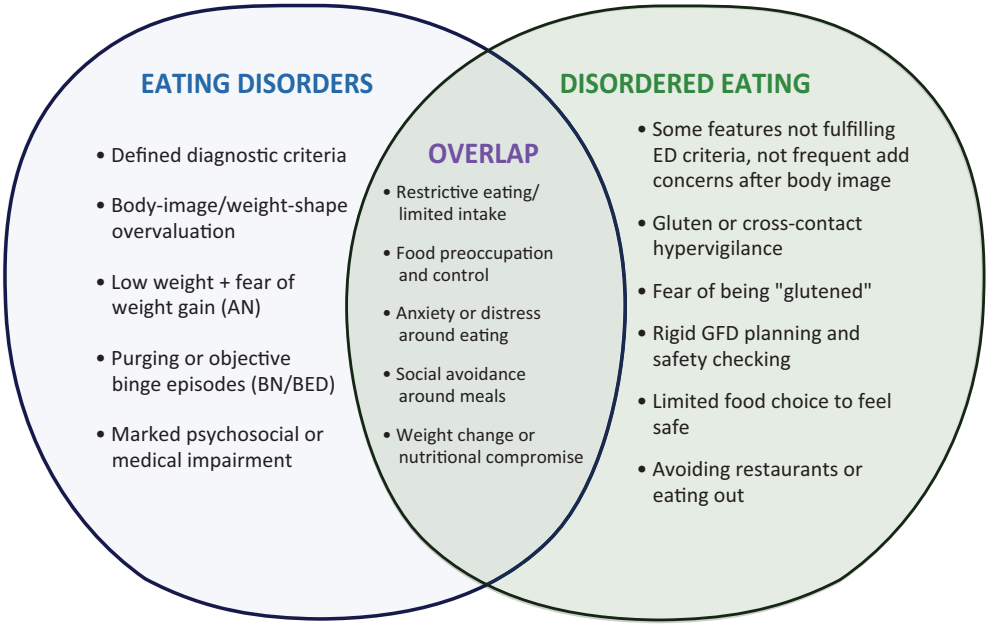
## Introdución

Celiac disease (CeD) is a chronic, immune-mediated condition triggered by gluten -the primary protein complex found in wheat, barley, and rye- that develops in genetically susceptible individuals.[1] It is one of the most common digestive disorders worldwide and affects approximately 1% of the world's population.[2]

Treatment of CeD requires strict and lifelong adherence to a gluten-free diet (GFD), as even minimal exposure to gluten can trigger an immune response.This dietary restriction represents a sustained burden for patients; their relationship with food, eating behaviors, and food-related anxiety are key factors in treatment adherence and long-term clinical outcomes.[3] The constant vigilance required to maintain adherence to the GFD may contribute to the development of eating behavior disturbances,[4] including disordered eating (DE). This phenomenon must be distinguished from eating disorders (EDs), clinically defined psychiatric conditions that generally precede a diagnosis of CeD or arise from psychological, social, or environmental factors independent of this disease. (Figure 1).

EDs are psychiatric conditions characterized by persistent disturbances in eating behaviors and associated thoughts, with significant medical consequences and psychosocial impairment. The main diagnostic categories include anorexia nervosa (AN), bulimia nervosa (BN), binge-eating disorder (BED), and avoidant/restrictive food intake disorder (ARFID).[5] In contrast,

***Figure 1.*** *Similarities and Differences Between Eating Disorders and Disordered Eating*




**AN:** Anorexia nervosa; **BN:** Bulimia nervosa; **BED:** Binge eating disorder; **GFD:** Gluten-free diet; **CeD:** Celiac disease.

DE represents a spectrum of maladaptive food-related attitudes and behaviors, such as rigid dietary restriction, fasting, skipping meals, or binge eating. Although these behaviors do not meet full diagnostic criteria for an ED, they may be associated with psychological distress, nutritional compromise, and suboptimal medical management.[6,7] This distinction is particularly relevant in gastrointestinal conditions such as CeD, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and food allergies or intolerance, where medically indicated dietary restrictions may evolve into excessively restrictive eating patterns or maladaptive eating behaviors.[6,7]

This review summarizes the current literature on ED and DE in individuals with CeD (Table 1 and Table 2), with the aim of guiding clinical recommendations and identifying critical knowledge gaps for future research.

***Table 1.*** *Studies on Eating Disorders in Celiac Disease*

| Author, Year | Country | Study design | Population | Aim | Assessment / Exposure | Outcome |
|---|---|---|---|---|---|---|
| **Mårild, 2017**[24] | Sweden | Nationwide cohort/case-control study | 17.959 women with biopsy-confirmed CeD; 89.379 matched controls | Association between CeD and AN | Registry follow-up for AN before/after CeD diagnosis | Increased AN risk after CeD diagnosis (HR 1.46); prior AN was also associated with later CeD (OR 2.18), supporting a bidirectional association |
| **Hedman, 2019**[25] | Sweden | Nationwide population-based cohort | > 2.5 million individuals | Bidirectional associations between EDs and autoimmune diseases | Registry follow-up for incident ED and autoimmune disease | Female AN was associated with an 83% increased risk of later CeD; prior CeD increased subsequent AN risk by 50 %; associations were also observed for other ED categories |
| **Butwicka, 2017**[20] | Sweden | Nationwide matched cohort study | 10,903 children with CeD; 12,710 siblings | Psychiatric risk in children with CeD | Registry analysis of psychiatric outcomes | Children with CeD had increased psychiatric risk, including EDs (HR 1.4) |
| **Lebwohl, 2021**[21] | Sweden | Nationwide matched cohort study | 19,186 children with CeD; 94,249 controls | Long-term psychiatric outcomes after childhood CeD | Registry-based psychiatric follow-up | Childhood CeD was associated with increased psychiatric risk persisting into adulthood; ED risk was increased (HR 1.34) |
| **Alkhayyat, 2021**[22] | United States | Retrospective EHR database study | 112,340 patients with CeD | Psychiatric comorbidity in CeD | EHR diagnostic database analysis | Higher odds of psychiatric disorders, including EDs (OR 15.84) |
| **Subramanian, 2024**[23] | Canada | Administrative matched cohort study | 83,920 immune-mediated GI disease (CeD n = 14,718); 167,776 controls | Incident ED risk in immune-mediated GI disease | Administrative incident ED analysis | Immune-mediated GI disease was associated with higher ED risk (adjusted HR 1.98); the association with CeD was significant primarily in younger populations |
| **Hansen, 2023**[19] | Denmark | Nationwide cohort study | 6,329 incident CeD patients; 63,287 matched controls | Neuropsychiatric outcomes after CeD diagnosis | Registry follow-up | CeD was associated with increased risk of anxiety, depression, EDs, epilepsy, migraine, and stress disorders |
| **Passananti, 2013**[26] | Italy | Case-control study | 100 newly diagnosed adults with CeD; 100 controls | ED symptoms in untreated adult CeD | Psychological assessment (EAT-26, EDI-2, BES, mood/anxiety scales) | Higher ED symptom burden in untreated CeD, particularly among women |

*Continuation* ***Table 1.*** *Studies on Eating Disorders in Celiac Disease*

| Author, Year | Country | Study design | Population | Aim | Assessment / Exposure | Outcome |
|---|---|---|---|---|---|---|
| Karwautz, 2008[27] | Austria | Cross-sectional study | 283 adolescents with CeD | Eating pathology in adolescents with CeD | EDI-2, EDE-Q, BMI, clinical interview | Higher rates of eating pathology, particularly BN, with poorer adherence to the gluten-free diet |
| Wagner, 2015[28] | Austria | Multicenter case-control study | 259 female adolescents with CeD | ED correlates in adolescents with CeD | Psychological assessment of ED, mood, coping, and quality of life | ED was associated with higher BMI, poorer dietary adherence, more depressive symptoms, and lower quality of life |
| Babio, 2018[29] | Spain | Cross-sectional case-control pilot study | 98 patients with CeD; 98 controls | ED risk in CeD vs controls | ED screening questionnaires | Modestly higher ED symptom scores in CeD, but no clear difference in clinically significant ED risk |
| Bennett, 2022[31] | United States | Retrospective clinic-based study | 137 adults with CeD | Suspected ARFID in CeD | ARFID screening with clinical correlation | 57% met criteria for suspected ARFID; food/social burden predicted ARFID, without differences in disease control or gluten-free diet adherence |
| Rabiee, 2024[32] | Iran | Cross-sectional registry-based study | 217 adults with CeD | ED symptoms, body image, and gluten-free diet adherence in CeD | EAT-26, body image scales, CDAT | ED symptom risk was 43.5%; poorer gluten-free diet adherence was associated with higher ED symptom scores |
| Nisihara, 2024[30] | Brazil | Cross-sectional comparative study | 484 adults with CeD; 257 controls | ED risk in adults with CeD | EAT-26 screening comparison | No significant difference in ED screening positivity between CeD and controls |
| Nikniaz, 2021[30] | Iran | Systematic review/meta-analysis | 23 observational studies | Bidirectional association between EDs and CeD | Systematic review/ meta-analysis | Pooled ED prevalence in CeD was 8.9%; risk of AN was increased in CeD (RR 1.48), and risk of CeD was increased in AN (RR 2.35) |

***Table 2.*** *Studies on Disordered Eating in Celiac Disease*

| Author, Year | Country | Study design | Population | Aim | Assessment / Exposure | Outcome |
|---|---|---|---|---|---|---|
| Satherley, 2017[45] | UK | Qualitative study | 21 adults with CeD | Disordered eating experiences in CeD | Interviews, questionnaires | Disordered eating was linked to body image concerns, binge/restrict patterns, and food restriction driven by cross-contamination fears |
| Simons, 2024[46] | United States | Cross-sectional observational study | 289 adults with GI disorders (including CeD) | Food-related quality of life in GI disease | FRQoL-29 | Food-related quality of life was impaired; hypervigilance around food was a major contributor |
| Wolf, 2018[53] | United States | Prospective cross-sectional study | 80 adolescents and adults with biopsy-confirmed CeD | Dietary vigilance and quality of life | CeD-specific QoL measures, dietary interview | Extreme dietary vigilance was associated with lower quality of life and greater eating-related burden, particularly when eating out |
| Gholmie, 2023[51] | United States | Cross-sectional study | 50 adults with biopsy-confirmed CeD | Maladaptive food attitudes in CeD | CD-FAB | Higher maladaptive food behavior scores were associated with recent diagnosis, GI symptom burden, neuroticism, and poorer quality of life |

*Continuation* ***Table 2.*** *Studies on Disordered Eating in Celiac Disease*

| Author, Year | Country | Study design | Population | Aim | Assessment / Exposure | Outcome |
|---|---|---|---|---|---|---|
| **Lebovits, 2022**[48] | United States | Cross-sectional study | 538 adults with biopsy-confirmed CeD | Social/dating impact of CeD food behaviors | CeD-specific behavioral and psychosocial questionnaires | CeD substantially affected dating and social eating; some participants reported risky eating behaviors or intentional gluten exposure |
| **Leffler, 2007**[50] | United States | Cross-sectional observational study | 154 adults with biopsy-confirmed CeD | Predictors of gluten-free diet adherence | Questionnaire, dietitian assessment | Better adherence was associated with greater dietary knowledge, support, and confidence managing social or stressful situations |
| **Zysk, 2019**[49] | Poland | Cross-sectional comparative study | 225 adults (101 CeD; 124 non-CeD following GFD) | Food neophobia in CeD | Food Neophobia Scale | Food neophobia was significantly higher in individuals with CeD than in non-CeD individuals following a GFD |
| **Cadenhead, 2019**[52] | United States | Cross-sectional mixed-methods study | 30 adolescents with CeD | Adolescent GFD management behaviors | CDAT, QoL survey | Over half demonstrated maladaptive approaches to maintaining the gluten-free diet |
| **Lee, 2024**[63] | United States | Cross-sectional study | 50 adults with CeD without diagnosed ED | Food avoidance behaviors in CeD without ED | CDAT, CD-QOL, CES-D, STAI, EPSI, CD-FAB | Food avoidance and maladaptive eating behaviors were present even in individuals without formal ED diagnoses |

### *Eating Disorders*

Eating disorders (ED) are serious psychiatric conditions characterized by persistent disturbances in eating behavior and associated thoughts or emotions, leading to significant impairment of physical and psychosocial health.[8,9] The estimated lifetime prevalence of ED is approximately 1 in 7 males and 1 in 5 females by age 40, with 95% of incident cases occurring before age 25.[10]

This review focuses on anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), and avoidant/restrictive food intake disorder (ARFID), as this are the diagnoses most frequently addressed in research and clinical practice related to CeD (Table 3).

**Anorexia nervosa (AN)** is characterized by persistent restriction of energy intake leading to significantly low body weight, an intense fear of weight gain, and disturbances in body image perception, often accompanied by poor insight into illness severity and behaviors that interfere with weight restoration.[8] AN includes two subtypes: the restricting type and a binge-eating/purging type, the latter involving recurrent episodes of binge eating and/or purging in addition to severe restriction.[8] Complications are multisystemic, with frequent gastrointestinal involvement.[11] They are accompanied by significant cognitive and emotional disturbances, high medical morbidity, and psychiatric comorbidity.[8] Recent global estimates place the point prevalence of AN at approximately 43.9 cases per 100,000 individuals (0.04%) in the general population.[8] Onset typically occurs in early or middle adolescence, is more common in females, and generally has a more favorable prognosis in adolescents than in adults.[12] Notably, AN is associated with one of the highest mortality rates among psychiatric disorders.[13]

**Bulimia nervosa (BN)** is characterized by recurrent binge eating episodes, defined as the consumption of an objectively large amount of food accompanied by a sense of loss of control, followed by inappropriate compensatory behaviors intended to prevent weight gain, such as self-induced vomiting, misuse of laxatives, fasting, or excessive exercise.[8] To meet diagnostic criteria, these behaviors must occur

at least once a week over a three-months period, and self-evaluating must be disproportionately influenced by body shape and weight. When the individual has a significantly low weight, the diagnosis is reclassified as anorexia nervosa, binge-purge subtype.[13] Recent estimates report a global prevalence of BN of approximately 156.85 cases per 100,000 individuals (0.16%) in the general population.[14]

***Table 3.*** *Most Common Eating Disorders Diagnoses in Celiac Disease and Main Symptoms*[75-76]

| Disorder | Main symptoms | Distinguishing feature |
|---|---|---|
| Anorexia nervosa (AN) | • Severe restrictions on food/energy intake<br>• Significantly low body weight<br>• Intense fear of gaining weight<br>• Distorted body image<br>• Denial of the seriousness of low body weight | Low weight plus fear of weight gain and body-image disturbance |
| Bulimia nervosa (BN) | • Recurrent binge eating<br>• Loss of control during binges<br>• Compensatory behaviors such as self-induced vomiting, laxatives, fasting, or excessive exercise<br>• Overconcern with shape/weight | Binge eating with regular compensatory behaviors |
| Binge-eating disorder (BED) | • Recurrent binge eating<br>• Loss of control<br>• Eating rapidly, when not hungry, alone, or until uncomfortably full<br>• Guilt, disgust, or marked distress afterward | Binge eating without regular compensatory behaviors |
| Avoidant / restrictive food intake disorder (ARFID) | • Restriction or avoidance of food intake<br>• Low interest in eating<br>• Sensory aversion, or fear of choking, vomiting or another aversive consequence<br>• Weight loss, nutritional deficiency, dependence on supplements, or psychosocial impairment | Restriction is not primarily driven by weight or body shape concerns |

**Binge-eating disorder (BED)** is characterized by recurrent episodes of binge eating without compensatory behaviors, occurring at least once a week for a minimum of three months.[8] These episodes typically involve the rapid consumption of large quantities of food, eating in the absence of hunger, eating until a feeling of uncomfortably fullness is reached, and marked emotional distress, including feelings of shame, guilt, or depression.[13] BED is approximately twice as common in women as in men and represents the most prevalent eating disorder. Its estimated global prevalence is 1.9%, reaching 2.6% in the United States, and it accounts for approximately 47% of all ED diagnoses.[15,16]

**Avoidant/restrictive food intake disorder (ARFID)** is an eating disorder characterized by persistent avoidance or restriction of food intake that leads to an inability to meet nutritional requirements. It has clinically significant consequences, including weight loss, nutritional deficiencies, dependence on supplements or nutritional support therapies, and psychosocial im-

pairment, in the absence of body image or weight concerns.[8] ARFID may manifest as highly selective eating, low appetite, sensory-based food avoidance, or restriction driven by anxiety or fear of adverse consequences, such as choking or vomiting.[13] ARFID differs from disordered eating (DE), a term describing problematic eating behaviors or attitudes, such as food avoidance or dietary restriction, that may be transient or context-dependent and do not necessarily result in clinically significant nutritional, functional, or psychosocial impairment.

Population-based data from the United States indicate that individuals with eating disorders defined according to DSM-5 criteria -including AN, BN, BED and ARFID- have higher rates of concurrent psychiatric comorbidity, particularly mood disorders, anxiety disorders, substance use disorders, and personality disorders. Among these comorbidities, major depressive disorder is the most common, followed by alcohol use disorder.[17]

Table 3 summarizes the most common eating disorders in celiac disease

### *Eating Disorders in Celiac Disease*

The association between eating disorders (ED) and celiac disease (CeD) varies across available studies. A meta-analysis and systematic review[18] reported a combined prevalence of EDs of 8.88% in individuals with CeD, and identified a bidirectional relationship between the two conditions, with the strongest and most consistent association observed with anorexia nervosa (AN). Population-based studies, in both adult[19] and pediatric cohorts[20] have also demonstrated an increased risk of ED in individuals with CeD. Similarly, Lebwohl *et al.*[21] reported an elevated risk of ED both before and after CeD diagnosis, supporting a complex bidirectional temporal relationship. Furthermore, large studies based on administrative database from the United States and Ontario suggest that individuals with CeD have a modest to substantially increased risk of ED diagnoses compared with controls, with reported increases of approximately 1.5 to 2 times, depending on the population studied and the ED subtype.[22,23]

Population-based cohort studies provide more specific evidence regarding the bidirectional association between CeD and AN. A Swedish national study showed that individuals with biopsy-confirmed CeD had an approximately 1.4 to 1.5 fold higher risk of developing AN compared to the general population. Conversely, individuals with a prior diagnosis of AN had an approximately 2-fold higher risk of subsequently developing CeD.[24] These findings have been replicated by Hedman *et al.*,[25]reinforcing the consistency of the epidemiological link between CeD and AN.

The clinical presentation of ED in CeD is highly heterogeneous. In adults with untreated CeD, higher scores on measures of eating disorder symptoms have been reported, particularly in women, with *Eating Attitudes Test* (EAT-26) scores that are approximately 1.5 to 2 times higher than those observed in controls.[26] In adolescents, higher rates of BN and a broader spectrum of eating disorders have been described (between 10 and 15% in some cohorts), with CeD preceding the onset of ED in most cases.[27] In adolescents with CeD, the presence of comorbid EDs was associated with higher BMI, more depressive symptoms, and poorer quality of life compared to those without EDs.[28] The association with a higher BMI suggests that disordered eating in this population are not limited to restrictive phenotypes with low-weight.

However, findings from case-control studies remain inconsistent. For instance, Babio *et al.*[29] reported only modest differences in screening scores for EDs between individuals with CeD and controls, while Nisihara *et al.*[30] found no significant difference in ED risk. More recently, ARFID has emerged as a clinically relevant phenotype in CeD, with one study reporting that more than half of adults with CeD met criteria suggestive of ARFID,[31] driven primarily by food-related anxiety and social burden associated with eating.

The relationship between DE and GFD adherence also appears complex. Although one might expect restrictive phenotypes such as AN or ARFID to be associated with greater dietary rigidity and higher adherence to the GFD, Rabiee *et al.*,[32] found that higher scores on symptoms consistent with EDs were significantly associated with lower adherence to the GFD.

Taken together, these findings suggest a higher burden of ED symptoms in subgroups of individuals with CeD, although estimates vary substantially depending on study design, the population assessed, and the measurement methods used. The most consistent evidence supports a bidirectional relationship between CeD and AN, whereas associations with other ED subtypes remain less robust.

### *Diagnosis and Assessment of Eating Disorders in Celiac Disease*

The diagnosis of ED is primarily clinical and should be based on DSM-5-TR criteria rather than on screening instruments.[8] Although ED can occur across all ages, gender, or ethnic background, adolescents and young adults are the groups at highest risk, and AN typically presents at an earlier age than BN.[33]

A comprehensive assessment should include evaluation of weight changes over time, patterns of food restriction or binge eating, the use of compensatory behaviors (Table 3), and attitudes associated with eating and body image, along with screening for psychiatric and medical comorbidities.[8,9] The evaluation should also consider the patient's motivation for treatment and the availability of psychosocial support.[12] Brief screening tools such as the SCOFF (Table 4),[34] can be useful as a first step; however, a positive result requires confirmatory diagnostic evaluation by a mental health professional, ideally a psychiatrist.[13,35] Diagnostic confirmation can be supported by structured interviews such as the *Eating Disorder Examination* (EDE)[36] and the *Eating Disorder Assessment* for DSM-5 (EDA-5).[37] Similarly, self-administered instruments such as the *Eating Disorder Inventory* (EDI-3)[38] can be useful for monitoring symptoms and conducting longitudinal assessment.[39] Given the potential for medical instability associated with EDs, including bradycardia, hypotension, electrolyte disturbances, dehydration, or signs of malnutrition, medical risk should be systematically evaluated when an ED is suspected, with referral to higher-level care when clinically indicated.[13,40]

***Table 4.*** *SCOFF[34] Screening of Eating Disorders in Clinical Practice*

| SCOFF[33] | Screening question |
|---|---|
| S | Do you make yourself Sick because you feel uncomfortably full? |
| C | Do you worry you have lost Control over how much you eat? |
| O | Have you recently lost more than One stone (≈ 6.35 kg) in a 3-month period? |
| F | Do you believe yourself to be Fat when others say you are too thin? |
| F | Would you say that Food dominates your life? |

### *Clinical Management of Eating Disorders in Celiac Disease*

The management of EDs in individuals with CeD requires a dual approach, integrating strict medical treatment of CeD with evidence-based therapeutic interventions for EDs. This overlap poses significant clinical challenges, as adherence to the GFD may inadvertently reinforce restrictive or obsessive eating patterns. Consequently, care should be provided by an integrated multidisciplinary team, with the goal of ensuring consistent messaging, minimizing unnecessary food-related fears, and clearly differentiating between medically indicated dietary restrictions and pathological restrictive behaviors driven by the ED.

As with patients without CeD, effective management of ED in CeD relies on a coordinated multidisciplinary approach, with individualized treatment based on the patient's specific diagnosis, age, nutritional status, and medical risk. Collaboration among physicians, dietitians, and mental health professionals is essential, and early diagnosis, along with timely, evidence-based intervention, is associated with better clinical outcomes.[9,13,40] In BED, the primary therapeutic goals include nutritional rehabilitation and weight restoration, combined with disorder-specific psychotherapy; in adolescents and young adults with family or caregiver support, family-based treatment is the strategy of choice.[9,12,40] Cognitive-behavioral therapy (CBT) is the first-line treatment for BN, and fluoxetine may be considered as an adjunctive treatment or effective therapeutic alternative when clinically indicated.[35,40] In AN, behavioral therapy (BT) and interpersonal psychotherapy have demonstrated solid efficacy, in both individual and group formats, and antidepressants may be considered in selected cases.[35,40] The management of ARFID focuses on restoring adequate nutritional intake, correcting nutritional deficiencies, expanding diet variety, and addressing avoidance behaviors through behavioral interventions, exposure-based therapies, cognitive-behavioral therapy, and family-based treatments.[41,42] The evidence for ARFID treatment remains more limited than for other EDs, and there is currently no universally accepted standard approach. In general, a stepped-care and coordinated model is recommended, in which treatment intensity is adjusted to the level of clinical risk, simultaneously integrating medical, nutritional, and psychological support.[35,40,42,43]

### *Disordered Eating in Celiac Disease*

In CeD, strict adherence to the GFD introduces unique challenges that can significantly influence eating behaviors.[4,44-46] The need for constant vigilance -including careful review of food labels, prevention of crosscontact, and management of social situations involving food- can lead to increased monitoring of food intake and food-related anxiety.[4,47] Although these behaviors are adaptive and medically necessary, in some individuals they evolve into maladaptive patterns resembling DE, such as excessive restriction, behavioral rigidity, or avoidance of eating outside the home.[46,48-51] Emerging evidence suggests a complex interaction between CeD and DE behaviors, with potential implications for psychological well-being and quality of life. It has been demonstrated that individuals with CeD exhibit higher rates of food neophobia, compared with non-CeD individuals -defined as fear or avoidance of new or unfamiliar foods-and of orthorexia nervosa (ON), characterized by a pathological preoccupation with consuming foods perceived as healthy, pure or "clean". These situations involve restrictive dietary behaviors, food avoidance, emotional distress when these behaviors are violated, and potential nutritional or psychosocial impairment.[49] In CeD, the distinction between AN and ON can be challenging, given that medically appropriate gluten avoidance may resemble orthorexic behaviors; clinical concern arises when dietary restriction becomes excessive, anxiety-driven, nutritionally harmful, or extends beyond what is medically necessary. Satherley *et al.*[45] reported elevated DE symptom scores in CeD populations, including both restrictive behaviors and episodes of binge eating. Similarly, Cadenhead *et al.*,[52] found that more than half of adolescents with CeD exhibited maladaptive eating patterns, such as rigidity, excessive preoccupation with food, and food avoidance, which were associated with a reduced quality of life.

Dietary vigilance itself appears to contribute to disease burden. Adaptive vigilance in maintaining a GFD involves proportionate and flexible behaviors that support safe disease management, whereas hypervigilance is characterized by excessive, anxiety-driven monitoring that leads to unnecessary restrictions, social impairment or a reduced quality of life. Studies on various gastrointestinal diseases, including CeD, have shown that strict dietary control is associated with increased food-related hypervigilance and reduced food-related quality of life.[46-48] In specific CeD cohorts,[51-53] greater adherence to the GFD has been associated with a greater perceived burden and lower quality of life, while maladaptive food attitudes assessed using tools such as the *Celiac Disease Food Attitudes and Behaviors* (CD-FAB) scale correlated with less favorable patient-reported outcomes.

The social implications of GFD adherence further exacerbate this burden. Lebovits *et al.*[48] reported that 68.4% of CeD patients indicated a moderate-to-major impact of their diagnosis on dating life, including concerns about physical intimacy and discomfort when discussing dietary needs in public settings, which contributed to episodes of intentional nonadherence. Similarly, Leffler *et al.*[50] found that adherence to a GFD negatively affected social functioning, with 44.2% of participants avoiding eating outside the home and 21.4% avoiding participation in social events. These factors may contribute to both intentional non-adherence and the development or maintenance of maladaptive eating behaviors.

Overall, current evidence suggests that, while dietary vigilance is essential for CeD management, it may also predispose a subgroup of individuals to the development of DE behaviors, with important implications for psychological well-being and quality of life. Table 3 summarizes studies on DE behaviors in CeD.

### *Diagnosis and Assessment of Disordered Eating in Celiac Disease*

The assessment of DE in CeD requires careful distinction between adaptive adherence to a GFD and maladaptive restrictive eating behaviors that exceed medical necessity. Because DE is not a formal diagnosis but rather a broad term that encompasses problematic eating attitudes or behaviors that may be subclinical or context-specific, evaluation should include assessment of dietary rigidity, fear of gluten exposure, food-related anxiety, psychosocial impairment, nutritional status, and the impact of eating behaviors on daily functioning. Examples of DE behaviors can be found in Table 5. Tools such as the Celiac Disease Food Attitudes and Behaviors (CD-FAB) scale may help identify maladaptive food-related cognitions and behaviors, although they do not establish a psychiatric diagnosis. It is essential to consider and rule out, when appropriate, the presence of an ED, including AN, BN, BED or ARFID, since these conditions are defined psychiatric diagnosis that require specific therapeutic approaches.

***Table 5.*** *Examples of Disordered Eating Behaviors*[77,78]

| Domain | Common signs/symptoms |
|---|---|
| Restrictive eating behavior | • Chronic dieting<br>• Skipping meals<br>• Excessive dietary restriction beyond medical need (e.g., overly strict gluten avoidance in CeD)<br>• Elimination of food groups without indication |
| Irregular/ binge-related loss-of-contro eating patterns | • Subclinical overeating without loss of control<br>• Grazing throughout the day<br>• Irregular or highly inconsistent meal timing<br>• Night-time eating patterns |
| Weight-control behaviors | • Extreme dieting<br>• Fasting<br>• Purging<br>• Misuse of weight-control methods |
| Subclinical compensatory behavior | • Fasting after perceived overeating<br>• Excessive exercise driven by guilt<br>• Rigid "reset" eating patterns |
| Weight/shape overconcern | • Persistent worry about body weight, shape, or appearance, which does not meet criteria of ED |
| Cognitive and emotional features | • Food-related anxiety<br>• Obsessive calorie/ingredient checking<br>• Guilt or shame after eating<br>• Rigid "good vs bad food" rules<br>• Preoccupation with weight or "clean eating" |
| Rigid eating patterns | • Inflexible eating rules<br>• Avoidance behaviors<br>• Dichotomous thinking about food ("good"/"bad") |
| Celiac disease-specific behaviors | • Hypervigilance around gluten exposure<br>• Avoidance of safe foods due to fear of contamination<br>• Social eating avoidance<br>• Progressive food restriction despite adequate disease control |

***Management of Disordered Eating in Celiac Disease***

Currently, there are no specific treatment guidelines for CeD that address the management of disordered eating. The available literature supports a multidisciplinary, prevention-oriented approach that integrates medical, dietary and psychological care, along with ongoing education and longitudinal monitoring.[52,54,55] Where comprehensive multidisciplinary care is unavailable, a minimal pragmatic care model should include a treating physician (gastroenterologist or primary care physician) responsible for clinical evaluation and me-

dical monitoring, a dietitian with experience in CeD to guide safe and nutritionally adequate GFD management, and referral to a mental health professional, when available, upon suspicion of underlying psychological factors or an ED, with escalation to specialized care based on clinical severity and medical risk.[49,50] Given that the cornerstone of CeD management is lifelong adherence to a GFD, clinicians must carefully balance the need for strict gluten avoidance with the risk of reinforcing maladaptive eating patterns, and to prevent progression to a formal ED.[56,57] In CeD, DE may arise from symptom-driven food restriction, hypervigilance defined as monitoring, worry or excessive or disproportionate avoidance behaviors related to the risk of accidental gluten ingestion or cross-contact, beyond what is reasonably required for safe disease management, or fear of adverse outcomes, all of which are amplified by the demands of strict dietary adherence.[44,58] In this context, clinical follow-up should include structured and repeated assessments of eating patterns and their context, avoiding the automatic assumption that increasing restriction reflects appropriate adherence or, conversely, prematurely labeling it as psychiatric pathology.[47,56]

Clinical assessments should extend beyond GFD adherence to assess patterns suggestive of maladapted eating, including meal skipping, fasting to avoid symptoms, a progressive reduction in dietary variety, avoidance of safe foods, fear of eating outside the home, excessive reliance on foods prepared exclusively by the patient and persistent preoccupation with food. Additional concerning features include unintentional weight loss, body image disturbance, compensatory behaviors (e.g., purging or laxative use) and persistent gastrointestinal symptoms despite escalating restriction.[56,58]

There is very limited information on the routine implementation of formal screening tools for ED or DE in CeD clinics and currently there are no clinical guidelines recommending universal standardized screening for ED/DE in all CeD patients. However, selected screening instruments may support case identification in higher-risk individuals, including general ED tools such as the *Eating Disorder Screen for Primary Care* (ESP),[59] the SCOFF questionnaire,[34] as well as CeD-specific instruments such as the *Celiac Disease Food Attitudes and Behaviors Scale* (CD-FAB),[60] which may help identify maladaptive food-related attitudes and behaviors.

Nutritional management should be carried out by dietitians with expertise in both CeD and EDs, with the goal of maintaining strict gluten exclusion while minimizing unnecessary restrictions. This includes promoting dietary variety within the GFD, clarifying the distinction between medically-required and avoidant restrictions and addressing food-related fears such as cross-contact. Psychological interventions are a core component of treatment and should target maladaptive cognition and behaviors related to food, food safety and body image. In this context, evidence-based approaches including cognitive-behavioral therapy (CBT) and family-based treatment can be adapted to address features that overlap with conditions such as ARFID and AN.

Developmental considerations are also important, as maladaptive eating behaviors often emerge during adolescence.[61] In individuals with CeD, early risk factors such as dissatisfaction with body weight, symptoms of anxiety or depression, and family dynamics surrounding meals, may interact with the chronic demands of a GFD, perpetuating or exacerbating DE behaviors into adulthood.[45,62] When DE behaviors are identified, clinicians should assess the patient's medical stability and initiate early referral to mental health professionals, ideally those with expertise in EDs and familiarity with gastrointestinal conditions.[56] Finally, it is essential to maintain consistent and coordinated messaging across disciplines to avoid reinforcing fear-driven eating patterns or excessive restrictions.

### *Nutritional Challenges in the Management of Eating Disorders and Disordered Eating in Celiac Disease*

The management of EDs, particularly AN, BN and ARFID in individuals with medically prescribed restrictive diets, such as those with CeD, presents a unique therapeutic paradox. Standard EDs treatment aims to reduce rigid dietary rules, challenge food avoidance and restore flexibility in the relationship with food, whereas CeD requires strict and lifelong adherence to a gluten-free diet (GFD), creating an inherent tension between psychological recovery and medical necessity.[26,63] This difficulty is especially relevant in restrictive phenotypes of EDs, in which the GFD may inadvertently reinforce restrictive cognitions or even become integrated into the disorder as a socially acceptable form of avoidance.[64,65]

From a nutritional perspective, maintaining a strict GFD while working to normalize eating patterns is inherently complex. A GFD requires the complete exclusion of wheat, rye, barley and related grains, as well as constant vigilance regarding hidden gluten sources and cross-contact during food processing, storage, and preparation. Without appropriate guidance, this necessary vigilance may evolve into excessive dietary restriction. Dietary management should therefore emphasize nutritionally adequate gluten-free substitutions, including whole grains and balanced meal planning to support sufficient caloric and nutrient intake.

This is particularly important given the nutritional limitations of many commercial gluten-free products, which are often not fortified with key micronutrients such as iron, folate, thiamine, riboflavin, and niacin. In a study by Jamieson *et al.*,[66] gluten-free staple products contained 1.3 times more fat and significantly lower levels of iron (-55%), folate (-44%), and protein (-36%) compared with gluten-containing counterparts. Variability in the content and composition of fiber -particularly fermentable fiber- may contribute to the persistence of gastrointestinal symptoms and negatively affect psychological well-being in patients with CeD.[67]

This is exacerbated in patients with coexisting EDs, in whom insufficient intake, elimination of food groups, binge-purge behaviors and erratic eating patterns can exacerbate micronutrient deficiencies commonly seen in both conditions, such as iron, B-complex vitamins, and essential fatty acids.[65,68] Altered eating behaviors may also contribute to gut microbiome dysbiosis, potentially worsening gastrointestinal symptoms and complicating dietary adherence.[69] In non-restrictive ED phenotypes such as BN and BED, episodes of uncontrolled intake may increase the risk of inadvertent gluten exposure, particularly when gluten-free options are limited.[64,68]

DE in CeD presents overlapping but distinct nutritional challenges. Unlike formal ED, DE in CeD is often driven by symptom-related anxiety, fear of gluten exposure or excessive dietary vigilance, rather than body image concerns. Patients may progressively eliminate foods beyond what is medically necessary, reducing dietary diversity and increasing the risk of nutritional inadequacy despite the adherence to GFD.[65,66] Hypervigilance around cross-contact and reliance to a GFD on a narrow repertoire of perceived "safe" foods may further impair quality of life and reinforce avoidance behaviors.[63,65,70] Access to a dietitian with CeD expertise can help reduce the risk of diet stacking, whereby patients progressively adopt multiple overlapping and unnecessary dietary restrictions beyond the GFD, increasing food-related anxiety, nutritional compromise, and psychosocial burden.[71]

Weight changes following the onset of a GFD can further complicate management. Weight restoration in previously malnourished individuals or weight gain associated with improved absorption and increased availability of processed gluten-free foods may contribute to body image concerns, triggering DE behaviors or exacerbating pre-existing ED, particularly in adolescents and young adults.[63,70] It is necessary to use standardized, evidence-based educational tools, including cross-contact checklists, which may help reduce unnecessary fear, improve consistency in counseling and support a better understanding of gluten exposure risk.[72] An example of a cross-contact checklist was published in a recent review.[73]

From a practical perspective, a hierarchy of nutritional goals in the management of DE begins with nutritional adequacy, prioritizing the restoration of consistent and sufficient energy intake, given that insufficient or erratic eating can worsen gastrointestinal symptoms, increase food-related anxiety and reinforce restrictive behaviors. Once adequate intake is established, the focus should shift to nutritional balance, ensuring meals that provide sufficient carbohydrates, protein and fat to promote satiety, nutritional adequacy, and more predictable digestive function. The next step is dietary variety, promoting a gradual expansion beyond a limited range of foods considered "safe", with the goal of improving dietary diversity, nutritional quality, and confidence in eating. Only once these foundations are established should the reintroduction of specific feared or avoided foods be addressed, using a gradual and structured approach to dietary rehabilitation (Figure 2). This stepwise model aligns with established principles of nutritional rehabilitation in eating disorders , emphasizing the restoration of adequate intake, balanced nutrition, dietary variety and gradual reintroduction of feared foods.

***Figure 2.*** *Stepwise Recommendations for Dietary Rehabilitation in Patients with Disordered Eating*

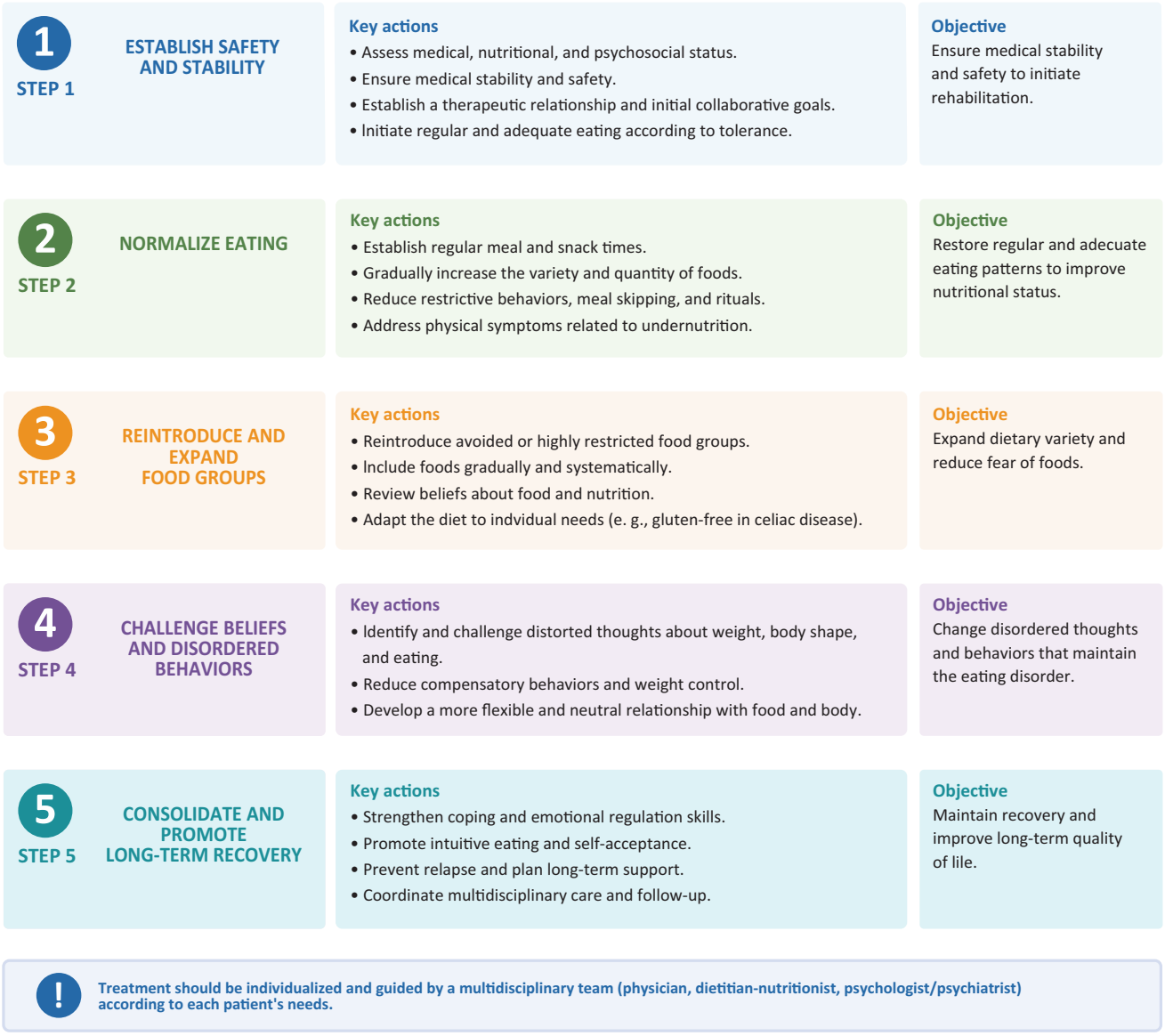



Image created using ChatGPT. References: 1- Thomas JJ, *et al.* Cognitive-behavioral treatment of avoidant/restrictive food intake disorder. Curr Opin Psychiatry. 2018;31(6):425-30. 2-Treasure J, *et al.* Eating disorders. Lancet. 2010; 375:583-93.

### *Recommendations for the Clinical Management of Eating Disorders and Disordered Eating in Celiac Disease*

This section provides practical guidance for clinicians managing ED and DE in individuals with CeD, with an emphasis on clinical decision-making and the delineation of roles within the care team.

In patients with restrictive eating, food-related anxiety, weight change or distress associated with the GFD, the first clinical task is to determine whether these manifestations correspond to a DE pattern or an ED requiring specialized mental health evaluation. Distinguishing between adaptive adherence to the GFD and patterns of DE or a formal ED can be challenging, as

medically necessary restriction may overlap with maladaptive or pathological behaviors. Brief tools such as the SCOFF questionnaire[34] or the Eating Disorder Examination Questionnaire (EDE-Q)[74] support early identification in clinical settings. Severe restrictions with low weight, fear of weight gain, binge eating, compensatory behaviors or marked body image disturbance suggest an ED, whereas hypervigilance, rigid safety behaviors or progressive narrowing of food choices may reflect DE.

When an ED is suspected, the role of the physician is to recognize warning signs, assess medical stability, and facilitate a timely referral to mental health services or specialized ED programs. ED requires specialized psychiatric management; nutrition-focused interventions alone may be insufficient or they may inadvertently reinforce maladaptive behaviors. For both of these reasons, early referral is essential.

In patients with DE not meeting ED criteria, physicians and dietitians play a more active role in management. Treatment should focus on maintaining strict gluten exclusion while minimizing unnecessary dietary restriction, supporting nutritional adequacy and addressing maladaptive food-related beliefs. When patients are reluctant to engage with mental health services, clinicians should maintain longitudinal follow-up, document clinical concerns, and reconsider referral using clear, nonjudgmental language focused on functionality, safety, and quality of life.

Within this framework, several practical recommendations can guide management:

1. Assess the severity and context of altered eating behaviors to differentiate DE from ED.

2. Refer patients early when there are features consistent with an eating disorder, significant psychological distress, or nutritional risk.

3. Promote multidisciplinary collaboration with dietitians and mental health professionals experienced in both CeD and EDs.

4. Reinforce evidence-based education on GFD to prevent excessive or unnecessary restrictions.

5. Acknowledge the psychological burden of dietary vigilance, particularly in social contexts and situations of food uncertainty.

6. Conduct longitudinal monitoring of eating behaviors, nutritional status, and psychosocial impact.

Overall, management should be individualized and multidisciplinary, with a clear delineation of roles across specialties.

Figure 3 presents a summary of the diagnosis and management of EDs and DE in CeD.

### *Addressing Hypervigilance in Celiac Disease*

Hypervigilance regarding gluten exposure warrants particular attention in the management of CeD.

While patients must develop practical skills to maintain a GFD -including reading labels, preventing cross-contact, and making safe food choices- in some individuals these behaviors may become excessively rigid or fear-driven.

In such cases, patient education is a central component of management.

Clear, evidence-based counseling from the clinical team or a dietitian specializing in CeD can help correct misconceptions about gluten exposure risk, clarify high-risk versus low-risk scenarios, and reduce uncertainty around food labeling, cross-contact, and safe practices when eating out.

The use of standardized educational tools, practical checklists, and consistent messaging among different healthcare professionals can help reduce unnecessary fears and prevent conflicting recommendations that may exacerbate anxiety.[30-32]

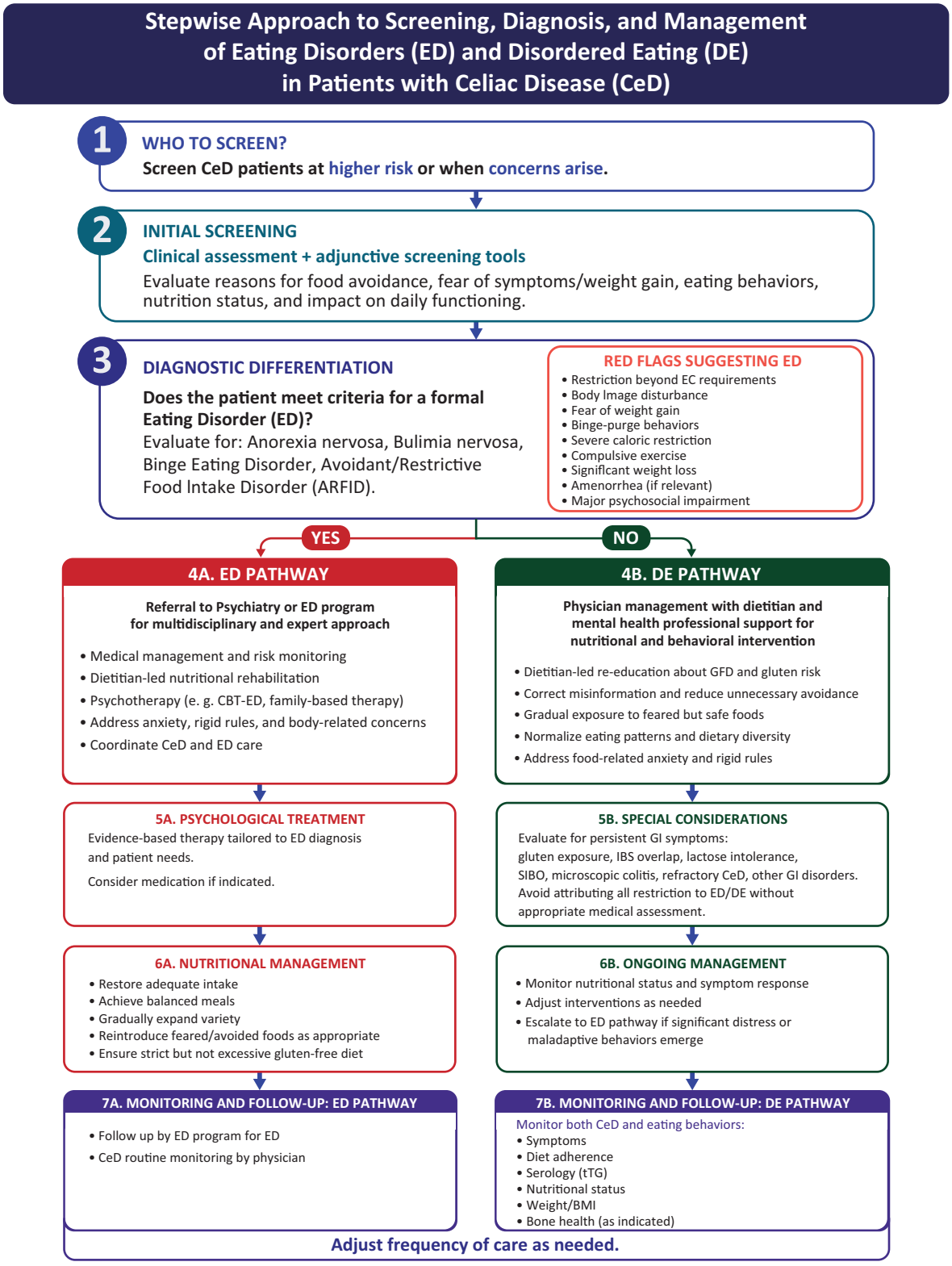
Behavioral strategies can also be helpful, particularly when hypervigilance leads to progressive restriction or psychosocial impairment.

Gradual reintroduction of unnecessarily avoided but safe foods, expansion of dietary variety and supported exposure to low-risk social eating situations can help rebuild confidence and reduce reliance on a narrow repertoire of foods perceived as “safe”.

The goal is not to reduce adherence to the GFD, but to promote proportionate vigilance which is maintaining medical safety while minimizing unnecessary restrictions, food-related anxiety and impaired quality of life.

Figure 3 summarizes a stepwise approach to the screening, diagnosis, and management of eating disorders and disordered eating in celiac disease.

***Figure 3.*** *Screening, Diagnosis and Management of Eating Disorders and Disordered Eating in Celiac Disease*




**GFD:** Gluten-free diet; **ED:** Eating disorder; **DE:** Disordered eating; **CeD:** Celiac disease; **ARFID:** Avoidant/restrictive food intake disorder; **CBT:** Cognitive behavioral therapy; **tTG:** Tissue transglutaminase.

## Discussion

The intersection between CeD, maladaptive eating behaviors and EDs represent an important and underrecognized challenge in gastroenterology. These conditions may mimic, obscure or exacerbate one another, as they share overlapping features including weight changes, abdominal pain, altered bowel habits, fatigue, micronutrient deficiencies, and malnutrition.[8] (Figure 1). As a result, distinguishing between ongoing intestinal disease activity, poor dietary adherence and coexisting DE or EDs can be particularly difficult in patients with persistent symptoms or nutritional compromise despite strict dietary adherence.

This complexity is heightened by the fact that CeD treatment is inherently dietary. While strict adherence to GFD is essential, the required vigilance may contribute to hypervigilance, rigidity and food-related anxiety in susceptible individuals, potentially evolving into maladaptive eating patterns. Conversely, pre-existing EDs may interfere with treatment adherence, nutritional rehabilitation and the clinical interpretation of symptoms. These dynamics underscore the importance of distinguishing adaptive dietary management from pathological restriction as a core component of CeD care. In this context, EDs and DE should be recognized as clinically relevant factors influencing adherence, symptom persistence, nutritional risk and quality of life, justifying a multidisciplinary approach involving gastroenterologists, dietitians, and mental health professionals.

Psychosocial factors appear to play a key role in this interaction. A higher burden of symptoms consistent with EDs has been associated with depressive symptoms, lower quality of life, greater social burden, and body dissatisfaction.[28,30-32] These findings support a biopsychosocial framework, although the directionality of these relationships remains unclear, as psychosocial distress may act as both a contributing factor or be a consequence of maladaptive eating behaviors. Prospective longitudinal studies are needed to clarify temporal relationships, identify predictors of progression from DE to formal ED, and determine whether targeted psychosocial interventions can improve clinical and quality-of-life outcomes in individuals with CeD.

Several important gaps in knowledge remain. First, there is limited guidance on how to adapt nutritional interventions for CeD patients with coexisting DE or ED. Standard dietary counseling, delivered in isolation, may be insufficient or may inadvertently reinforce restrictive or fear-driven behaviors. Second, there is a lack of treatment-focused evidence. Most of the available studies are cross-sectional or observational and do not evaluate the effectiveness of integrated care models. It remains unclear whether standard ED treatments require modifications in the context of CeD, or what the best strategy is for coordinating gastrointestinal, nutritional and psychiatric care.

Third, there is a lack of validated tools specifically designed to distinguish maladaptive eating behaviors from medically necessary dietary restriction. Existing instruments (e.g., EAT-26, SCOFF) were developed for the general populations and may have limited specificity in conditions requiring therapeutic dietary modification, such as CeD, food allergy, inflammatory bowel disease, eosinophilic gastrointestinal disorders or irritable bowel syndrome managed with elimination diets. Although condition-specific tools, such as the *Celiac Disease Food Attitudes and Behaviors* (CD-FAB) scale, show potential for identifying maladaptive food-related cognitions and behaviors in CeD, further validation and broader clinical implementation are needed.[51,60]

Finally, the role of social determinants of health (SDOH), including food access, health literacy and social support, remains underexplored, despite their likely influence on vulnerability to DE in CeD.

Future research should prioritize longitudinal studies that clarify the temporal relationships between CeD, DE and ED, as well as intervention trials that evaluate multidisciplinary and integrated care models. The development of assessment tools specific to CeD and the incorporation of conceptual frameworks based on the SDOH will be critical to improving both clinical care and research in this population.

***Intellectual property.*** *The authors declare that the data, figures and tables in this article are original and were carried out at their institutions.*

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