Prospective Considerations for Suicide Preventative Dietetics Practice: A Narrative Review

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PROSPECTIVE CONSIDERATIONS FOR SUICIDE PREVENTATIVE DIETETICS
PRACTICE: A NARRATIVE REVIEW

by

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A Thesis

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**“The sun will rise, and we will try again.” – Tyler Joseph, Twenty-One Pilots**

**Dedication:** I dedicate this thesis to my dear late older brother, John Swink Fite. He is my hero and a model older brother in how he loved me and included me in his passions and pursuits. He struggled for many long, dark years and, ultimately, died by suicide in 2017. My family’s journey with his treatment showed us that significant gaps exist in mental healthcare, and novel, accessible treatments are needed to save lives. It is with great love and admiration that I dedicate this thesis to you, my brother.

**Acknowledgments:** Along with the support of my wonderful committee, I want to acknowledge the support of my family throughout my research. I owe them much gratitude for keeping me accountable and for reminding me of my motivation for this work.
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**Keywords:** suicide, dietetics, nutrition

**Abstract:**

This narrative review draws connections between the scope of practice of Registered Dietitians and issues related to suicide risk. It covers literature on topics including nutrition science (divided into biomarkers, micronutrients, and microbiome), dietary pattern, food insecurity, eating disorders, and chronic illnesses. Articles were collected from three databases: PubMed, SCOPUS, and CINAHL Complete. They were then saved to a citation manager and screened, with additional screening being performed following export to Excel documents, with $n = 61$ being included. Altered lipid metabolism, thyroid markers, and fasting blood glucose may be associated with suicide risk. Diet composition, along with nutrient deficiencies, may be associated with suicide risk. Microbiome composition has been associated with variance in suicidal ideation, as well as depression and anxiety. Food insecurity is associated with suicide risk among adolescents and elderly, alike, and suicide risk has been found to be disproportionately higher among recipients of food assistance. Suicide risk varies among eating disorder diagnoses and behaviors, with denial of eating disorder behavior also being a significant factor. Chronic illnesses are associated with suicide risk due to their negative effects on quality of life and functional ability, and economic instability and lack of social support further influence suicide risk. Further research should focus on further developing understanding of these issues and investigating the efficacy of RDN interventions with patients at risk for suicide.

1. **Statement of Purpose**
The aim of this narrative review is to provide evidence to support increased awareness of the potential benefits of the inclusion of dietitians in the treatment of individuals at risk for suicide and share initial recommendations of implications for practice and future research.

2. Introduction and Background

2.a Background on Suicide

Suicide nomenclature is historically not standardized across the literature.\(^1,2\) For the current work, definitions by the National Institute of Mental Health (NIMH) will primarily be used.\(^3\) Suicide attempts (SA) are defined by the NIMH as self-directed actions with the goal of dying, which may or may not cause injury or death.\(^3\) Additionally, they define suicidal ideation (SI) as thinking about, considering, or planning suicide.\(^3\) SI and SA can collectively be referred to as suicidal thoughts and behaviors (STB).\(^4\) Both SA and SI appear as variables in suicide research and are often recorded through self-reporting and screening tools such as the 9-item Personal Health Questionnaire (PHQ-9).

In the U.S., suicide is a public health priority, as the Healthy People 2030 goal is to reduce the suicide rate to 12.8 per 100,000, from a baseline in 2018 of 14.2 per 100,000.\(^5\) Nationally, rates of suicide and suicidal ideation vary among populations. In 2020, suicide was reportedly within the top ten causes of death for ages 5-64.\(^6\) It was the second highest cause of death for ages 10-14 and 24-34, as well as the third highest cause of death for ages 15-24.\(^6\) Despite a decline in U.S. suicide deaths between 2018-2020, there was a reported increase of 4% in 2021, signaling an urgent need for advances in mental health care in the U.S.\(^7\)

Suicide is also a global health priority, with the United Nations’ 2030 Sustainable Development Goal of reducing international suicide rates by one-third.\(^8\) Between 2000-2019,
133 countries were estimated to have a decrease in suicide rates, while 26 countries experienced an increase in suicide mortality. While rates per capita of suicides are reportedly higher in upper-middle-income countries, the majority of suicides occur in low-and-middle-income countries, where rates are disproportionately increasing. It is important to note that suicide statistics may be inaccurate due to a lack of quality instruments for reporting vital statistics, as well as social and cultural stigma leading to misclassification of suicide deaths. As such, suicide researchers may include deaths of undetermined causes in suicide statistics in order to avoid underreporting.

Theories on suicide have evolved over the previous century and recent decades. Notable theories of the 21st century largely address biological, psychological, and social influences on suicide. Proposed biological influences include, but are not limited to the autonomic system, hypothalamic-pituitary-adrenal axis (HPA) abnormalities, neuroinflammation, and decreased serotonergic neurotransmission. Psychological influences discussed are extensive, including factors like previous psychiatric diagnosis, thwarted belongingness, perceived burdensomeness, and entrapment. Furthermore, examples of social influences include social support, abuse and neglect, and traumatic life events. Additional factors may include physical illness, economic status and instability, gender and sexual minority, and many more. Theories of suicide may be utilized, collectively, to better understand the suicidal experience and predisposing factors to death by suicide.

Mental health and psychiatric disorders are consistently reported as significant risk factors for SI and SA. In Zhu et al.’s 2021 cross-sectional (CS) study on risk factors for SI among Chinese psychiatric inpatients, those at the highest risk had recurrent depressive disorder. Similarly, Nock et al. found a significant association between prior mental disorder
and suicidal behaviors in their 17-country cross-national study. Kessler et al.’s analysis of the 1990-1992 Nationally Comorbidity Survey determined that more than half of respondents with lifetime history of suicide attempt had three or more risk factors (such as major depressive disorder, panic disorder, or drug abuse), indicating that suicide risk may be influenced by the comorbidity of mental health conditions. SI associated with psychiatric illness is evident even among pre-adolescents. In the Adolescent Brain Cognitive Development Study (ABCD,) a 10-year longitudinal study including 11,875 9-10 year old US children, presence of any psychiatric condition was significantly associated with greater odds of SI.

2.b Current Treatment Modalities

In the United States healthcare system, patients presenting with SI are typically treated with psychotherapy and pharmaceuticals. Additional treatments include electroconvulsive therapy and transcranial magnetic stimulation, along with more recently approved treatments like ketamine and esketamine. Psychotherapy, primarily cognitive behavioral therapy (CBT), has been found to reduce incidences of SI and suicide attempts through a range of randomized control trials. It can equip suicidal individuals with support from therapists and coping skills to regulate emotions. Nonetheless, with recent increases in suicide in the U.S. and internationally, it is likely that gaps exist in suicide prevention.

2.c Connecting Mental Health and Nutrition

As psychiatric disorders may increase risk of SI, it is important to address associations between nutrition and mental and cognitive health. Research throughout the 20th century helped to build a foundation of knowledge on nutrients’ influence on mental health. This foundation of knowledge continues to grow, with connections between nutrition and mental health are being
increasingly recognized in fields of study like nutritional psychiatry and nutritional psychology, represented by professional organizations like the International Society for Nutritional Psychiatry Research and the Center for Nutritional Psychology.\textsuperscript{35,36} Both macronutrients and micronutrients are involved in metabolic processes essential to cognitive function and mental health.\textsuperscript{37–46} Macronutrients play multiple roles in neurometabolic function, such as the use of carbohydrates and proteins to produce precursors for neurotransmitters like norepinephrine and serotonin.\textsuperscript{40,45,46} Micronutrients are critical for brain health, with B vitamins supporting neuronal development and neurotransmitter production, and vitamins E and C protecting from oxidative damage.\textsuperscript{40} The gut-brain axis is another area of nutrition research relevant to mental health, as metabolites produced by bacteria, such as serotonin and brain-derived neurotropic factor, affect neuroplasticity, cognition, and mood.\textsuperscript{38}

Along with the risk of self-harm and suicide, individuals experiencing SI may be at nutritional risk. Researchers have found associations between mental illness and food addiction, food insecurity (FI), and poor overall health outcomes.\textsuperscript{47–50} Teasdale et al.’s CS study of individuals attending community mental health centers \((n = 30, \text{ age range } 16-25)\) found that 37\% of participants had food addictions.\textsuperscript{47} Moreover, Pourmotabbed et al.’s meta-analysis indicated a significant association between FI and depression among adults \((\text{OR } = 1.40)\), most prominently for adults \(\geq 65\) years of age \((\text{OR } = 1.75, \text{ } P < 0.001)\).\textsuperscript{48} People suffering from severe mental illnesses (SMI) - which include conditions like major depressive disorder, schizophrenia, and bipolar disorder - have been found to present concurrently with nutrition risks, including both underweight and overweight, malnutrition, food insecurity, eating disorders, and poor diet quality/eating patterns.\textsuperscript{51–57}

2.d Nutrition Screening Tools for Mental Health Patients
Due to these risks, several screening tools tailored to individuals with mental illness currently exist, and more are being developed.\textsuperscript{58–60} Hancox et al.’s scoping review presents seventeen nutrition risk screening methods for adults with SMI, of which three have been validated for this population.\textsuperscript{58} Nutrition risks included in these tools included malnutrition, dysphagia risk, constipation, and disordered eating.\textsuperscript{58} Risch et al. successfully predicted malnutrition among a sample of German patients with SMI ($n = 132$) based on self-reported weight loss and severity of mental and physical health symptoms (determined with the 9-item Symptom Checklist, or SCL-K-9).\textsuperscript{59} The predictive model combined the Nutritional Risk Screening and Mini Nutrition Assessment – Short Form, which the researchers had adapted for patients with SMI\textsuperscript{59}. NutriMental is a nutrition screening tool in development by Teasdale et al. for assessing nutrition risk for individuals with SMI.\textsuperscript{60}

2.e Registered Dietitians’ Scope of Practice and its Relevance to Suicide Preventative Care

Registered Dietitian Nutritionists (RDN) are healthcare professionals trained to provide nutritional care for a wide range of disease states and conditions using medical nutrition therapy (MNT), which is carried out through the nutrition care process (NCP).\textsuperscript{61} Using the NCP, RDNs assess for nutrition needs, diagnose nutrition problems, develop interventions to address etiologies, and monitor and evaluate progress in the patient’s care.\textsuperscript{61} Dietitians use the NCP with patients and clients in settings including acute and ambulatory medical facilities, long-term care centers, mental health facilities, rehabilitation centers, colleges and universities, and more.\textsuperscript{61}

Dietitians provide care for individuals suffering from mental illness and addictions in inpatient, outpatient, community, and private practice settings.\textsuperscript{62} Statements on the roles of dietitians with this population have been published by nutrition organizations like the Academy of Nutrition and Dietetics, Dietitians of Canada, and Dietitians Australia.\textsuperscript{62–64} MNT can be used to
address prevalent comorbidities, such as cardiometabolic conditions, along with psychotropic medication side effects and barriers to health-promoting dietary behaviors. Additionally, collaboration between RDNs and mental health professionals may be well received and should be promoted through interdisciplinary education, maintenance of practice boundaries, and valuing of other professions’ contributions to care.

3. Methods:

The current review was conducted in a narrative format. Search terms (see Appendix A) related to both the issue of suicide and dietetics practice were based on previous Google searches made for graduate-level course assignments by the primary investigator (PI). Literature searches were conducted on three major databases: SCOPUS, CINAHL Complete, and PubMed, with keywords being applied on SCOPUS and CINAHL Complete to further refine results (Appendix A). Exclusion criteria included publication date earlier than 2018 and review design. Inclusion criteria were suicide-related variables, such as SI and SA, being among the primary variables (unless literature for a given topic was very limited, such as with the microbiome). Limited exceptions were made throughout the screening process, and decisions were not comprehensively categorized and recorded. Results from these database searches \( n = 3,009 \) were saved to a citation manager, Zotero, and manually screened for duplicates and irrelevant articles. The remaining articles were then exported to Microsoft Excel files \( n = 171 \), with further articles being removed due to excessive limitations or determination of the article’s topic being outside of the scope of the current review. The final number of articles included is 61.

4. Literature Review:

4.i Nutrition Science:
Dietitians use knowledge of nutrition science content, such as macronutrients, micronutrients, and laboratory values to assess patients and formulate plans of care. Research on these topics in the context of patients at risk for suicide may help to develop guidelines for interventions and create roadmaps for research projects.

4.i.a Biomarkers:

Biomarkers associated with suicidal ideation and suicide attempts are a significant research topic for suicide, especially under the stress-diathesis model of suicide, as they may indicate underlying neurological function and ability to respond to stressors. Blood lipids are prevalent biomarkers throughout suicide research. In sample groups with suicidal ideation and/or suicide attempts, the majority of studies determined the statistical significance of elevated total cholesterol (TC) and low-density lipoprotein (LDL), along with decreased high-density lipoprotein (HDL). Of note, these studies involved patients with first episode drug naïve (FEDN) major depressive disorder (MDD), meaning that there were no mediating effects of antipsychotics. After controlling for potential confounders (depression, smoking, gender, and BMI), Sankaranarayanan et al. also determined a significant inverse relationship (p <0.05) between HDL and current SI, though they commented that this may have been due to a type I error. Segoviano-Mendoza noted statistically significant (p < 0.05) decreases in TC among patients with MDD and SA (OR 5.540, p<.001) compared to patients with MDD but not SA. Though not statistically significant, Capuzzi et al. also found lower levels of TC (<160 mg/dL) amongst patients with a variety of mental health conditions who had attempted suicide. Regarding other lipid measures, W. Liu et al. found significantly elevated triglyceride levels (TG) amongst patients with FEDN MDD and SI (n = 1,279), while Capuzzi et al. failed to determine any association between recent SA and total TG.
Thyroid markers have been explored as possible biomarkers for SI.\textsuperscript{69,76,77} W. Liu et al.’s sample of outpatients with FEDN MDD and SA had elevated levels of thyroid stimulating hormone (TSH), anti-thyroglobulin (A-TG), and anti-thyroid peroxidase (A-TPO).\textsuperscript{69} These findings are expanded through Peng, Wen, and Yan’s analysis of free thyroxine (FT4) as a variable in a sample of patients with MDD with or without SA ($n = 69$ and $n = 202$, respectively).\textsuperscript{76} In the SA group, FT4 levels were significantly decreased ($p < 0.001$) compared to the non-SA group, while FT3 and TSH did not change significantly ($p > 0.025$).\textsuperscript{76} TSH was also considered in Aguglia et al.’s study but did not reach significance ($p = 0.529$).\textsuperscript{77}

While several studies included blood glucose in their tests, Zhao et al. appeared to be the only to find it significant as a marker.\textsuperscript{70} Their study of 740 patients with MDD (age range 18-45) found that previous lifetime suicide attempt was significantly associated (OR = 1.918, $p < 0.05$) with increased fasting blood glucose (FBG).\textsuperscript{70} Elevated FBG, reported as >6.10 mmol/L, was also significantly correlated with depression and anxiety.\textsuperscript{70}

Recent findings do not appear to support clearly defined associations between biomarkers and risk for suicidal behavior. However, RDNs and other healthcare professionals may consider blood lipids, thyroid panels, and fasting blood glucose levels, in the context of patient background and individual characteristics, when assessing patients at risk for suicidal behavior.

4.i.b Micronutrients

Micronutrients appear throughout research on cognition, neurological conditions, and mental health conditions like MDD and schizophrenia. Vitamin D is a fat soluble vitamin known to participate in calcium and phosphorus balance, immune system modulation, and more.\textsuperscript{78} Additionally, it appears to have some association not only with depression but also with suicide
risk and SI.\textsuperscript{79–83} Porto et al. noted significantly higher rates of hypovitaminosis D (67.4\%, \( p = 0.005 \)), defined as serum levels \( \leq 20 \text{ ng/mL} \), among patients with MDD and SI compared to those with MDD but no SI.\textsuperscript{79} There was also a non-significant higher frequency (10.9\%) of SA among those with hypovitaminosis D.\textsuperscript{79} Kim et al. found the association between vitamin D and SI to be significant only among their participants with deficiencies (<10 ng/mL), indicating a possible threshold for associations with SI.\textsuperscript{80}

In a sample of patients with schizophrenia \(( n = 251, \text{ mean age } 35.4 \pm 11.2, 72.1\% \text{ male})\), Fond et al. determined a significantly higher suicide risk (aOR = 1.04, \( p = 0.01 \)) among those patients with hypovitaminosis D (defined as <25 nmol/mL).\textsuperscript{82} Results from Grudet et al.’s study comparing patients with MDD and SI to those without SI suggests that vitamin D’s association with SI may be related to its immunoregulatory functions.\textsuperscript{81} The researchers noticed a significant negative association between vitamin D level and inflammatory markers amongst participants with both MDD and SI \(( n = 17)\).\textsuperscript{81} Lastly, Lavigne and Gibbons uncovered a significant association between higher vitamin D\(_3\) dosage and suicide risk reduction among veterans with serum vitamin D levels of 0-19 ng/mL, while the overall association did not reach significance in the 20-39 ng/mL group.\textsuperscript{83} Nonetheless, both cohorts experienced a suicide risk reduction per percentage point increase of dosage – a 13.8\% reduction for the cohort with lower serum levels and a 9.6\% reduction for that with greater serum levels.\textsuperscript{83} Thus, it appears that supplementation with D\(_3\) may be most effective for individuals with deficiencies.

Among many functions, vitamin B\(_9\), folate, is essential for DNA and amino acid metabolism via 1-carbon methylation, neural tube development, and homocysteine homeostasis.\textsuperscript{84} Gibbons et al.’s novel pharmacoepidemiologic study of 866,586 veterans (81.30\% female and 10.42\% \( \geq 60 \text{ years of age} \)) revealed, through duration-response analysis, a 5\%
reduction of suicidal events per extra month of 1 mg dosage of folic acid (FA) treatment.\textsuperscript{85} Additionally, the hazard ratio for FA for suicidal events was 0.56, after adjustment for confounding variables, indicating a 44% decreased risk of suicidal events.\textsuperscript{85} J. Liu et al. explored the possibility of increased risk of SA among patients with schizophrenia (SCZ) and MTHFR Ala222Val polymorphism ($n = 767$), which can lead to excessive concentrations of homocysteine and altered neurotransmitter production.\textsuperscript{86} However, this study indicated that the Ala222Val polymorphism did not reach significance for SA risk ($p = 0.07$), with confounding factors including number of cigarettes smoked per day and drinking status achieving significance, instead.\textsuperscript{86}

Trace minerals, such as zinc, copper, and selenium, have been studied in the context of suicidal ideation.\textsuperscript{87–89} Kim et al. did not find a significant association between zinc levels and SI among a sample of Korean adults ($n = 1748$), while Huang et al.’s sample of U.S. adults ($n = 186$) had a significant, nonlinear relationship between serum zinc levels and SI.\textsuperscript{87,88} Huang et al. did not note any significant relationship between copper or selenium and SI.\textsuperscript{88} In a sample of patients with anorexia nervosa ($n = 82$), Strumila et al. determined an association between previous suicide attempts, along with suicide risk, and selenium deficiency.\textsuperscript{89} Overall, these findings indicate the possibility of zinc and selenium impacting SI outcomes.

4.i.c Microbiome

There is currently limited research evaluating associations of the microbiome with STB.\textsuperscript{90,91} Ahrens et al. tested salivary microbiome content of 372 university students and had participants complete a survey.\textsuperscript{90} Analysis indicated significant differences in bacterial taxa from the SI group ($n = 47$) to the control group ($n = 325$).\textsuperscript{90} Additionally, prevalence of salivary microbiota varied by human leukocyte antigen haplotypes associated with SI.\textsuperscript{90} Madan et al.
analyzed bacterial genomic DNA through Whole Genome Shotgun Sequencing (WGS) in a
psychiatric inpatient sample (n = 111, 54.1% female, mean age = 35.7 ± 13.8) with prevalence of
SI (63.6% in the past month) and SA (35.0%, lifetime), as well as traumatic events (76.3%,
lifetime). Findings from the study included a negative association of bacterial richness and
alpha diversity (variety of bacterial species samples from one individual) with depression and
anxiety measures recorded shortly after inpatient admittance. along with a significant difference
in relative abundance of several bacterial taxa according to depression severity (ranked mild,
moderate, and severe). There was significant (p = 0.0148) beta-diversity (a comparison
between groups) between patients who received remission from depressive symptoms at
discharge and those who did not, though no such pattern was present with anxiety symptoms (p =
0.2724).

4.i Recommendations:

Assessment: Cautiously consider abnormal biomarkers (TC, TG, TSH, FT4, FBG) for
patients/clients presenting with STB within the context of their overall condition. Consider diet
quality and any factors potentially contributing to nutrient deficiencies with vitamin D, folate,
zinc, and selenium. The RDN may consider discussing these factors with other members of the
healthcare team.

No considerations recommended for the gut microbiome and suicide risk at this time, though
considerations related to mental health outcomes may be warranted, with adequate investigation
of evidence and patients’/clients’ unique cases.

4.ii Dietary Pattern:
Diet composition, including specific diets, like the Mediterranean and MIND diets, have been studied in connection with mental health outcomes.\textsuperscript{92–94} It appears that diet composition, along with meal frequency, and psychosocial aspects of eating seem to relate to suicide.\textsuperscript{95–103} According to two separate studies by Louis et al. on 12-15-year-old adolescents from 32 countries, utilizing data from the Global Student-health Based Survey (GSBS), there was a positive association between carbonated soft drink consumption and past-year SA. The strongest association was in middle-income countries, as opposed to lower and higher-income countries.\textsuperscript{96} Similarly, their study on fast food consumption and SA produced a significant positive association among fast food consumers compared to non-consumers within low-income, lower-middle-income, and upper-middle-income countries, though not in high-income countries.\textsuperscript{95} Michael et al.’s analysis of data from the 2017 Youth Risk Behavior Study supported a positive association between SA and consumption >1 soft drink/day among female students.\textsuperscript{97} There was also an increased likelihood of seriously considering suicide for students who missed breakfast every day of the week.\textsuperscript{97} Barbosa et al. studied associations between risk factors for non-communicable diseases (NCD) in a sample of 2,515 Brazilian adolescents and noted a significant association between added sugar intake and both depression ($p = 0.005$) and suicide risk ($p = 0.012$).\textsuperscript{98} It is critical to keep in mind that such associations in no way represent a causal link. Rather, these findings likely represent many factors influencing suicide risk, and it is necessary for the clinician to investigate the possible associations.

Perera et al.’s case-control study of 84 case participants and 197 control participants, drawn from both the psychiatric inpatient and community settings, examined an array of preventative health behaviors.\textsuperscript{99} Self-reported diet composition by food group indicated decreased intake of fish/seafood, nuts, fruits, and vegetables among the SA group, with nut
consumption providing the only statistically significant risk reduction (OR 0.51, \( p = 0.026 \)). Ki et al. also failed to produce a significant association between dietary patterns – specifically, regular meal intake – and SI, after adjusting for the covariate depressive feelings.\(^{100}\)

Pro-inflammatory diets are also a research consideration for suicide. Two studies investigated this association.\(^{101,102}\) Bergmans et al. addressed inflammation as a marker for suicidal ideation among a sample of National Health and Nutrition Examination Survey (NHANES) participants.\(^{101}\) They measured markers like WBC and CRP (\( N_{\text{CRP&WBC}}=13,912 \)), along with IgE (\( N_{\text{IgE}} = 4,060 \)), and Dietary Inflammatory Index (DII) (\( N_{\text{DII}} = 17,076 \)) – a measure for pro-inflammatory contribution based on dietary intake, which was self-reported in this study.\(^{104}\) The analysis produced significant associations between DII and MDD, and also with SI among participants with and without MDD.\(^{104}\)

Meanwhile, Xiao and Huang conducted a CS study of 10,956 elderly participants via NHANES.\(^{102}\) Using the mean DII value of 1.23 calculated from participants’ daily nutrient and dietary ingredient intake, the sample was split into even groups of 5,478 – Low-DII (<1.23) and High-DII (>1.23). This produced a significant association between a High-DII score and risk for depression but not incidence of SI over the past two weeks.\(^{102}\) However, the High-DII group did have a significantly higher prevalence (8.9%, 487) of SI and comorbid depression compared to the Low-DII group (7.6%, 367).\(^{102}\) Moreover, the risk of comorbid SI did increase in a dose-response manner with DII levels, though not statistically significantly.\(^{102}\)

Lastly, one study by Kim et al. analyzed a sample of 3,515 Korean adults via the Korean National Health and Nutrition Examination Survey (KNHANES) and found a non-significant association between eating alone and SI, after adjusting for covariates.\(^{103}\) Eating dinner alone, though, did present significant risk for stress (OR = 1.308).\(^{103}\) Despite the lack of significant
association with SI in this sample, this study does raise questions on the psychosocial experience of eating and how it might exacerbate or ameliorate stress, depression, and SI.

4.ii Recommendations:

**Assessment:** Consider soft drink and fast-food consumption in the context of social factors and chronic illnesses. Assess meal frequency, noting skipped meals and determining reasons for missed meals.

4.iii Food Insecurity:

Food insecurity (FI) is a significant concern for dietetics practice at both a community and clinical level. Food insecurity is a significant concern in the general population, with 12.8% of U.S. households experiencing FI at some point in 2022.\(^{105}\) Moreover, it is significant for individuals with mental illness and severe mental illness.\(^{106,107}\)

Among U.S. veterans, Elbogen et al. found a significant association between food insecurity and suicidal ideation within a year of reported food insecurity, even when accounting for MDD and post-traumatic stress disorder.\(^{108}\) Kamdar et al. also determined a significant association between FI and SI among their U.S. veteran sample, but this association was no longer present when accounting for depression symptomology.\(^{109}\) Lee et al. reported an odds ratio (OR) of 2.36 among Korean adults aged ≥65. They also addressed mediating interventions and found that meal delivery services, instead of congregate meals, significantly reduced the odds of SI.\(^{110}\)

Adolescents facing food insecurity reportedly have positive correlations between FI and both SI and SA.\(^{111}\) Among Brinkman et al.’s sample of Vermont middle school students (\(n = 11,836\)), those who reported experiencing FI most of the time or always had an OR of 3–4 for SI,
indicating the possible significance of severity of FI. Potential protective factors noted in this study were feeling connected to their community and or a teacher, along with physical activity and breakfast intake.

Two studies examined SI among recipients of Supplemental Nutrition Assistance Program (SNAP) benefits. Bergmans et al. reported STB being two times more common among SNAP participants versus non-participants, along with greater use of mental health treatment among SNAP participants. Austin et al. assessed for changes in prevalences of suicidal ideation and suicide deaths among U.S. adults receiving SNAP benefits following the expansion of SNAP access through state elimination of the asset test and increase in income limit. They found a significant reduction in reported suicidal ideation and a non-significant decrease in suicide deaths.

4.iii Initial Considerations:

Assessment: Screen to determine presence and severity of FI.

Coordination of Care: Connect with social workers and other relevant staff involved in patient discharge and connection to resources. Coordinate with social workers and any other relevant personnel in the outpatient or community setting.

4.iv Eating Disorders:

Eating disorders (EDs) are consistently reported as having a high suicide risk. According to Udo et al.’s 2019 CS study using the Third National Epidemiological Survey on Alcohol and Related Conditions (NESARC-III), participants with all EDs included presented with significantly higher adjusted odd ratios of SAs – bulimia nervosa (BN), anorexia nervosa (AN), and binge eating disorder (BED). Factors influencing risk of SA among different EDs...
diagnoses were evident, with a greater length of illness being significant for AN, while a shorter duration of illness was significant for BN. Additionally, earlier ED onset in BN and BED was associated with increased SA risk.

Specific ED behaviors may be related to an increased risk of suicide. Joiner et al. studied associations between ED behaviors per the Eating Pathology Symptoms Inventory (ESPI) amongst a sample of $n = 936$ patients (87.82% female, mean age of 26.22 ± 9.63) receiving ED treatment across a range of levels of treatment. They ultimately found purging to significantly predict presence or absence of SI. However, the association became nonsignificant in the final model, which included the variables BMI above and beyond demographic covariates, level of care, and length of stay. In a sample of 899 Korean females (mean age 23.19 ± 6.50, range 11-57), Ahn et al. determined significant predictors of SAs among individuals with EDs. Between attempters ($n = 187, 20.8\%$) and non-attempters ($n = 712, 79.2\%$), those with a history of SAs were most likely to be diagnosed with ED not Otherwise Specified, followed by bulimia nervosa-purging and anorexia nervosa-purging. Other significant factors across all diagnoses included depression (OR = 1.784), hospitalization history (OR = 4.280), self-mutilating behavior (OR = 5.557), and impulse regulation (OR = 1.069).

Body dissatisfaction (BD), a key feature of eating disorder symptomology, was studied in relation to passive vs. active SI by Rufino et al. in a sample of 432 psychiatric inpatients (age range 18-65). BD was quantified in this study with scores from the Eating Disorder Inventory 3, which is based on ten questions addressing dissatisfaction with the shape and size of body regions significant to individuals with EDs. BD above the clinical level (score > 45) was significantly associated with a higher mean score of SI compared to participants scoring under
the BD clinical level (score of 0-44), even after controlling for both depression and difficulty with emotion regulation.\textsuperscript{119}

Denial of ED behaviors may also be a significant consideration for SI/SA risk.\textsuperscript{121} Howard, Heron, and Cramer utilized an online survey with a sample of 360 undergraduate women to assess for associations between suicidality, as well as non-suicidal self-injury (NSSI), and denial of disordered eating behavior.\textsuperscript{121} The suicidality model, employing hierarchical regression, found that the interaction between denial and disordered eating had a significant and moderate association with suicidality, which appeared to increase relative to the extent of denial.\textsuperscript{121} Similarly, the suicide risk model, which used logistic regression, presented a strengthened association between disordered eating and elevated suicide risk category relative to denial of disordered eating score.\textsuperscript{121}

4.iv Initial Considerations:

Assessment: Note patients' or clients' eating disorder (ED) behaviors, especially purging, as these may be associated with increased suicide risk.

Coordination of Care: Collaborate with therapists and other mental health professionals to optimize care.

4.v Chronic Illnesses:

Several studies examined associations with multiple chronic illnesses (CI) and SI or SA.\textsuperscript{122–127} In a sample of adolescents ($n = 1,166$), Dean-Boucher et al. noted that cardiovascular conditions had positive associations with SAs (OR = 2.9) and the transition from suicidal ideation to suicide attempt (OR = 4.8).\textsuperscript{122} Among adult populations, multimorbidity, reduced quality of life (QoL), and reduced ability to complete activities of daily living (ADL) appear to
be significant considerations for CI and suicide risk.\textsuperscript{123,125–127} Sariaslan et al.’s cohort study compared individuals with CIs (n = 1,074,222) – chronic respiratory diseases, cardiovascular diseases, and diabetes – to age and sex-matched controls (n = 10,345,758) and unaffected biological control full siblings (total n = 1,119,543).\textsuperscript{123} In assessment for associations between NCDs and premature mortality, participants with NCDs had a significantly elevated risk of suicide (P <0.001), though unmeasured familial factors did partially confound this finding.\textsuperscript{123} Premature death was seven times more likely among participants with medical and psychiatric comorbidities, though incidence of suicide is not detailed in this finding.\textsuperscript{123} Chang et al. noticed an especially high suicide risk among individuals with psychiatric disorders prior to CI diagnosis, as well as a high suicide risk for those who appeared to develop psychiatric disorders after CI diagnosis.\textsuperscript{124} Thus, it appears that preexistent psychiatric disorder symptoms may compound the effect of CIs on suicide risk, and CIs may influence the development of psychiatric disorder symptoms and suicide risk.

Onyeka et al.’s analysis of 1,196,364 Northern Irelanders revealed that activity limitation due to disabilities from physical health conditions had a significant risk for suicide (OR = 1.72), most notably for younger participants (age range 18-34 years).\textsuperscript{125} Among this sample, the association between multimorbidity and suicide risk disappeared when activity limitation was factored in, suggesting that the physical complications of multimorbidity, and, perhaps, their psychological effects, are more explanatory than just the quantity of conditions an individual has.\textsuperscript{125} Huh et al. expound upon this link with their findings from their KNHANES study (n = 16,059) on relationships between the number/type of CI reported within 12 months and suicidal thoughts.\textsuperscript{126} Suicidal thoughts were significantly more prevalent among individuals with almost all CI tested, including but not limited to hypertension, diabetes, dyslipidemia, stroke, and renal
Risk for suicidal thoughts was significant and highest among individuals with history of renal failure (OR = 4.43), stroke (OR = 1.59, p = 0.05), and arthritis (OR = 1.31, p = 0.03), perhaps supporting Onyeka et al.’s finding on the impact of activity limitation on suicide risk. Similarly, Gürhan et al. analyzed data from patients diagnosed with CIIs (n = 286) at a Turkish public hospital and reported significant associations with suicide among patients who reported poor life quality, low economic status, and no support from family.

The effect of CIIs on suicide can also be seen through studies evaluating outcomes with individual illnesses. Abdel-Rahman performed a CS study of 2005-2016 NHANES respondents with (n = 3,043) and without (n = 29,675) cancer diagnosis, testing for associations between cancer diagnosis and depression and SI. Of the variables tested between the groups, the SI group had significantly greater incidence of MDD diagnoses (p = 0.045), along with a higher prevalence of of cancer diagnosis (OR = 0.695). Several covariates were associated with SI, such as unmarried status (OR = 1.697) and poor health status (OR = 1.875). Tang et al. addressed the potentially mediating covariate of MDD diagnosis by testing for association of SI with cancer diagnosis among patients without MDD (n = 2582, 86.9%), who were separated from the parent sample (n = 2930). They then divided the group without MDD diagnosis into subgroups - those with (n = 383, 14.8%) and those without (n = 2192, 80.2%) SI within the previous two weeks. They found significantly lower quality of life scores (EuroQol Five Dimensions Questionnaire-5L version) (p < 0.001) among the group with SI, as well as significantly greater presence of moderate and severe symptoms (MDASI) like lack of appetite and vomiting. A retrospective case-control study by Kahn et al. (controls n = 297,034; cases n = 3,330) did not find comorbid psychiatric condition and cancer diagnosis to be significantly related to increased suicide risk compared to psychiatric condition and cancer, independently.
Severity of cancer prognosis was a notable factor, as both moderate (aOR = 1.56, p = 0.003) and poor (aOR = 4.76, p < 0.001) prognosis cancers were significantly associated with suicide risk.\textsuperscript{130}

Metabolic syndrome (MetS) and DM may contribute to the risk of STB. In a sample of 9687 Korean adult participants (age ≥ 19) in KNHANES, Ko et al. investigated associations between SI and MetS, with analysis indicating a significant association between MetS and SI (adjusted odds ratio [aOR] = 1.194), along with significant associations between both elevated fasting plasma glucose (aOR = 1.241) and TG (aOR = 1.241) and SI.\textsuperscript{131} In contrast, MetS was not determined to be significantly associated with SI (p = 0.84) among a sample of patients with bipolar disorder (n = 215, 51.6% male and 48.4% female, mean age 43.94 ± 13.68).\textsuperscript{132} Two studies on DM and suicide risk suggest possible associations.\textsuperscript{133,134} Among a sample of 6,296 participants in KNHANES VIII (2019), those diagnosed with DM (n = 624) had significantly greater incidences of suicide plans (aOR = 2.926, p <0.001) than the non-DM group (n = 5,672), while suicidal behavior was not significantly different and SI lost significance following adjustment for covariates that distinguished the two groups.\textsuperscript{133} Additionally, duration of DM diagnosis between 2 to 9 years, but not ≤1 year or ≥ 10 years, correlated with a significant increase in risk for both SI (aOR =2.035) and suicidal behavior (aOR = 7.130).\textsuperscript{133} Sharif et al.’s CS study of 493 individuals diagnosed with DM (21.1% male, 78.9% female) found that they had an SI prevalence of 20.39%, though no measure of significance was reported.\textsuperscript{134} Little or poor social support during illness duration (aOR = 3.41), as well as physical disability due to long-term DM diagnosis (aOR = 4.70) were significant and independent indicators of depression.\textsuperscript{134} Despite the highly limited generalizability of this study, due to all participants being residents of the same city and patients at one hospital, the results indicate the possible
significance of disabilities and socioeconomic factors for worsening depression among patients with DM.

Several CS studies indicate significant associations between irritable bowel disease (IBD) and risk of SI and/or completed suicide.\textsuperscript{135–137} An online self-report questionnaire for suicide risk was administered by Mihajlovic et al. to 282 patients with IBD (54.6\% Crohn’s disease, 35.8\% ulcerative colitis, and 9.6\% both), of whom 71.63\% had a clinically significant suicide risk.\textsuperscript{136} The refined model of suicide risk developed from this sample depicts how IBD symptoms may be linked to increased suicide risk. The authors depict a theoretical bridge from IBD symptoms to depressive symptoms, hopelessness, and suicide risk, demonstrating how factors such as average body pain, shame, psychache, and more influence his progression.\textsuperscript{136} A sample of Swedish participants in a national population-based cohort study with adult-onset IBD (n = 69,865) had a higher SA risk across all IBD types (ulcerative colitis, Crohn’s disease, and IBD-unclassified) than both the general population (n = 3,472,913) and age/sex-matched siblings (n = 66,292).\textsuperscript{135} Uniquely, Crohn’s disease was associated with death by suicide (HR = 1.5).\textsuperscript{135} Hashash et al. found a higher representation of Crohn’s disease (n = 51, 71.8\%) among IBD patients scoring positively for SI (n = 71), who were part of a larger sample of patients with IBD (n = 1,352) from the University of Pittsburgh Medical Center.\textsuperscript{137} Multivariate regression identified the most significant contributors to suicide risk as tricyclic antidepressant (TCA) use (β=0.31; P=0.012), considered in the study as representative of chronic pain, and depression severity (β=0.46; P=0.002).\textsuperscript{137} IBD activity, however, did not reaching significance.\textsuperscript{137}

**4.v Initial Considerations:**

**Assessment:** Consider disease severity, mental health comorbidities, and economic and social factors.
Coordination of Care: Cooperation with social workers, therapists, psychiatrists, and rehabilitation services – namely physical and occupational therapists – should be strongly considered by RDNs to address the effects of chronic illnesses on quality of life and activities of daily living.

5. Strengths

This study has several strengths. First, it covers a range of topics relevant to dietetics, mental health, and suicide. Secondly, it addresses the understudied role of dietitians in working with patients who are suicidal or have a history of SI or SA.

6. Limitations:

This review was written by a single entry-level PI. It was written in a narrative review structure, as opposed to a systematic review, scoping review, or meta-analysis to fit the narrative purpose of setting a case for dietitian inclusion in suicide preventative care. The search and narrowing process is also a limitation, as it is possible that relevant articles were missed, as only the PI screened, though with advice from the research committee. Also, meta-analyses were excluded, and these may have contributed comprehensive insights. Important topics, including nutrients like omega-3 fatty acids, and conditions, such as substance use disorder, were missed due to initial oversight and insufficient time for inclusion.

Several limitations in the collected literature ought to be considered. In all topics covered, the studies are highly heterogenous, with varying distributions of age, sex, ethnicity, and geography. Many of the studies utilized self-reported measures for SAs, as well as for other variables like dietary intake. For those studies that measured SI with PHQ-9, the use of one question from this tool to determine SI was frequently considered a limitation. Given the limited
rigor of this narrative review, the information provided presents evidence through the author’s interpretation and should be considered primarily to raise questions and inspire future research.

7. Summary of Conclusions

To the author’s knowledge, no literature is currently available on involvement of dietitians in the care of patients with suicidality, nor are any guidelines for dietitians working with this population published. The evidence gathered in this review indicates that suicide risk is a significant concern among individuals with chronic illnesses—especially those incurring physical disabilities—as well as among individuals experiencing food insecurity or eating disorders. Evidence on nutrition science topics and dietary patterns need to be explored more thoroughly, they though may be considered, cautiously. In practice, RDNs will likely encounter patients or clients who present with combinations of the factors discussed, so there may be multiple avenues of care through which they can help to reduce suicide risk. Coordination with other healthcare professionals is also essential for addressing factors like underlying psychiatric comorbidities, disabilities from chronic illnesses, and the detrimental psychological effects of illness, eating disorders, and food insecurity.

Future research should develop guidelines for using the nutrition care process in the context of suicide risk, indicating how RDNs may be involved in care from acute to long-term stages of suicidality and recovery. Studies designed to measure outcomes of RDN intervention on measures of suicide risk could help to solidify benefits of RDN involvement in the process of suicide prevention. In collaboration with nutrition scientists and other pertinent researchers, RDNs may develop research projects to further test possible associations of dietary composition with suicide risk. Despite significant limitations and gaps in current literature, it is initially
evident that RDNs have opportunities to participate in reducing the burden of suicide, with more opportunities to be discovered through future investigation.

8. References


9. Appendices

Appendix A: Search Terms and Keywords
### Search Terms

diet OR nutrition OR "diet pattern" OR "diet composition" OR "dietary intake" OR "micronutrients" OR "vitamin" OR "vitamins" OR "mineral" OR "minerals" OR lipids OR cholesterol OR triglycerides OR lipoprotein OR "chronic illness" OR "chronic disease" OR "food insecurity" OR "eating disorders" OR anorexia OR bulimia OR "disordered eating" OR "binge eating disorder" OR microbiome OR microbiota OR "gut microbiome" OR dysbiosis

### SCOPUS Keywords*
- Cholesterol Blood Level
- Food Insecurity
- Low Density Lipoprotein Cholesterol
- Health Status
- High Density Lipoprotein Cholesterol
- Disease Duration
- Metabolism
- Medical History
- Body Weight Loss
- Cholesterol
- Triacylglycerol
- Cardiovascular Disease
- Nutrition
- Eating Disorders
- Diabetes Mellitus
- Binge Eating Disorder
- Feeding And Eating Disorders
- Anorexia
- Obesity
- Body Mass
- Anorexia Nervosa
- Comorbidity
- Risk Factors
- Chronic Disease
- Eating Disorder

### CINAHL Major Headings*
- Eating disorders
- Chronic disease
- Bulimia nervosa
- Health behavior
- Quality of life
- Health status
- Food security
- Eating behavior
- Poverty

### PubMed*

No additional keywords utilized.
*Additional keywords and major headings generated as filter options were used in addition to the search terms to refine results.

**Appendix B: Summary of Initial Considerations**

<table>
<thead>
<tr>
<th>Category</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nutrition Science</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
<td>Cautiously consider abnormal biomarkers (TC, TG, TSH, FT4, FBG) for patients/clients presenting with STB within the context of their overall condition. Consider diet quality and any factors potentially contributing to nutrient deficiencies with vitamin D, folate, zinc, and selenium. The RDN may consider discussing these factors with other members of the healthcare team.</td>
</tr>
<tr>
<td></td>
<td>No considerations recommended for the gut microbiome and suicide risk at this time, though considerations related to mental health outcomes may be warranted, with adequate investigation of evidence and patients’/clients’ unique cases.</td>
</tr>
<tr>
<td><strong>Dietary Pattern</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
<td>Consider soft drink and fast-food consumption in the context of social factors and chronic illnesses. Assess meal frequency, noting skipped meals and determining reasons for missed meals.</td>
</tr>
<tr>
<td><strong>Food Insecurity</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
<td>Screening to determine presence and severity of FI.</td>
</tr>
<tr>
<td><strong>Coordination of Care:</strong></td>
<td>with SW and other relevant staff involved in patient discharge and connection to resources.</td>
</tr>
<tr>
<td><strong>Eating Disorders</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
<td>Note patients' or clients' eating disorder (ED) behaviors, especially purging, as these may be associated with increased suicide risk.</td>
</tr>
<tr>
<td><strong>Coordination of Care:</strong></td>
<td>Collaborate with therapists and other mental health professionals to optimize care.</td>
</tr>
<tr>
<td><strong>Chronic Illnesses</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment:</strong></td>
<td>Consider disease severity, mental health comorbidities, and economic and social factors.</td>
</tr>
<tr>
<td><strong>Coordination of Care:</strong></td>
<td>Cooperation with social workers, therapists, psychiatrists, and rehabilitation services – namely physical and occupational therapists – should be strongly considered by RDNs to address the effects of chronic illnesses on quality of life and activities of daily living.</td>
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</tbody>
</table>