

DEPRESSION AND NUTRITIONAL SCREENING

**IMPLEMENTATION OF NUTRITIONAL SCREENING IN ADULTS (AGES 19-65)
WITH MAJOR DEPRESSIVE DISORDER: AN INTEGRATIVE REVIEW**

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Laurie Stephens

Liberty University

Lynchburg, VA

September, 2023

**IMPLEMENTATION OF NUTRITIONAL SCREENING IN ADULTS (AGES 19-65)
WITH MAJOR DEPRESSIVE DISORDER: AN INTEGRATIVE REVIEW**

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Laurie Stephens

Liberty University

Lynchburg, VA

September, 2023

Scholarly Project Chair Approval:

Folashade Odedina, DNP, PMHNP-BC Date

ABSTRACT

The World Health Organization estimates the total percentage of depression at 3.8% and projects it to be the leading cause of global disability by 2030 (WHO, 2023). The economic burden for adults with major depressive disorder in the United States is estimated at a staggering annual cost of 236 billion dollars (Greenberg et al., 2018). Nutritional psychiatry is a growing subspecialty focused upon how diet can improve mental health outcomes. The evidence shows a correlation between diet and depression, influencing questions on how this translates to current dietary recommendations and treatment. An integrative review of current literature was performed to explore the state of the science for major depressive disorder and the implementation of nutritional screening. Findings reflect a lack of both validated screening instruments and standardized nutritional guidelines for major depressive disorder in adults. Clinical barriers were identified through the integrative review with evidence-based practice recommendations.

Keywords: major depression, major depressive disorder, nutrition, diet, nutritional screening, dietary screening

Table of Contents

Acknowledgements.....	5
List of Abbreviations	6
Section One: Formulating the Review Question	7
Background	7
Defining Concepts and Variables.....	8
Rationale for Conducting the Review.....	9
Formulate Inclusion and Exclusion Criteria of the Literature	11
Conceptual Framework (Whittemore and Knafl).....	12
Section Two: Comprehensive and Systematic Search.....	13
Search Organization and Reporting Strategies	13
Terminology	15
Section Three: Managing the Collected Data.....	16
Section Four: Quality Appraisal	17
Sources of Bias	17
Internal Validity.....	18
Applicability of Results	19
Critical Appraisal Tools.....	20
Reporting Guidelines	20
Section Five: Data Analysis and Synthesis	20
Data Analysis Methods (Constant Comparison)	20
Descriptive Results	22
Synthesis.....	23
Ethical Considerations	28
Section Six: Discussion	29
Implications for Practice/Future Work	30
Dissemination	31
References	32
Appendix A.....	41
Appendix B.....	42
Appendix C.....	45
Appendix D.....	53
Appendix E.....	58
Appendix F	59

Acknowledgements

I would like to acknowledge Jesus Christ, my personal Savior. He is my refuge, navigator, and source of strength. It is only by His grace that we are saved, and life has meaning. He is the reason I have been able to persevere through tumultuous life stressors during the course of this doctoral program. My sincerest hope is that this academic journey is part of a greater purpose in preparing me to be a servant leader that brings glory to the Kingdom. To my three beautiful children, mother, and grandmother: my gratitude is endless for your patience and support throughout this academic journey. I would also like to thank Liberty University and my advising Chair, Dr. Folashade Odedina, a trailblazer amongst APRNs. Your guiding expertise and unfailing encouragement were a blessing throughout this rigorous experience. My parting words to my children: never ever, ever give up-where there is a will there is a way.

List of Abbreviations

American Dietetic Association (ADA)

American Psychological Association (APA)

Beck Depression Inventory (BDI)

Binge Eating Disorder Screener (BEDS)

Center for Epidemiologic Studies Depression Scale (CES-D)

Cumulative Index to Nursing and Allied Health Literature (CINAHL)

Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text-Revision (DSM-5-TR)

Dietary Screening Tool (DST)

Doctor of Nursing Practice (DNP)

Food Frequency Questionnaire (FFQ)

Food Mood Questionnaire (FMQ)

Integrative Review (IR)

International Classification of Diseases (ICD)

Major depressive disorder (MDD)

Mediterranean Diet (MD)

Mixed Methods Appraisal Tool (MMAT)

Patient Health Questionnaire (PHQ-9)

Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA)

Randomized Controlled Trials (RCTs)

SMI (Serious Mental Illness)

United States Department of Agriculture (USDA)

World Health Organization

SECTION ONE: FORMULATING THE REVIEW QUESTIONS

Healthy People 2030 has identified national goals to improve mental health and healthy eating due to the rising incidence of both mental illness and poor dietary habits that can adversely affect health (U.S. Department of Health and Human Services, 2023). The literature supports a positive relationship between healthy eating and improvement in depression scores (Bayes et al., 2020; Firth et al., 2019). Dietary screening is not a routine part of primary care or psychiatric visits in spite of the fact that electronic medical records can frequently support the administration of rapid dietary screening tools (Vadiveloo et al., 2020). This identifies a gap/problem area which is the impetus for a comprehensive literature review to examine the evidence for nutritional screening in depression and identify both barriers and implications for practice.

Background

Depression is a burdensome condition that spans across multiple geographic locations, disciplines, and healthcare settings. The World Health Organization (WHO, 2023) estimates that 3.8% of the global population has depression and projects that it will be the leading cause of disease burden by 2030. Depression has been associated with an increased risk for comorbidities, reduced quality of life, and substantial economic consequences (Firth et al., 2019). Individuals diagnosed with depression are more likely to report unhealthy eating habits which may trigger conditions such as obesity, metabolic syndrome, inflammation, and heart disease that further reduce quality of life (Kim & Hwang, 2023; Mechlinska et al., 2022; Shivappa et al., 2018).

Nutritional psychiatry is a growing subspecialty that focuses upon how diet quality can transform mental health outcomes (Firth et al., 2019; Parletta et al., 2019). Huang et al.

(2019) suggested dietary education as a key intervention for patients who either failed pharmacologic options or who prefer alternative treatments. Dietary screening is a crucial component to the identification of nutritional problem areas and usually predates the development and implementation of nutrition interventions. With the increasing paradigm shift toward nutrition focus in psychiatry, an integrative review was conducted to scrutinize the state of the evidence surrounding available screening tools and the screening practices/recommendations for major depressive disorder.

Defining Concepts and Variables

It is necessary to define concepts and operations of variables to eliminate contextual ambiguity in integrative reviews (Toronto & Remington, 2020). *Diet* is conceptually defined as the type and total amount of food consumption whereas *nutrition* refers to the actual nutrients obtained from diet for human body processes such as metabolism, growth, and tissue repair (Zohoori, 2020). The reciprocal relationship in how diet and nutrition affect health is well known and demonstrated in the literature, which is why the terms are frequently used to describe similar or the same phenomena. Dietary/nutritional screening is distinguished from assessment, which is more diagnostic in nature although screening results can aid in formulating a diagnosis (Correia, 2017). To provide clarity for the review and operationalization, *dietary* and *nutritional screening* will refer to the same process of identifying dietary habits to indicate risk factors for health in the chosen population through processes of measurable surveys, inventories, and food questionnaires.

The National Institute of Mental Health (2023) acknowledges that *major depression*, *major depressive disorder*, or *clinical depression* are all terms referring to the same mood disorder. *The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text-*

Revision (DSM-5-TR) defines the criteria for major depressive disorder as an individual experiencing five or more symptoms during the same 2-week period with at least one of the symptoms being either depressed mood or loss of interest or pleasure (American Psychiatric Association, 2022). These symptoms must cause impairment/distress in domains of social, occupational, or other essential areas of functioning and are not attributed to another medical condition or better explained by an alternative psychiatric diagnosis. Furthermore, an individual cannot have a history of manic or hypomanic episodes. The interchangeable terms *major depression* and *major depressive disorder* in this integrative review will be both conceptually and operationally defined based upon the DSM-5-TR criteria and will not be referring to populations with subclinical symptomatology or adjustment disorders. According to the American Psychological Association (2023), acceptable screening tools such as the Patient Health Questionnaire (PHQ-9), Beck Depression Inventory (BDI), and Center for Epidemiologic Studies Depression Scale (CES-D) are well validated and clinically sensitive in correlation with the DSM criteria for major depressive disorder. The Depression Anxiety Stress Scale (DASS) DASS-21 was also considered acceptable due to the strength of internal validity and reliability of the depression subscale for MDD (Moya et al., 2022). The MDD coding (F33) from World Health Organization's International Classification of Diseases (ICD) 10 and 11 are also used to classify MDD globally. Therefore, studies utilizing these screening instruments and classification coding were considered to be aligned with the conceptual definition of major depression and thus acceptable for the integrative review.

Rationale for Conducting the Review

A preliminary literature overview provided background for key clinical issues surrounding diet, nutritional screening, and major depressive disorder. The epidemiological evidence strongly suggests that poor diets are associated with depression (Francis et al, 2019;

Mechlinska et al., 2022). There is a growing body of RCTs (randomized controlled trials) showing that the link between diet and depression extends across the lifespan. The literature is robust concerning the benefits of healthy eating and depression scores for middle age and older adults, including higher quality of life reports, and reduced medical comorbidities (Bayes et al., 2022; Firth et al., 2019; Yin et al., 2021). The Francis et al. (2019) RCT was the first study performed amongst young adults utilizing screening and healthy dietary intervention to improve clinical depression scores. Young adults are still the least represented group in the literature; however, there is a growing number of studies showing a relationship between a Mediterranean diet intervention and reduced rates of depression (Bayes et al., 2022; Francis et al., 2019; Fresan et al., 2019). A common limitation in these studies is the use of convenience sampling with university students that may make findings less generalizable to all young adult populations (Francis et al., 2019; Fresan et al., 2019).

There are several meta-analyses and systematic reviews indicating a relationship between high-quality diet adherence and depressive symptom reduction. One prominent meta-analysis featuring 24 cohort studies showed an association between any high-quality diet regardless of type (Mediterranean or healthy/prudent) and lower depression scores (Molendijk et al., 2018). Another smaller systematic review included nine articles that suggested links between high vegetable and fruit consumption and lower incidence of depression (Selvaraj et al., 2022). The Firth et al. (2019) meta-analysis featured 16 studies, which also showed a relationship between any healthy dietary intervention and reduced depression.

Dietary interventions in depression are frequently individualized and guided by the results of nutritional screening, which is why this area is so vital to examine in the literature. According to Bodnar and Wisner (2005), dietary intake and frequent screening for nutritional status may be the keys to major depressive disorder prevention, especially in women of

childbearing age. Nutritional screening tools represented in the studies varied in type, time needed for administration, and ease of use for clinicians (Firth et al., 2019; Pham et al., 2020; Yin et al., 2021). However, there was a common theme that most tools and education interventions were based on either USDA/ADA guidelines for healthy eating or international recommendations for limiting processed foods with increase in fresh fruit and vegetable intake.

Purpose and Review Questions

The purpose of the integrative review is to explore the state of the science of dietary screening for depression, as well as identify evidence-based practice recommendations for mental health providers treating major depressive disorder. Questions to address from the review are as follows: What dietary screening types and tools are being utilized for major depressive disorder in adults? What are the recommendations for nutritional screening in adults with major depressive disorder? What are the clinical barriers to the implementation of nutritional screening in adults with major depressive disorder?

Formulate Inclusion and Exclusion Criteria of the Literature

Formulation of inclusion and exclusion criteria is necessary to reduce incidence of confounding variables and bias (Toronto, 2020). Inclusion criteria for this integrative review included cohort studies, randomized controlled trials, observational and comparison studies, descriptive studies, systematic reviews, and meta-analyses if they pertained to the relationship between diet and major depression, screening tool validation, or evidence based clinical recommendations. Interventions of interest were those implementing nutritional and/or dietary screening tools, food questionnaires and inventories, and surveys that addressed major depressive disorder. Population characteristics were limited to the age range 19-65 years in order to control for special populations such as pediatrics and geriatrics which may have

different screening or nutritional recommendations. Studies from both inpatient and outpatient settings were included to provide a comprehensive review of the state of the science for nutritional screening. Articles were limited to those published in the English language within the last five years from content sources of journals, publications, reports, and manuscripts. Articles were excluded if the primary study focus was measurement of effectiveness of specific medications or a focus primarily on chronic illnesses unrelated to diet or nutrition in major depression. Studies focusing on subclinical depression, adjustment disorders, mania or hypomania, or other populations that did not meet the threshold criteria for major depressive disorder were excluded, as well as studies using diagnostic screeners that were not well validated with DSM criteria for MDD. Studies with special populations such as pregnant women were excluded since these studies may be less generalizable.

Conceptual Framework

Whittemore and Knafl (2005) provided a framework for integrative reviews that highlights a five-stage process including problem identification, literature search, data evaluation, data analysis, and presentation. This is the chosen conceptual framework for this integrative review. This review process allowed for the inclusion of both experimental and nonexperimental studies in order to answer the chosen clinical questions and to guide evidence-based practice recommendations for nutritional psychiatry. The problem identification established the purpose of the review which is supported by the selection of variables with conceptual and operationalized definitions as previously discussed.

Whittemore and Knafl support a literature search process that promotes more than one database and outside sources as needed. This is reflected in the selection of two databases and the additional use of an outside source for two articles. This integrative review includes diverse methodologies, careful selection of key word searches, and the development of

rigorous inclusion and exclusion criteria which are all consistent with the chosen framework.

A four-stage process was used for the data evaluation phase of the integrative review: data reduction, data display, data comparison, and conclusion drawing and verification (Whittemore & Knafl, 2005). Data were abstracted from primary sources, reduced to categories with subheadings and coded appropriately. Microsoft Word was used to comprise matrices and a supplemental table for data reduction and display. Articles were categorically divided according to the three clinical questions with emerging themes, purpose, country, sample size, study type, and methodology. The next step included data comparison/contrast through identification of themes and patterns in the literature according to the chosen clinical questions (Toronto & Remington, 2020; Whittemore & Knafl, 2005). Lastly, the reviewer prepared final conclusions and discussed implications for psychiatric practice.

SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH

Integrative reviews require a comprehensive and systematic search that should be replicable for others (Toronto & Remington, 2020). Therefore, each step of the IR was documented to achieve end results for the final 20 articles. The librarian assisted with developing key terms used for the search, limiters, Boolean operators, databases chosen, and eligibility based upon inclusion and exclusion criteria, which are documented in detail.

Search Organization and Reporting Strategies

The preliminary literature review to inform the problem was conducted four months prior to the integrative review and the meeting with the librarian. The questions to inform the search included: What dietary screening types and tools are being utilized for major depressive disorder in adults? What are the recommendations for nutritional screening in adults with major depressive disorder? What are the clinical barriers to the implementation of nutritional screening in adults with major depressive disorder?

Due to the nature of the clinical questions utilizing similar terminology, the reviewer was able to utilize one universal set of key terms/conceptual phrases for the searches. This was initially done through the Liberty University Jerry Falwell Advanced Search with the key terms “depression” and “diet” with limiters being in the English language, peer reviewed, and dated within the last five years from 2018-2023. This yielded a voluminous result of 72,723 articles. Book, journal, and newspaper articles in disciplines other than nursing, public health, nutrition, and medicine were excluded in the search limit parameters. Additional key terms were added including “dietary screening”, “dietary intervention”, “major depressive episode”, and “education” which dramatically narrowed the search to just 93 articles. The 93 articles were then screened and narrowed to 15 according to relevance to clinical questions and study type. Chosen articles were categorically limited to systematic reviews, meta-analyses, experimental, and correlational studies.

Although this initial search was crucial in identification of the problem, it was not considered replicable since it was conducted only through the general Jerry Falwell Library search engine. Six of the 15 original articles were included in the second search and final matrix. Nine of those articles were excluded due to becoming out of date in the timeframe between the two searches or becoming less relevant to the review as refinements to the clinical questions were made. This warranted a secondary replicable search for the integrative review. The second search was organized with the assistance of a librarian who helped with the selection of the reputable databases, CINAHL Ultimate and Health and Medical Collection (ProQuest platform) to develop a refined key term list.

There were two articles included during the initial search phase from The National Institute of Health’s National Library of Medicine which is disclosed as an outside source for the IR. An outside source for articles and gray literature was deemed acceptable by the

school librarian. The outside articles were not found in the secondary search likely due to being in an early phase of study protocol development. This decision to include these articles is consistent with the definition of an integrative review which includes comprehensive/broad searches, rigor, and inclusion of diversified outside sources of value that may have otherwise been excluded from a systematic review or meta-analysis (Toronto & Remington, 2020).

The key term list was refined with librarian assistance for the second search that could be replicable in the chosen databases. Key terms included “food”, “diet”, “nutrition”, “dietary screening”, “nutritional screening”, and “nutrition screening”. The Boolean operator “OR” was applied to expand results for these key terms. The Boolean operator “AND” with additional key terms “depression”, “depressive disorder”, “depressive symptoms”, “major depressive disorder”, and “depression diagnosis” were added in the search fields. Limiters were applied such as a data range from 2018 to 2023, age range from 19-65 years, English language, full-text availability, peer review, and abstract availability. The CINAHL Ultimate database search yielded 638 total articles for screening while the ProQuest Health & Medical Collection resulted in an additional 85 articles. When added to the two outside articles, this was a total of 725 articles for screening.

Terminology

Toronto and Remington (2020) emphasized the importance of clarifying terminology for databases in an integrative review. A *platform* is described as the specific database software that may not have the same name correlating to the database. For example, this integrative review utilized CINAHL Ultimate, which is the database name, but the corresponding platform is EBSCO. The Health & Medical Collection is the name of the second database utilized under the ProQuest platform. Toronto and Remington described a

database as “an electronic, searchable collection of published materials, including some combinations of journal articles, book chapters, reports, dissertations, and conference proceedings “ (p. 25). This integrative review includes a *search interface* which describes the utilization of a search page feature with a variety of fields, limiters, and saving function.

SECTION THREE: MANAGING THE COLLECTED DATA

A free version of the Covidence software was used during the sorting and screening process. Toronto and Remington (2020) reference Covidence software as a potentially helpful tool for integrative review data management. The program provided the reviewer with a manageable method to select “yes”, “maybe”, or “no” while saving and tracking the number of article abstracts screened. It also allowed for the detection and elimination of duplicates, which in this case reduced the number of articles to screen from 725 to 721. This was only used for the first 500 articles since the software trial was limited to this amount screened. The remaining 221 abstracts were screened without the use of the software through direct database retrieval from the saved searches. The database “save” folders were used to track eligible articles found from the screening process. The RefWorks interface was utilized from the database searches to generate a reference list which was then transferred to the Microsoft Word Master document for data organization and citation indexing of eligible articles. The initial screening was laborious but allowed the reviewer to eliminate hundreds of articles that were not relevant to the clinical questions or inclusion criteria. These initial discards focused on chronic diseases/illnesses other than major depressive disorder or had endpoints that focused on medication outcomes versus nutrition. Articles were discarded if their focus was a specialized population of pregnancy or advanced aging/geriatrics. A total of 611 articles were eliminated. The next phase of data reduction was a thorough full text screening of the remaining 110 articles. During this phase, 91 articles were discarded due to

small sample size, participant age being out of the inclusion criteria range, or being irrelevant to the review focus. This left 19 articles for quality appraisal: four systematic reviews, a scoping review, three RCTs, nine correlational/observational studies, a preliminary study in mid phase development, and one single descriptive study. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Flowchart illustrates the search and screen process for the integrative review (see Appendix A).

SECTION FOUR: QUALITY APPRAISAL

A quality appraisal of the literature was conducted to determine reliability, rigor, and applicability to nutritional screening and major depressive disorder. All studies were critically appraised, even lower-level evidence to maintain broadness and diversity. Sources of bias, credibility, and internal reliability were examined for critical quality appraisal. In spite of some identification of bias and minor validity compromise, there were no studies eliminated during the appraisal phase.

Sources of Bias

Identification of bias is important to the integrative review process. According to Toronto and Remington (2020), it is preferred to have two reviewers for the critical literature appraisal. This review only had one reviewer, which presents potential reviewer bias. Many of the chosen studies were observational/correlation studies (cross-sectional and cohort) or were systematic reviews/meta-analyses that contained such studies. A limitation of correlational studies is the inability to determine cause and effect. It was important to identify other common problems for observational studies such as information bias or selection bias, and confounding. The reviewer appraised if the articles acknowledged confounding variables and attempted to institute control measures to improve validity. In the Molendijk et al. (2018) meta-analysis examining diet quality/type and depression risk, the

reviewers were unable to identify many confounders for included studies, thus partially compromising validity. This is a similar issue identified with the Bayes et al. (2020) systematic review that featured several observational studies that did not identify any bias potential. However, the reviewer was able to identify possible bias with confounders based upon the narrative review and data collection methods.

Many of the studies readily identified confounder presence. The “AMMEND” study (Bayes et al., 2022), an RCT with rigorous methodology, and several correlational studies identified multiple confounders but executed control measures (Nouri Saeidlou et al., 2021; Shayka et al., 2021; Yin et al., 2021). Based on the content of the clinical questions for the integrative review, the majority of the studies featured nutritional screening tools such as food diaries, and questionnaires/surveys, which entailed self-reporting from participants pertaining to diet and mood symptomatology. Therefore, all of these studies have some potential for participant recall bias based upon the self-report element which would be difficult for researchers to address within the limits of an observational study. The majority of the articles acknowledged this as an inherent limitation to dietary studies so the strength of the articles was based on other attributes such as rigor of methodology or utilization of well validated tools for dietary screening (Fresan et al., 2019; Godos et al., 2023, Lahouti et al., 2021; Nouri et al., 2021; O’Neill et al., 2022; Radavelli et al., 2021; Sun et al., 2021). Risk for selection bias was identified in at least two of the articles based upon sampling methods (Morkl et al., 2021; Radavelli et al., 2021).

Internal Validity

According to Toronto and Remington (2020), methodological rigor and validity is essential for credibility and generalizability of findings. Several of the articles addressed validity and reliability of tools utilized for depression. The Begdache et al. (2019) article

concluded that the Food-Mood Questionnaire had high levels of internal reliability ($p < 0.01$, CI 95%) and validity with Cronbach's $\alpha > 0.70$ and was appropriate for mental health population use. Many articles utilized multiple statistical models to enhance methodological rigor (Chatterton et al., 2018; Hancox et al., 2021; Shayka et al., 2021). The Sun et al. (2021) study included a large sample of population (16,925) to improve generalizability of results and enhance statistical power of their cross-sectional correlation study. This was seen in other studies such as the Fresan et al. (2019) cohort which studied 15,980 participants with low dropout rate and the Yin et al. (2021) cohort including 49,261 participants. Several other studies that had relatively small sample sizes, however, were awarded a higher graded evidence due to strong methodologic rigor such as the O'Neill et al. (2022) systematic review of RCTs and two single blinded RCTs (Bayes et al., 2022; Parletta et al., 2019).

Applicability of Results

Studies were appraised and determined applicable to the IR purpose according to Melnyk and Fineout-Overholt's (2015) levels of evidence with design, sampling, data collection and methodology, and results. The literature range was from 1 to 6, indicating a diversified pool of articles. There was one systematic review of RCT's graded as level 1 (O'Neill et al., 2022) three RCTs graded as level 2 (Bayes et al., 2022; Chatterton et al., 2018; Parletta et al., 2019), and nine correlational studies graded as level 4 (Begdache et al., 2019; Fresan et al., 2019; Godos et al., 2023; Lahouti et al., 2021; Nouri Saeidlou et al., 2021; Radavelli et al., 2021; Shayka et al., 2021; Sun et al., 2021; Yin et al., (2021)). There were three systematic reviews of observational studies and a scoping review graded as level 5, as well as a level 6 descriptive study and study protocol review (Bayes et al., 2020; Hancox et al., 2021; Molendijk et al., 2018; Morkl et al., 2021; Selvaraj et al., 2022; Teasdale et al., 2021).

Critical Appraisal Tools

In order to improve the rigor of the quality appraisal since there was only one reviewer, two critical appraisal tools were utilized versus one. The reviewer chose Melnyk and Fineout-Overholt's (2015) leveling matrix for grading all evidence and the Mixed Methods Appraisal Tool (MMAT) as a secondary appraisal for qualifying single studies (see Appendix C). The leveling matrix allowed for bias identification, determining general limitations and strengths of each article, as well as appraising content relevance to the clinical questions. The MMAT is of particular benefit for reviews that contain a combination of qualitative, quantitative, and/or mixed method study type (Hong et al., 2018). Oermann and Knafl (2021) suggested this as a preferred tool for integrative reviews because of its clearly defined review criteria. The MMAT checklist was downloaded into Excel Spreadsheet format to provide the reviewer with an organized data display during the critical appraisal phase. A Microsoft Word table was used for the leveling matrix.

Reporting Guidelines

Reporting guidelines are used to appraise the research as a whole in order to improve transparency, quality, and appropriateness to nursing phenomena (Toronto & Remington, 2020; Whitemore & Knafl, 2005). The PRISMA 2020 guideline (Page et al., 2021) was used for analysis of the research from a "whole" perspective of quality which overlapped with multiple components from the MMAT and the Melnyk leveling matrix for a final determination of acceptable quality for the 19 articles.

SECTION FIVE: DATA ANALYSIS AND SYNTHESIS

Data Analysis Methods

The chosen data analysis method was the constant comparison method devised by Whitemore and Knafl (2005). This included an exhaustive stage of data reduction, data

display, and data comparison with eventual conclusion formation and verification. Following the constant comparison of the data, an overall synthesis was completed to support new concepts (Toronto & Remington, 2020).

Data Reduction

The first step in data reduction was to return to the primary sources for abstraction and organization of data with subcategories, and correlation of themes, and relevant information (Toronto & Remington, 2020). Two matrices were utilized in this stage, as well as an additional table. The preliminary literature review matrix contained crucial components of abstracted information (See Appendix C). A secondary matrix and table (See Appendices D and E) enabled the reviewer to organize recurring themes pertaining to the clinical questions and categorize data according to study type and evidence grading. Emerging themes and categories included analysis of nutritional screening types/tools, diagnostic criteria variability for MDD in research studies pertaining to dietary studies, recommendations for dietician referrals, and barriers to implementation of nutritional psychiatry methods related to screening.

Data Display

The reviewer performed the data display phase in tandem with data reduction. Toronto and Remington (2020) discussed the purpose of data display as a way for the reviewer to compress voluminous information and allow readers visual assistance to process themes derived from large amounts of data. The table and matrices fulfill this stage of data display and enabled the reviewer to detect recurring patterns crucial for the next stage in the constant comparison method (refer to Appendices C, D, and E). The first matrix allowed for general information comparison and methodology with grading code, results, and strengths and limitations. The second matrix and table organized data according to citation, country of

origin, sample size, study type, and themes.

Data Comparison

The organized data display (matrices and table) enabled the reviewer to detect emerging themes across the literature through continuous comparison. For example, during this comparison phase, variability in diagnostic criteria and tools for classification of MDD in nutritional screening and dietary relationship was a theme that emerged across international descriptive and experimental studies. Dietary screening tool representation was another theme found during the comparison of study methodologies. One particular screening questionnaire (FFQ) was utilized more than any other tool when comparing study methodologies. Data comparison revealed the robust correlation of diet and depression across international cohort and longitudinal studies, as well as the lack of uniform recommendations in screening and dietary recommendations spanning all grades of evidence.

Conclusion Drawing with Verification

Toronto and Remington (2020) described conclusion drawing and verification as the final results from constant comparison and analysis. The conclusions determined from the previously discussed themes were verified for congruency with the original article samples. Conclusions included research scarcity of nutritional screening types/tools, lack of consistency in diagnostic criteria/mood questionnaires for MDD dietary studies, referral recommendations for nutritionists, and barriers to implementation of nutritional screening.

Descriptive Results

Toronto and Remington (2020) reported no set guidelines for reporting descriptive results of study characteristics. The second matrix created in the data analysis portion of the integrative review displays study characteristics according to citation, country of origin, date, sample, methodology, and emerging themes (see Appendix D). There were 14 quantitative

studies (observational correlational design, RCTs, and systematic reviews) that shared the same purpose of examining relationship to diet type and depression (Bayes et al., 2020, 2022; Fresan et al., 2019; Godos et al., 2023; Lahouti et al., 2021; Molendijk et al., 2018; O’Neil et al., 2022; Parletta et al., 2019; Radvalli et al., 2021; Selvaraj et al., 2022; Shayka et al., 2021; Sun et al., 2021; Teasdale et al., 2020; Yin et al., 2021). Several articles of mixed type and level ranging from a systematic review of RCTs to a descriptive study addressed recommendations for nutritional psychiatry that were related to dietary habits and major depression (Chatterton et al., 2018; Morkl et al., 2021; O’Neil et al. 2022). Only two quantitative studies sought to validate specific dietary tools that could be potentially used in MDD (Begdache et al., 2019; Teasdale et al., 2021). There was one level 5 article in the review that had an explicit purpose to review preexisting dietary screening tools for mental health (Hancox et al., 2021).

Most of the studies were conducted in countries of higher economic status. Australia was the most well represented country with ten studies (Bayes et al., 2020, 2022; Chatterton et al., 2018; Hancox et al., 2021; O’Neil et al., 2022; Parlette et al., 2019; Radavelli et al., 2021; Selvaraj et al., 2022; Shayka et al., 2021; Teasdale et al., 2021). Other represented countries included Austria, Switzerland, the Netherlands, Spain, Italy, Iran, Korea, New Zealand, and the United States. Sample sizes of research articles greatly differed depending upon type and methodology (refer to Appendix D). The larger samples were understandably representative of systematic reviews and longitudinal cohorts whereas reduced sample sizes were seen with RCTs, and some of the smaller scale correlational studies.

Synthesis

Toronto and Remington (2020) described synthesis as the process that relates the analytic themes of the evidence back to the purpose/questions of the review. The integrative

review questions were as follows: What dietary screening types and tools are being utilized for major depressive disorder (MDD) in adults? What are the recommendations for nutritional screening in adults with MDD? What are the clinical barriers to the implementation of nutritional screening in adults with MDD?

What dietary screening types and tools are being utilized for MDD in adults?

Findings from the IR indicate that several different dietary screening types and tools have been utilized in nutrition studies for major depression. The overwhelming majority of the studies utilized food frequency questionnaires (FFQs) which are considered the most common screening tool in general populations since they are typically well validated against national/international dietary guidelines and easy to administer (Bayes et al. 2020; Fresan et al., 2019; Godos et al., 2023; Lahouti et al., 2021; Molendijk et al., 2018; Nouri et al., 2021; O'Neill et al., 2022; Radavelli et al., 2021; Selvaraj et al., 2022; Shayka et al., 2021; Sun et al., 2021; Yin et al., 2021). These tools typically assign a numerical value/score depending upon the frequency of a food consumed during a specific period of time. In contrast, lengthy food diaries and 24-hour diet recalls were not as well represented in the literature with only three studies using them as primary screening methods in depression (Molendijk et al., 2018; O'Neill et al., 2022; Sun et al., 2021). Mediterranean diet specific screening tools such as the 14 Item Mediterranean Questionnaire and the Mediterranean Dietary Adherence Screener (MEDAS) were used for several observational studies examining the relationship between major depression and Mediterranean diets (Bayes et al., 2022; Fresan et al., 2019; Parletta et al., 2019). The Dietary Screening Tool (DST) was represented in one study examining the economic benefits of nutritional screening and interventions for major depression (Chatterton et al., 2018).

Few studies focused upon validation of nutritional screening tools for use in mental

health populations that could include MDD. The Food Mood Questionnaire (FMQ), which is based upon ADA guidelines, is both valid and reliable for use in mental health but there is limited application of the tool so far in major depressive populations in spite of the versatility for use in both inpatient and outpatient settings (Begdache et al., 2019). This is a similar issue described in the scoping review of nutritional screening tools in SMI (which included severe cases of MDD), as well as an article description of the new NutriMental Screener which is in mid-phase protocol development toward validation (Hancox et al., 2021; Teasdale et al., 2021). Hancox et al. reported that the MNRS (Malnutrition Risk Screening) is the only screening tool validated for SMI besides binge eating disorder tools (BEDS, BED-F). However, the MNRS is not readily available for use in clinical settings in comparison to other non-validated tools. There is also the additional issue of no isolated studies exclusive to MDD, but only as a disorder listed under SMI.

What are the recommendations for nutritional screening in adults with MDD?

The majority of the studies examined the relationship between dietary habits and depression symptomatology, although final recommendations varied depending upon nutrient focus. Few studies addressed practice recommendations in the context of nutritional screening process, protocol, or guideline development (Morkl et al., 2021; Teasdale et al., 2021). Multiple studies focused on the benefits of a Mediterranean Diet (MD) for depressive symptoms. Bayes et al. (2020) and Bayes et al. (2022) found reduced risk for major depression with MDs rich in polyphenols. Bayes et al. (2022) suggested dietician referrals for both screening and cooking instruction. Yin et al. (2021) and Fresan et al. (2019) recommended MDs due to association with lower depression risk. Findings from the Lahouti et al. (2021) and Godos et al. (2023) studies suggested that “Western” diets with processed/ultra-processed foods are associated with higher incidence of depression compared

to MDs and that there should be a focus on risk reduction through screening and education. Similarly, Parletta et al. (2019) suggested a Mediterranean diet with fish oil supplementation for depression but also made a further recommendation for providers to refer patients to group nutrition classes for education and counseling.

Numerous studies focused upon “healthy” eating as those diets rich in fruits and vegetables and whole foods versus processed foods. All of the studies examining these diet types found correlation between improved/lowered depression symptomatology in participants consuming categorically “healthy” diets (Molendijk et al., 2018; Nouri et al., 2021; O’Neil et al., 2022; Radavelli et al., 2021; Selvaraj et al., 2022; Shayka et al., 2021; Sun et al., 2021). The findings suggest dietary recommendations as interventions for depression but specific guidelines for type and frequency of screening or in what setting isn’t discussed in these particular studies.

O’Neil et al. (2022) suggested that dietary screening, education, and nutrition intervention should be a part of depressive disorder treatment plans with no preference suggested between face to face, group versus individual, phone or electronic/web-based delivery. Chatterton et al. (2018) also suggested dietary screening and interventions with a dietician are cost effective treatment for major depression. In congruence with other studies, no specific guidelines were referenced for the method of screening implementation in MDD, just that it was important to address it in the future. Begdache et al. (2019) made recommendations for providers for “prophylactic and therapeutic” screening use of the Food Mood Questionnaire, suggesting its implementation at both secondary and tertiary levels of care. Morkl et al. (2021) also supported greater integration of dietary interventions which could include screening and education for both eating disorders and MDD.

What are the clinical barriers to the implementation of nutritional screening in adults with

MDD?

Several barriers were identified for screening implementation. The most frequent theme that emerged from the literature was the novelty of nutritional psychiatry with suggestions for additional research in this field (Bayes et al. 2020; Chatterton et al., 2018; Godos et al., 2023; Lahouti et al., 2021; Molendijk et al., 2018; Nouri et al., 2021; Radavelli et al., 2021; Selvaraj et al., 2022; Sun et al., 2021). Several articles suggested increasing the body of evidence for gender specific studies (Lahouti et al., 2021; Nouri et al., 2021). Findings from the Bayes et al. (2020) systematic review showed that isoflavones, a key element in polyphenols associated with Mediterranean cuisine, may be more beneficial for men versus women and that more research is needed. The Bayes et al. (2022) study also identified a potential issue with male attitude as a barrier to prioritization and discussion of healthy eating practices, which could affect the veracity of screening results for men versus women. Chatterton et al. (2018) acknowledged the significant monetary savings of dietary interventions for major depression but also suggested that more economic studies are needed with greater international focus. The evidence suggests that more than one diet can be beneficial for major depression which may lead to variability in choice of screening type and confusion for making universal recommendations for practice. As previously discussed, the lack of validated and available tools for MDD is a significant barrier and there are no universal guidelines (Begdache et al., 2019; Hancox et al., 2021).

An unexpected clinical barrier noted was the lack of formal nutrition education reported by psychiatric professionals. A descriptive study from Morkl et al. (2021) indicated that two thirds of the surveyed mental health providers reported no nutritional training; however, 60% of the participants would recommend dietary referrals, screening, treatment, and interventions for their patients diagnosed with major depression. The sample included

1,056 individuals, including psychiatrists, psychologists, psychotherapists, and other licensed mental health professionals with higher education. These findings suggest that lack of nutrition education may be a significant barrier to implementation of screening and dietary interventions.

Ethical Considerations

Reviewers must adhere to ethical guidelines while conducting IRs (Toronto & Remington, 2020). Research ethics training for protection of human subjects (CITI) was completed prior to conducting the review. The Liberty University Institutional Review Board (IRB) approved an exemption before starting the actual review process. Furthermore, no conflicts of interest have been identified for the reviewer. The IR was conducted in accordance with the Christian worldview, which includes upholding principles of integrity and honesty. The reviewer did not detect unethical conflicts of interest for the authors of the IR articles.

Timeline

Milestone	Deliverable	Description	Estimated Completion Date
IR Proposal	Defense with Chair Approval	Finish edits to Proposal Paper and develop and edit the PowerPoint	6/25/2023
IRB Phase	IRB Approval	Complete and submit IRB Application Obtain response from IRB with exemption letter IRB response/letter added to Appendix of IR manuscript	7/2/2023
Literature Search	Completion of Step 2 of IR	Comprehensive literature review based upon librarian search terms, utilization of inclusion and exclusion criteria, add to paper	7/9/2023
Data Evaluation	Completion of Step 3 of IR	Extraction of methodological features of sample studies, quality criteria implementation, add to paper	7/15/2023
Data Analysis	Completion of Step 4 of IR	Constant comparison method with data reduction, data display, conclusion drawing and verification, add to paper	7/21/2023
Presentation	Completion of Step 5	Results, Implications for Practice,	7/30/2023(Canvas

	of IR with Final Edits	completion of all stages finalized, review, add to paper	due date)
Defense	Final Defense with Scholarly Crossings and Dissemination Phase Completion	Final Defense Powerpoint presentation, arguing the defense, edits as appropriate for successful submission to Scholarly Crossings	9/17/2023 (end of Nursing 950)

SECTION SIX: DISCUSSION

The state of the evidence supports the potential benefits of healthy eating for major depression. The integrative review confirmed many of the findings from the background literature, that any “healthy” diet could be of benefit and that screening is an essential yet underdiscussed component of dietary interventions. Although no universal screening guidelines from the APA and other entities/commissions were identified from the background literature and integrative review, suggestions have been made for more research and clinical focus on this area of nutritional psychiatry with a suggestion that providers increase referrals to dietitians (Teasdale & Firth, 2020).

Some unexpected findings from the review included the amount of variability in international diagnostic criteria for MDD nutritional studies. This could be considered a limitation of the review, as well as the inability to determine cause and effect from correlational studies. Some degree of variability was anticipated by the reviewer based upon the background literature, which influenced the decision for more rigorous inclusion criteria for the integrative review. However, the volume of variability across international studies was still unexpected (Bayes et al., 2020; Molendijk et al., 2018; O’Neill et al., 2022; Selvaraj et al., 2022). Another unexpected theme was the overrepresentation of higher socioeconomic countries and continents such as Australia, Europe, and the United States. This reveals a major gap in nutritional research for second and third world nations.

Implications for Practice and Future Work

According to Lara-Breitinger et al. (2023), general barriers to implementation of nutritional screening in outpatient clinical settings included time constraints, workflow issues, the survey fatigue associated with long inventory taking, and undereducation of nutrition education for providers. Several of these same issues were represented from the IR findings. The standardized dietary assessments in the general population that have been most validated are 24-hour diet recalls and FFQs. This is also congruent with the findings from the integrative review and background literature, where these were the most represented tools used in studies. However, these tools can also be time consuming to administer (Lara-Breitinger et al., 2023). The Mini-Eat and the REAP-S are examples of quick to administer tools that may address the general barriers to practice implementation; however, there remains an issue of obtaining validation of these tools in MDD populations (Lara-Breitinger et al., 2023; Vadiveloo et al., 2020). This is a clear research and practice gap that needs to be addressed. The NutriMental Screener, as previously discussed, is still in mid phase development for validation which is a promising step toward increasing the number of tools validated for nutritional psychiatry (Teasdale et al., 2021). However, will it be user-friendly and rapid enough to administer in “real world” practice? Will it be adopted in both primary care and psychiatric settings? This is yet to be determined and should be an impetus for further research.

The integrative review findings in comparison to background literature and other outside studies, suggest that solutions to these implementation barriers will take a combination of efforts. Evidence based suggestions include increasing formal education for providers concerning the numerous benefits of healthy diet in depressive populations, developing policies for nutritional screening in both inpatient and outpatient settings, adopting a standardized rapid screening tool compatible with EHRs to facilitate efficiency in practice, and implementing a dietician referral system for mental health practices (Mork et al., 2021;

Teasdale & Firth, 2020; Vadiveloo et al., 2020).

Role of the Doctor of Nursing Practice

Doctor of Nursing Practice (DNP) graduates are well positioned to find innovative, evidence-based solutions for process change and practice recommendations in nutritional psychiatry. The DNP education includes eight *Essentials* developed by the AACN such as scientific underpinnings, organizational and systems leadership for quality improvement and systems thinking, clinical scholarship and analytical methods for EBP, information systems/technology and patient care technology, health care policy for advocacy in health care, interprofessional collaboration for improving population health outcomes, clinical prevention and population health for improving national health, and advanced nursing practice (AACN, 2006). Future work for the DNP provider could include application of the IR findings to improve/devise nutritional education for providers in both psychiatric and primary care settings, implement nutritional screening pilot studies for MDD patients with validated tools, initiate policies that support screening and dietary interventions, and develop evidence-based interdisciplinary referral programs to dietitians.

Dissemination

Toronto and Remington (2020) described dissemination as the final phase to share findings from the integrative review. This IR is applicable to multiple target audiences including nursing, medicine, public health, and mental health. The reviewer's plan for dissemination is to obtain acceptance of the manuscript in Liberty University's compilation of student works known as "Scholar's Crossing." Future consideration will be given to dissemination of findings at mental health conferences or with presentations at local clinics treating this population. This would raise community awareness of the importance of nutritional screening in major depressive disorder and promote practice changes.

References

- American Association of Colleges of Nurses (2006). *The essentials of doctoral education for advanced nursing practice*. Retrieved from <http://www.aacnnursing.org/> DNP/ DNP-Essentials.
- American Psychological Association. (2010). *Publication manual* (6th ed.). Author.
- American Psychological Association (2023). *Depression assessment instruments*.
<https://www.apa.org/depression-guideline/assessment/>
- Balani, R., Herrington, H., Bryant, E., Lucas, C., & Kim, S.C. (2019). Nutrition knowledge, attitudes, and self-regulation as predictors of overweight and obesity. *Journal of the American Association of Nurse Practitioners*, 31(9), 502–510.
<https://doi.org/10.1097/JXX.000000000000169>
- Bayes, J., Schloss, J., & Sibbritt, D. (2020). Effects of polyphenols in a Mediterranean diet on symptoms of depression: A systematic literature review. *Advances in Nutrition*, 11(3), 602–615. <https://doi.org/10.1093/advances/nmz117>
- Bayes, J., Schloss, J., & Sibbritt, D. (2022). The effect of a Mediterranean diet on the symptoms of depression in young males (the “AMMEND: A Mediterranean Diet in MEN with Depression” study): A randomized controlled trial. *The American Journal of Clinical Nutrition*, 116(2), 572–580.
<https://doi.org/10.1093/ajcn/nqac106>
- Begdache, L., Marhaba, R., & Chaar, M. (2019). Validity and reliability of Food–Mood Questionnaire (FMQ). *Nutrition and Health*, 25(4), 253–264.
doi:10.1177/0260106019870073

Chatterton, M. L., Mihalopoulos, C., O'Neil, A., Itsiopoulos, C., Opie, R., Castle, D., . . .

Jacka, F. (2018). Economic evaluation of a dietary intervention for adults with major depression (the "SMILES" trial). *BMC Public Health, 18*(1), 599.

doi:10.1186/s12889-018-5504-8

Firth, J., Marx, W., Dash, S., Carney, R., Teasdale, S., & Solmi, M. (2019). The effects of dietary improvement on symptoms of depression and anxiety: A meta-analysis of randomized controlled trials. *Psychosomatic Medicine, 81*, 265-280.

<https://doi.org/10.1097/PSY.0000000000000673>

Francis, H.M., Stevenson, R.J., Chambers, J.R., Gupta, D., Newey B., & Lim, C.K.

(2019). A brief diet intervention can reduce symptoms of depression in young adults: A randomised controlled trial. *PLoS ONE 14*(10): e0222768.

<https://doi.org/10.1371/journal.pone.0222768>

Fresán, U., Bes Rastrollo, M., Segovia Siapco, M., Sanchez Villegas, G., Lahortiga1, G.,

Antonio, R., & Martínez Gonzalez, M. (2019). Does the MIND diet decrease depression risk? A comparison with Mediterranean diet in the SUN cohort.

European Journal of Nutrition 58, 1271-1282. <https://doi.org/10.1007/s00394-018-1653-x>

Godos, J., Bonaccio, M., Al-Qahtani, W., Marx, W., Lane, M. M., Leggio, G. M., &

Grosso, G. (2023). Ultra-processed food consumption and depressive symptoms in a Mediterranean cohort. *Nutrients, 15*(3), 504. doi:10.3390/nu15030504

. Hancox, L.E., Pui, S.L., Armaghanian, N., & Hirani, V., & Wakefield, G. (2021). Nutrition

risk screening methods for adults living with severe mental illness: A scoping

review. *Nutrition & Dietetics: Journal of Dietetics Australia*, 79(3), 349-363.

<https://doi.org/10.1111/1747-0080.12652>

Hong, Q. N., Gonzalez-Reyes, A., & Pluye, P. (2018). Improving the usefulness of a tool for appraising the quality of qualitative, quantitative, and mixed methods studies, the Mixed Methods Appraisal Tool (MMAT). *Journal of Evaluation in Clinical Practice*, 24(3), 459–467. <https://doi.org/10.1111/jep.12884>

Huang, Q., Liu, H., Suzuki, K., Ma, S., & Liu, C. (2019). Linking what we eat to our mood: A review of diet, dietary antioxidants, and depression. *Antioxidants (Basel, Switzerland)*, 8(9), 376. <https://doi.org/10.3390/antiox8090376>

Johnston, C. S., Bliss, C., Knurick, J. R., & Scholtz, C. (2018). Rapid Eating Assessment for Participants [shortened version] scores are associated with Healthy Eating Index-2010 scores and other indices of diet quality in healthy adult omnivores and vegetarians. *Nutrition Journal*, 17(1), 89. <https://doi.org/10.1186/s12937-018-0399-x>

Kim, I. S., & Hwang, J. Y. (2023). Does better diet quality offset the association between depression and metabolic syndrome? *Nutrients*, 15(4), 1060. <https://doi.org/10.3390/nu15041060>

Lahouti, M., Zavoshy, R., Noroozi, M., Rostami, R., Gholamalizadeh, M., Rashidkhani, B., & Doaei, S. (2021). Dietary patterns and depressive symptoms among Iranian women. *Journal of Health Psychology*, 26(12), 2278–2289. <https://doi.org/10.1177/1359105320909888>

Lara-Breitinger, K. M., Medina Inojosa, J. R., Li, Z., Kunzova, S., Lerman, A., Kopecky, S.

L., & Lopez-Jimenez, F. (2023). Validation of a brief dietary questionnaire for use in clinical practice: Mini-EAT (Eating Assessment Tool). *Journal of the American Heart Association*, *12*(1), e025064. <https://doi.org/10.1161/JAHA.121.025064>

Mechlińska, A., Włodarczyk, A., Gruchała-Niedoszytko, M., Małgorzewicz, S., & Cubała,

W. J. (2022). Dietary patterns of treatment-resistant depression patients. *Nutrients*, *14*(18), 3766. <https://doi.org/10.3390/nu14183766>

Melnyk, B.M., & Fineout-Overholt, E. (2015). "Box 1.3: Rating system for the hierarchy of evidence for intervention/treatment questions" in *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed. p.11).

Wolters Kluwer Health.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Group, T. PRISMA. (2009).

Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The

PRISMA statement: e1000097. *PLoS Medicine*, *6*(7), e1000097.

<https://doi.org/10.1371/journal.pmed.1000097>

Molendijk, M., Molero, P., Ortuño Sánchez-Pedreño, F., Van der Does, W., & Angel

Martínez-González, M. (2018). Diet quality and depression risk: A systematic

review and dose-response meta-analysis of prospective studies. *Journal of Affective*

Disorders, *226*, 346–354. <https://doi.org/10.1016/j.jad.2017.09.022>

. Mörkl, S., Stell, L., Buhai, D. V., Schweinzer, M., Wagner-Skacel, J., Vajda, C., Lackner,

S., Bengesser, S. A., Lahousen, T., Painold, A., Oberascher, A., Tatschl, J. M.,

Fellinger, M., Müller-Stierlin, A., Serban, A. C., Ben-Sheetrit, J., Vejnovic, A. M.,

- Butler, M. I., Balanzá-Martínez, V., Zaja, N., ... Holasek, S. J. (2021). 'An apple a day'? Psychiatrists, psychologists, and psychotherapists report poor literacy for nutritional medicine: International survey spanning 52 countries. *Nutrients*, *13*(3), 822. <https://doi.org/10.3390/nu13030822>
- Moya, E., Larson, L. M., Stewart, R. C., Fisher, J., Mwangi, M. N., & Phiri, K. S. (2022). Reliability and validity of depression anxiety stress scale (DASS)-21 in screening for common mental disorders among postpartum women in Malawi. *BMC Psychiatry*, *22*(1), 352. <https://doi.org/10.1186/s12888-022-03994-0>
- Nouri Saeidlou, S., Kiani, A., & Ayremlou, P. (2021). Association between dietary patterns and major depression in adult females: A case-control study. *Journal of Research in Health Sciences*, *21*(1), e00506. <https://doi.org/10.34172/jrhs.2021.37>
- O'Neill, S., Minehan, M., Knight-Agarwal, C. R., & Turner, M. (2022). Depression, is it treatable in adults utilising dietary interventions? A systematic review of randomised controlled trials. *Nutrients*, *14*(7), 1398. <https://doi.org/10.3390/nu14071398>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ : British Medical Journal (Online)*, *372*. <https://doi.org/10.1136/bmj.n71>

- Parletta, N., Zarnowiecki, D., Cho, J., Wilson, A., Bogomolova, S., Villani, A., ...O'Dea, K. (2019). A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED). *Nutritional Neuroscience*, 22(7), 474–487.
<https://doi-org.ezproxy.liberty.edu/10.1080/1028415X.2017>
- Pham, K. M., Pham, L. V., Phan, D. T., Tran, T. V., Nguyen, H. C., Nguyen, M. H., Nguyen, H. C., Ha, T. H., Dao, H. K., Nguyen, P. B., Trinh, M. V., Do, T. V., Nguyen, H. Q., Nguyen, T. T. P., Nguyen, N. P. T., Tran, C. Q., Tran, K. V., Duong, T. T., Nguyen, L. V., Do, T. T., ... Duong, T. V. (2020). Healthy dietary intake behavior potentially modifies the negative effect of COVID-19 lockdown on depression: A hospital and health center survey. *Frontiers in Nutrition*, 7, 581043.
<https://doi.org/10.3389/fnut.2020.581043>
- Radavelli-Bagatini Simone, Reindolf, A., Bondonno, N. P., Sim, M., Bondonno, C. P., Stanley, M. J., Harms, C., Woodman, R., Magliano, D. J., Shaw, J. E., Daly, R. M., Hodgson, J. M., Lewis, J. R., & Blekkenhorst, L. C. (2021). Association of habitual intake of fruits and vegetables with depressive symptoms: The AusDiab study. *European Journal of Nutrition*, 60(7), 3743-3755. <https://doi.org/10.1007/s00394-021-02532-0>
- Selvaraj, R., Selvamani, T. Y., Zahra, A., Malla, J., Dhanoa, R. K., Venugopal, S., Shoukrie, S. I., Hamouda, R. K., & Hamid, P. (2022). Association between dietary habits and depression: A systematic review. *Cureus*, 14(12), e32359.
<https://doi.org/10.7759/cureus.32359>

- Shakya, P. R., Melaku, Y. A., Page, A. J., & Gill, T. K. (2021). Nutrient patterns (NP) and depressive symptoms among Australian adults. *European Journal of Nutrition*, *60*(1), 329-343. doi:10.1007/s00394-020-02243-y
- Shivappa, N., Hebert, J. Veronese, N., Caruso, M., Notarnicola, M., Maggi, S., ... Solmi, M. (2018). The relationship between the dietary inflammatory index (DII) and incident depressive symptoms: A longitudinal cohort study. *Journal of Affective Disorders*, *8*, 235-44. doi:10.1016 /j.jad.2018.04.014
- Stratton, S. (2019). Quasi-experimental design (pretest and post-test studies) in prehospital and disaster research. *Prehospital and Disaster Medicine*, *34*(6), 573-574. doi:10.1017/ S1049023X19005053
- Sun, J., Li, Z., Li, Y., & Zhang, D. (2021). Intakes of specific categories of vegetables and fruits are inversely associated with depressive symptoms among adults. *Journal of Epidemiology*, *31*(3), 210-219. <https://doi.org/10.2188/jea.JE20200003>
- Teasdale, S.B., Burrows, T. L., Hayes, T., Hsia, C. Y., Watkins, A., Curtis, J., & Ward, P. B. (2020). Dietary intake, food addiction and nutrition knowledge in young people with mental illness. *Nutrition & Dietetics : The Journal of the Dietitians Association of Australia*, *77*(3), 315–322. <https://doi.org/10.1111/1747-0080.12550>
- Teasdale, S. B., & Firth, J. (2020). Recommendations for dietetics in mental healthcare. *Journal of Human Nutrition and Dietetics: The Official Journal of the British Dietetic Association*, *33*(2), 149–150. <https://doi.org/10.1111/jhn.12716>
- Teasdale, S. B., Moerkl, S., Moetteli, S., & Mueller-Stierlin, A. (2021). The development of a nutrition screening tool for mental health settings prone to obesity and

cardiometabolic complications: Study protocol for the NutriMental Screener. *International Journal of Environmental Research and Public Health*, 18(21), 11269. <https://doi.org/10.3390/ijerph182111269>

Toronto, C.E., & Remington, R. (2020). *A step-by-step guide to conducting an integrative review* (1st ed.). Springer International Publishing.

United States Department of Health and Human Services. (2023). *Healthy People 2030: Nutrition and Health Eating*. <https://health.gov/healthypeople/objectives-and-data/browse-objectives/nutrition-and-healthy-eating>

Vadiveloo, M., Lichtenstein, A. H., Anderson, C., Aspry, K., Foraker, R., Griggs, S., Hayman, L. L., Johnston, E., Stone, N. J., & Thorndike, A. N. (2020). Rapid diet assessment screening tools for cardiovascular disease risk reduction across healthcare settings: A scientific statement from the American Heart Association. *Circulation Cardiovascular Quality and Outcomes*, 13(9), e000094-e000094. <https://doi.org/10.1161/HCQ.0000000000000094>

White, K. M., Dudley-Brown, S., & Terhaar, M. F. (2021). *Translation of evidence into nursing and health care*. (3rd ed.). Springer Publishing Company.

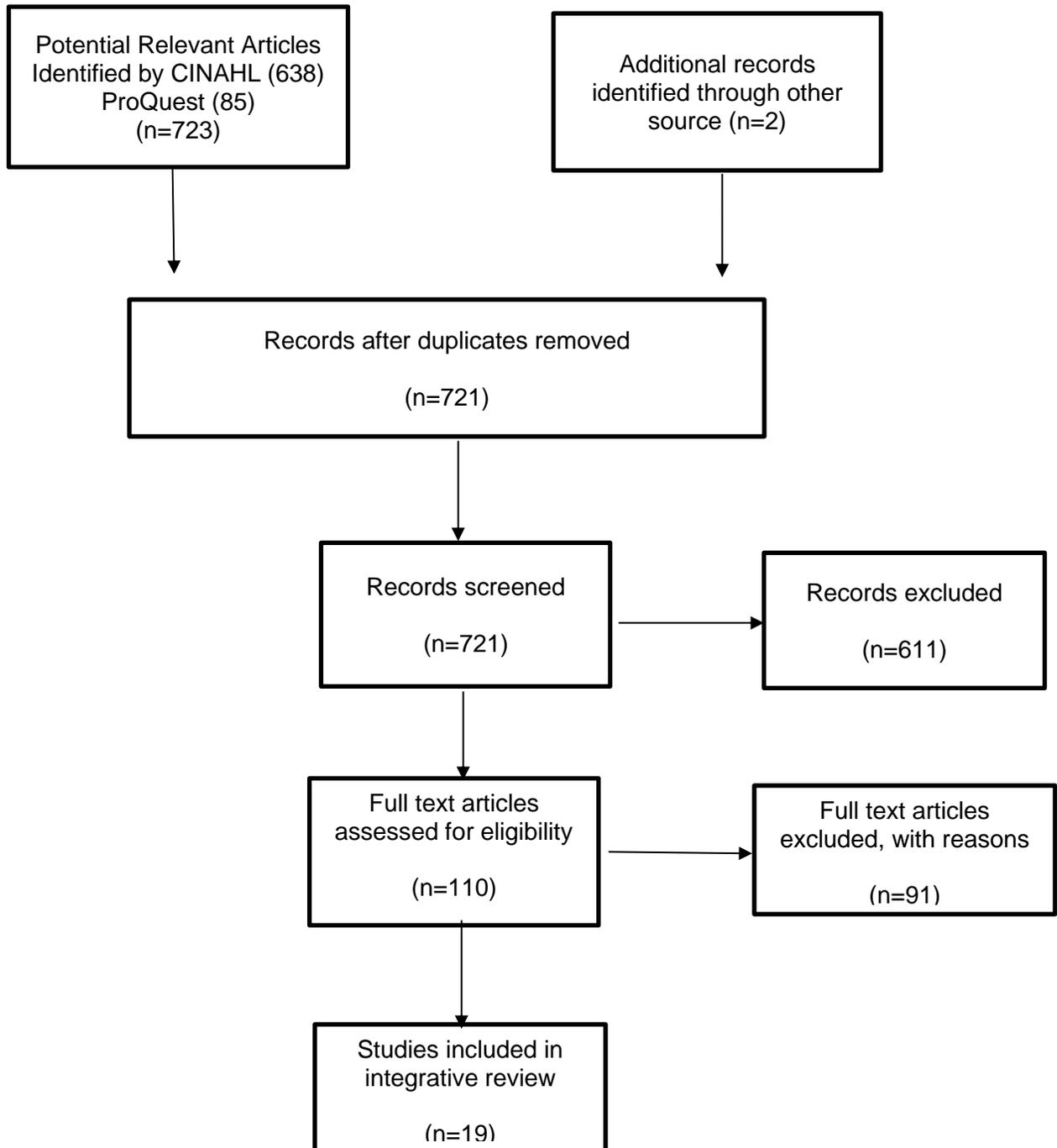
Whittemore, R. & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52(5), 546–553. <https://doi.org/10.1111/j.1365-2648.2005.03621.x>

World Health Organization: WHO & World Health Organization: WHO. (2023). Depressive disorder (depression). [www.who.int](http://www.who.int/news-room/fact-sheets/detail/depression) <https://www.who.int/news-room/fact-sheets/detail/depression>

Yin, W., Löf, M., Chen, R., Hultman, C. M., Fang, F., & Sandin, S. (2021). Mediterranean diet and depression: A population-based cohort study. *The International Journal of Behavioral Nutrition and Physical Activity*, 18(1), 153. <https://doi.org/10.1186/s12966-021-01227-3>

Appendix A

PRISMA Flow Diagram



Flowchart of search and screening process. Adapted from “Preferred reporting items for systematic reviews and meta-analysis: The PRISMA statement” by Moher et al., 2009, *Annals of Internal Medicine*, 151, p. 267. Copyright 2009 by PRISMA Group.

Appendix B
Evidence Table

Name: Laurie Stephens

IR Questions:

- What dietary screening types and tools are being utilized for major depressive disorder in adults?
- What are the recommendations for nutritional screening in adults with major depressive disorder?
- What are the clinical barriers to the implementation of nutritional screening in adults with major depressive disorder?

Author(year)	Study Purpose/ Objective(s)	Design, Sampling Method, & Subjects	LOE*	Intervention &Outcomes	Results	Study Strengths & Limitations
1. Bayes, J., Schloss, J., & Sibbritt, D. (2020). Effects of polyphenols in a Mediterranean diet on symptoms of depression: A systematic literature review. <i>Advances in Nutrition, 11</i> (3), 602–615. https://doi.org/10.1093/advances/nmz117	Examination of the role of polyphenols on depression symptomatology in the Mediterranean diet (MD)	Systematic literature review; 37 articles with total of 10,301 study participants, studies mostly both gender ages with majority targeting ages 23-55; Joanna Briggs Institute critical appraisal tool for systematic reviews; Checklist for Randomized Controlled Trials; STROBE	Level 5	No intervention observational studies Experimental studies indicate that polyphenols can reduce depression risk greater than antidepressants	studies showed relationship between MDs and reduction in depression risk	<p><i>Strengths</i>-high level I evidence to support dietary screening and that Mediterranean diets can reduce depression symptoms, large data pool</p> <p>-value of nutritional screening for polyphenols in diet through FFQ</p> <p><i>Limitations</i>-Failure to address study design bias in a few multiple observational studies, more polyphenol studies needed</p>

		<p>checklist, cut-off date March 2019 with inclusion of original research only</p> <p>Criteria for depression using CESD, PHQ-9, DSM-IV-TR</p> <p>- FFQ dietary screening tool</p>				
<p>2. Bayes, J., Schloss, J., & Sibbritt, D. (2022). The effect of a Mediterranean diet on the symptoms of depression in young males (the “AMMEND: A Mediterranean Diet in MEN with Depression” study): a randomized controlled trial. <i>The American Journal of Clinical Nutrition</i>, 116(2), 572–580. https://doi.org/10.1093/ajcn/nqac106</p>	<p>Evaluate the effects of a MD versus control in a population of young men with major depressive disorder</p>	<p>72 young males aged 18–25 years with major depressive disorder random sampling; 12-week RCT with MD group vs control group; Beck Depression Inventory Scale (II) for outcome measure</p> <p>Nutrition screening tool - Mediterranean Diet Adherence Score (MEDAS)</p>	<p>Level 2 evidence</p>	<p>Mediterranean diet education and intervention group, outcome comparison with control</p>	<p>20.6-point reduction mean in depressive symptom scoring for intervention group versus control</p>	<p><i>Strengths</i>-high level evidence and results support MD can improve depression</p> <p>-supports value of MEDAS tool for long term use (12 weeks)</p> <p>- recommendation for medical and psychiatric professionals to refer to dietitians/nutritionists as an important component of depression treatment if unhealthy eating is identified</p> <p><i>Limitations</i>-needs more replication studies</p>

<p>3. Begdache, L., Marhaba, R., & Chaar, M. (2019). Validity and reliability of Food–Mood Questionnaire (FMQ). <i>Nutrition and Health</i>,25(4),253-264. doi:10.1177/0260106019870073</p>	<p>Develop a well validated dietary screening tool for use in mental health, Food–Mood Questionnaire (FMQ)</p>	<p>Mixed methods, Food-Mood Questionnaire developed from National Health and Nutrition Examination Survey Food Frequency Questionnaire (FFQ)</p> <p>pilot-testing, and statistical validation-PCA</p> <p>KMO testing, Bartlett’s sphericity test</p> <p>convenience sampling, 138 participants for pilot internal validity and 563 participants for external validity, ages 18-50, qualitative face validity</p>	<p>Level 4</p>	<p>No intervention</p> <p>Pilot validation of tool development for depression based upon ADA guidelines, integrating questions based upon dietary nutrients with inverse association for depression</p>	<p>Internal validity: Cronbach’s alpha > 0.70 internal reliability with correlation coefficient range of (0.619 and 0.884 and $p < 0.01$, CI 95%)</p>	<p><i>Strengths-</i> Well validated tool as evidenced by high study rigor, addresses gap in mental health/depression nutrition screening, can be used in multiple settings</p> <p><i>Limitations-</i>Limited application of tool in depressive populations so far</p>
---	--	--	----------------	---	---	---

<p>4. Chatterton, M. L., Mihalopoulos, C., O'Neil, A., Itsiopoulos, C., Opie, R., Castle, D., . . . Jacka, F. (2018). Economic evaluation of a dietary intervention for adults with major depression (the "SMILES" trial). <i>BMC Public Health</i>, 18(1), 5. doi:10.1186/s12889-018-5504-8</p>	<p>Provide an economic evaluation of dietary intervention for major depressive episode from "SMILES"</p>	<p>-RCT "SMILES", 67 adults meeting criteria for DSM-IV MDE, random assignment to nutrition education group vs control, economic evaluation of hourly wages for dietician sessions versus societal cost estimates</p> <p>-Dietary Screening Tool used for nutritional screening</p>	<p>Level 2</p>	<p>-Seven dietician education sessions vs social support group -Primary outcome was Quality Adjusted Life Years (QALYs) measured by AQoL-8D at baseline and 12-week follow-up</p>	<p>-Reduced health sector costs \$856 lower (95% CI -1247 to -160) -societal costs \$2591 lower (95% CI -3591-198) for dietary intervention vs control</p>	<p><i>Strengths</i>-Inclusive of pioneer study aimed at examining benefits of dietary screening with intervention and economic savings, rigorous methodology</p> <p><i>Weaknesses</i>-needs replication due to small sample size</p>
<p>5. Fresán, U., Bes-Rastrollo, M., Segovia-Siapco, M., Sanchez-Villegas, G., Lahortiga, G., Antonio, R., & Martínez-Gonzalez, M. (2019). Does the MIND diet decrease depression risk? A comparison with Mediterranean diet in the SUN cohort. <i>European Journal of Nutrition</i> 58, 1271-1282. https://doi.org/10.1007/s00394-018-1653-x</p>	<p>Compare association of depression risk in Mediterranean diet and neuro-degenerative delay (MIND) diet</p>	<p>Cohort;15,980 university graduates through University of Navarra, adult age >18; comparison groups</p>	<p>Level 4</p>	<p>No intervention MIND and Mediterranean diets assessed at baseline and two-year mark via questionnaire</p>	<p>666 identified depression cases Mediterranean diet associated with lower depression risk but no association found for MIND diet</p>	<p>Limitation- University graduate population; Data reliant on self-report</p> <p>Strength-Yes, provides data supporting association of Mediterranean diet with lower depression risk</p>
<p>6. Godos, J., Bonaccio, M., Al-Qahtani, W., Marx, W., Lane, M. M., Leggio, G. M., & Grosso, G. (2023). Ultra-processed food</p>	<p>Examine relationship between ultra-processed eating and</p>	<p>Cross-sectional observational study of 2044</p>	<p>Level 4</p>	<p>No intervention NOVA for ultra-</p>	<p>Results show association between</p>	<p><i>Strengths</i>- Large sample size,</p>

<p>consumption and depressive symptoms in a Mediterranean cohort. <i>Nutrients</i>, 15(3), 504. doi:10.3390/nu15030504</p>	<p>incidence of depression in Mediterranean area.</p>	<p>Italian participants ages 18 to 35, data taken from MEAL study Nutritional screening done with FFQ</p>		<p>processed foods; FFQ utilized for ongoing diet assessment, CES-D-10 used to measure depression scores</p>	<p>eating high amount of ultra-processed foods reported and increased depressive symptoms (OR 01.89, 95% CI-1.06, 3.28) Reduced incidence of depression with higher adherence to Mediterranean diet</p>	<p>examined two areas: relationship with eating ultra processed foods and Mediterranean diet with depressive symptoms <i>Limitations-</i> Potential for confounders, observational study limitations(cannot determine cause and effect)</p>
<p>7. Hancox, L.E., Pui, S.L., Armaghanian, N., & Hirani, V., & Wakefield, G. (2021). Nutrition risk screening methods for adults living with severe mental illness: A scoping review. <i>Nutrition & Dietetics: Journal of Dietetics Australia</i>, 79(3), 349-363. https://doi.org/10.1111/1747-0080.12652</p>	<p>Identify available nutritional screening tools for Serious Mental Illness</p>	<p>Scoping review of adult nutritional screening tools for use in adult SMI populations including major depressive disorder, used the Arksey and O'Malley framework, Joanna Briggs Institute (JBI) Reviewer's Manual, PRISMA extension for Scoping Reviews, 6 databases</p>	<p>Level 5</p>	<p>No intervention 20 observational /case control studies initially, 30-35 participant range</p>	<p>Narrowed to Seventeen dietary/nutrition screening methods identified, three for SMI which includes major depressive disorder No tools identified for major depressive disorder alone, only as inclusion for SMI No validated screening tool/method for dysphagia, overnutrition, or constipation MNRS (Malnutrition</p>	<p><i>Strengths-</i> thorough review of available tools, rigor demonstrated in scoping review, first scoping review for this population <i>Limitations-</i> Small sample size of some included studies, MNRS tool is validated but as readily available for use as other less validated tools</p>

					Risk Screening) is validated in SMI population Validated tools (SMI) were for eating disorders(BEDS, BED-F)	
8. Lahouti, M., Zavoshy, R., Noroozi, M., Rostami, R., Gholamalizadeh, M., Rashidkhani, B., & Doaei, S. (2021). Dietary patterns and depressive symptoms among Iranian women. <i>Journal of Health Psychology, 26</i> (12), 2278–2289. https://doi.org/10.1177/1359105320909888	Investigate relationship between patterns of diet and depressive symptoms in Iranian women	Correlational design, 217 Iranian women ages 20-45 BDI used for depression FFQ used for dietary screening	Level 4	No intervention principle component analysis for dietary pattern detection, “Western” and “Semi-Mediterranean identified” with group comparison	“Western” diet indicated higher rate of depression (p<0.05) compared to “semi-Mediterranean” diet, which did not show an association	<i>Strengths</i> - low dropout rate, well validated tools for screening mood and diet, rigorous attempts to control confounding variables <i>Limitations</i> -cross-sectional design method
9. Molendijk, M., Molero, P., Ortuño Sánchez-Pedreño, F., Van der Does, W., & Angel Martínez-González, M. (2018). Diet quality and depression risk: A systematic review and dose-response meta-analysis of prospective studies. <i>Journal of Affective Disorders, 226</i> , 346–354. https://doi.org/10.1016/j.jad.2017.09.022	To determine if quality of diet affects depression risk	Systematic review, Data from 1,959,217 included in 24 studies pooled in random-effects meta-analyses	Level 5	Multiple dietary types compared with onset of depressive symptom risk	Healthy diet adherence linked with reduction in depression symptoms over time [P < 0.01]	<i>Strengths</i> - large data pool, evidence level <i>Limitation</i> -reduced ability to identify confounders
10. Mörkl, S., Stell, L., Buhai, D. V., Schweinzer, M., Wagner-Skacel, J., Vajda, C., Lackner, S., Bengesser, S. A., Lahousen, T., Painold, A., Oberascher, A., Tatschl, J. M., Fellingner, M., Müller-Stierlin, A., Serban, A. C., Ben-Sheetrit, J., Vejnovic, A. M., Butler, M. I., Balanzá-Martínez, V., Zaja, N., ... Holasek, S. J. (2021). 'An apple	To assess international literacy of nutritional medicine in psychiatric professionals	Snowball sampling, survey 1056 psychiatric professionals (354 psychiatrists, 511 psychologists,	Level 6	Nutrition education data from online survey collected over 22 months December 2018-September 2020, professionals	2/3 professionals reported having no nutritional training; 60%, providers recommended dietary treatment/intervention especially in key areas of eating	<i>Strengths</i> - First study of its kind, large sample, international representation Study addresses important area of weakness in professional

<p>a day'? Psychiatrists, psychologists and psychotherapists report poor literacy for nutritional medicine: International survey spanning 52 countries. <i>Nutrients</i>, 13(3), 822. https://doi.org/10.3390/nu13030822</p>		<p>44 psychotherapists, 147 MHPs in training) included in likert scale online survey questionnaire to assess literacy with nutrition medicine, 52 countries represented, ANOVA</p>		<p>representing 52 countries, identifying themes such as Mediterranean diets recommended for depression</p>	<p>disorders and depression</p>	<p>education programs which may affect incidence of screening and making nutritional recommendation <i>Weaknesses</i>-possible selection bias</p>
<p>11. Nouri Saeidlou, S., Kiani, A., & Ayremlou, P. (2021). Association between dietary patterns and major depression in adult females: A case-control study. <i>Journal of Research in Health Sciences</i>, 21(1), e00506. https://doi.org/10.34172/jrhs.2021.37</p>	<p>Determine relationship between dietary habits and major depression in women</p>	<p>Case control study of 170 cases and 340 controls, women with major depression ages 19-65, BDI to validate MDE, FFQ used as nutritional screening tool</p>	<p>Level 4</p>	<p>No intervention Outcome assessed: dietary pattern score and association with depression using BDI and FFQ</p>	<p>Healthy eating group had lower depression risk, higher risk for depression associated with traditional and Western eating habits 95% CI</p>	<p><i>Strengths</i>-shows relationship between healthy eating and lower depression rates, low bias <i>Weaknesses</i>- no cause and effect can be established, only relationship</p>
<p>12. O'Neill, S., Minehan, M., Knight-Agarwal, C. R., & Turner, M. (2022). Depression, is it treatable in adults utilising dietary interventions? A systematic review of randomised controlled trials. <i>Nutrients</i>, 14(7), 1398. https://doi.org/10.3390/nu14071398</p>	<p>Conduct a systematic review of whole food/dietary interventions for depression treatment</p>	<p>Systematic review of RCTs featuring adults, (no pediatrics or advanced geriatrics) with major depression receiving a whole food dietary intervention, PRISMA</p>	<p>Level 1</p>	<p>Inclusion and exclusion criteria application yielded 7 articles</p>	<p>size from Cohen's $d = 0.32$ to 1.82 Lowered depression scores with whole food and diet intervention</p>	<p><i>Strengths</i>- high level 1 evidence, strict inclusion criteria <i>Weaknesses</i>-Short duration of some treatments, variability in screening tools, small samples</p>

		Screening tools included FFQ, 24-hour diet recall, food diary				
13. Parletta, N., Zarnowiecki, D., Cho, J., Wilson, A., Bogomolova, S., Villani, A., ...O'Dea, K. (2019). A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED). <i>Nutritional Neuroscience</i> , 22(7), 474–487. https://doi.org.ezproxy.liberty.edu/10.1080/1028415X.2017	To evaluate if a Mediterranean-style diet (MedDiet) supplemented with fish oil can improve adult depression	RCT, 152 eligible adults aged 18-65 were with diagnosed major depressive symptoms (DASS-21) over previous 2 months or longer, Screening tools used: 14-item Mediterranean diet questionnaire and Simple Dietary Questionnaire (SDQ)	Level 2	Treatment group receiving fish oil supplementation (6 months) and food hampers with MedDiet workshops (3 months) fortnightly for 3 months vs social support group control	MedDiet group had higher reduction in depressive symptoms ($t = -2.24, P = 0.03$) and improved mental health QoL scores ($t = 2.10, P = 0.04$) vs control group	<i>Strengths</i> -high evidence level; Current research to support dietary intervention for depression with encouragement for group nutrition and education counseling <i>Limitations</i> -Single blind study (not double blind);High dropout rate for social group
14. Radavelli-Bagatini Simone, Reindolf, A., Bondonno, N. P., Sim, M., Bondonno, C. P., Stanley, M. J., Harms, C., Woodman, R., Magliano, D. J., Shaw, J. E., Daly, R. M., Hodgson, J. M., Lewis, J. R., & Blekkenhorst, L. C. (2021). Association of habitual intake of fruits and vegetables with depressive symptoms: The AusDiab study. <i>European Journal of Nutrition</i> , 60(7), 3743-3755. https://doi.org/10.1007/s00394-021-02532-0	Explore the relationship between vegetable and fruit intake frequency and vegetable diversity on depression	Longitudinal, observation study, 4105 Australian participants mixed gender, adults age > 25 years taken from Australian Diabetes, Obesity and Lifestyle Study,	Level 4	No intervention Comparison of screening results for diet and depression symptoms at baseline, 5 yrs, and 12 yrs	20% lowered risk for depression with routine fruit and vegetable intake at 12-year interval, greatest association with yellow, orange, red and green leafy vegetables and diversity of 4-6 vegetables	<i>Strengths</i> - first study of its kind examining relationship of vegetable diversity and depression, large sample pool <i>Weaknesses</i> -study type, possible selection bias for sample

		Using depression scale (CESD-10)				
		FFQ used as nutritional screening				
		Multiple logistic regression models				
15. Selvaraj, R., Selvamani, T. Y., Zahra, A., Malla, J., Dhanoa, R. K., Venugopal, S., Shoukrie, S. I., Hamouda, R. K., & Hamid, P. (2022). Association between dietary habits and depression: A systematic review. <i>Cureus, 14</i> (12), e32359. https://doi.org/10.7759/cureus.32359	Determine association between diet and depression with review of observational and systematic articles	Systematic review, PRISMA, PubMed and Google Scholar with range of January 1, 2010 -January 31, 2021, 51334 articles, participants age 15-45	Level 5	No intervention; 51334 narrowed to final 9 articles through Newcastle Ottawa quality assessment scale	Correlation between consumption of fresh fruit and vegetable intake, low inflammatory foods and lower incidence of depression	<i>Strengths</i> -strict inclusion and exclusion criteria <i>Limitations</i> -some studies with low statistical correlation
16. Shakya, P. R., Melaku, Y. A., Page, A. J., & Gill, T. K. (2021). Nutrient patterns (NP) and depressive symptoms among Australian adults. <i>European Journal of Nutrition, 60</i> (1), 329-343. doi:10.1007/s00394-020-02243-y	Investigate relationship between nutrient patterns and symptoms of depression	Longitudinal cohort of 4056 Australian adults over age of 18, mean age 57; data from Northwest Adelaide Health Study conducted in three stages 1999-2003, 2004-2006, and 2008-2010	Level 4	No intervention Outcome-examining NP from plant source and relationship with depression and NP from animal/mixed sources with depression	Inverse relationship with plant source NP and major depression no inverse relationship with animal/mixed NP	<i>Strengths</i> -First study to examine patterns of nutrients, high level of rigor with multiple statistical models, large sample size <i>Weaknesses</i> -no cause and effect, only relationship, possible residual confounding factors,

		Measuring CES-D scores FFQ used for nutritional screening				needs more subsequent studies
17. Sun, J., Li, Z., Li, Y., & Zhang, D. (2021). Intakes of specific categories of vegetables and fruits are inversely associated with depressive symptoms among adults. <i>Journal of Epidemiology</i> , 31(3), 210-219. https://doi.org/10.2188/jea.JE20200003	Examine relationship of fruit and vegetable intake and depressive symptoms in a large general population	Correlational, cross-sectional survey design, National Health and Nutrition Examination Survey(2007-2014) 16,925 adults 20-64 PHQ-9 used to measure depression 24-hour dietary recall x 2 consecutive days	Level 4	No intervention Determine association between fruit and vegetable intake through logistic regression, restricted cubic spline	Total vegetable and fruit intake inversely associated with depressive symptoms (berries, dried fruits, dark green veggies, tomatoes, other vegetables, fresh fruit) P < 0.001	<i>Strengths</i> - Large sample of population to improve generalizability of findings and enhance statistical power <i>Weaknesses</i> - recall bias potential with 24-hour dietary recall, study could not explore dose response relationship between different categories
18. Teasdale, S. B., Moerkl, S., Moetteli, S., & Mueller-Stierlin, A. (2021). The development of a nutrition screening tool for mental health settings prone to obesity and cardiometabolic complications: Study protocol for the NutriMental Screener. <i>International Journal of Environmental Research and Public Health</i> , 18(21), 11269. https://doi.org/10.3390/ijerph182111269	To discuss phases of protocol development and validation for a nutrition screening tool for adult mental health patients (SMI including major depressive disorder)	5 phase study protocol	Level 6	No intervention Prospective observational study will be outcome, with validation of NutriMental Screener, has finished stage I and II (identification of themes of interest and literature	Results will be published at end of stage V, going into stage III phase	<i>Strengths</i> - Will be first validated nutrition screening tool specific for SMI patients and general mental health settings-adult population -study will be validated for major depressive disorder, under umbrella of SMI

				review/service user interviews)		<i>Limitations-</i> no feasibility study conducted to evaluate rigor; the tool is still in process of obtaining validation
19. Yin, W., Löf, M., Chen, R., Hultman, C. M., Fang, F., & Sandin, S. (2021). Mediterranean diet and depression: A population-based cohort study. <i>The International Journal of Behavioral Nutrition and Physical Activity</i> , 18(1), 153. https://doi.org/10.1186/s12966-021-01227-3	Determine association of MD adherence and depression	20-year cohort study, MDP adherence calculation used, data extraction from National Patient Register 1991-2012 range. 49,261 Swedish women aged 29-49 Nutritional screening tool was FFQ	Level 4	No intervention (observational), FFQ determined adherence rates to MD with correlating depressive symptoms	Association between higher adherence to MD and reduced depression risk at a later age; Per unit increase of diet adherence, depression risk lowered by 5% (HR = 0.95, 95% CI = 0.92-0.98)	<i>Limitations-</i> Association found but no cause-and-effect relationship <i>Strengths-</i> sound methodology with support that there is a correlation with MD and lower depression risk

Appendix C

Display of Themes and Descriptive Characteristics: Constant Comparison Analysis

IR Questions:

- What dietary screening types and tools are being utilized for major depressive disorder in adults?
- What are the recommendations for nutritional screening in adults with major depressive disorder?
- What are the clinical barriers to the implementation of nutritional screening in adults with major depressive disorder?

Author (year) Country	Method/ Sample	Quality rating	Dietary Screening Type	Dietary Screening Tool(s)	Diagnostic Tool/Criteria used for MDD	Recommendations	Barriers
Bayes et al. (2020) Australia	Quantitative Systematic review of observational and experimental studies n=10, 301	Fair	Questionnaire	FFQ	DSM-IV-TR PHQ-9 CESD	- screening and education for polyphenols for depression may be beneficial (more for women vs men) -no official recommendations made given novelty of this area for nutritional research	-first study of its kind (polyphenols), need more replication studies to inform future guidelines for polyphenol screening -isoflavones may be more beneficial for women vs men, lack of studies is barrier to making recommendations
Bayes et al. (2022) Australia and New Zealand	RCT n=72	Good	Questionnaire	MEDAS	BDI-II	-Recommendation for medical and psychiatric professionals to refer to dietitians for nutrition evaluation as essential component to depression treatment if unhealthy diet identified	-novelty of nutritional psychiatry, screening and education not a standard practice for depression -Potential issue with male attitude as barrier to prioritize and discuss healthy eating

Begdache et al. (2019) United States	Mixed methods n=138 quantitative Part 1 n=536 qualitative Part 2	Good	Questionnaire FMQ	n/a	Tool can address gap in mental health/depression nutrition screening, recommended for multiple settings such as inpatient and community mental health Recommended use for both “prophylactic and therapeutic” aspects of care	Limited application of tool in exclusively depressive populations so far
Chatterton et al. (2018) Australia	RCT n=67	Good	Questionnaire DST	DSM-IV TR	Dietary screening and interventions with a dietician are cost efficient and effective treatment for depression	Need more economic studies for monetary savings of dietary screening and interventions
Fresan et al. (2019) Spain	Quantitative-Cohort longitudinal n=15,980	Good	Questionnaire FFQ MEDAS	DSM-IV TR	Nutrition screening with Mediterranean specific eating patterns recommended prophylactically to reduce depression risk	n/a
Godos et al. (2023) Italy	Quantitative-cross sectional observational n=2044	Good	Questionnaire FFQ	CESD-10	Limit Western diets with ultra processed food, promote Mediterranean diet prophylactically to reduce depression symptoms	Needs replication studies
Hancox et al. (2021) Australia	Scoping review, quantitative	Good				
Lahouti et al. (2021) Iran	Correlational observation n=217	Good	Questionnaire FFQ	BDI	Focus on risk reduction through screening and education: limit Western diet, promote Mediterranean diet	May need more gender studies for men before guidelines can be developed
Molendijk et al. (2018) Netherlands, Spain, US	Systematic review n=1,959,217	Good	Questionnaire FFQ Inventory 24 hr recall Questionnaire DQES	DSM-IV, DSM 5, CES-D	No formal recommendations made, dietary quality can influence depression, but <i>degree</i> of the influence needs more studies	More studies recommended before guidelines/recommendations are developed

Morkl et al. (2021) Austria (but 52 countries surveyed)	Descriptive survey Snowball sample n=1056	Fair	n/a	n/a	Nutrition education for health providers is necessary to increase nutritional screening and treatment interventions for major depression	2/3 professionals reported from study have no nutritional training although 60% would recommend dietary screening, treatment, and interventions for patients with depression
Nouri et al. (2021) Iran	Quantitative: case control observational n=170 cases n=340 controls	Good	Questionnaire FFQ	BDI	Limiting Western diet and improving healthy eating is recommended for major depressive disorder, no specific screening preferred	May need more gender specific studies
O'Neill et al. (2022) Australia, UK, US, Korea	Systematic review of RCTS n= 49,156	Good	Questionnaire FFQ Inventory 24 hr recall Diary Food recall	BDI DSM-IV-TR CESD	Dietary screening, education/intervention are highly recommended for depression, no preference between face to face, group vs individual, phone, or electronic web based delivery mode	Need more population specific studies
Parletta et al. (2019) Australia	RCT n=152	Good	Questionnaire SDQ Questionnaire- 14 item Mediterranean	DASS-21	MedDiet/fish oil can reduce depression, screen for dietary habits for depression Encouraged group nutrition/cooking and education counsel	n/a
Radavelli et al. (2021) Australia	Quantitative longitudinal observational n=4105	Good	Questionnaire FFQ	CESD-10	Increase fruit and vegetable diversity for depression	More generalizable studies needed specific to FV diversity
Selvaraj et al. (2022) Australia	Quantitative Systematic review observational studies Did not address total participant	Fair	Questionnaire FFQ	CESD-10	Increase fruit and vegetable intake, consume low inflammatory foods for depression	body of research needs more nutrient specific studies

	sample					
Shakya et al. (2021) Australia	Quantitative longitudinal cohort n=4056	Good	Questionnaire FFQ	CES-D	Antioxidant rich plant sources encouraged for patients with depression	n/a
Sun et al. (2021) United States	Quantitative Correlational cross-sectional survey n=16,925	Good	Inventory 24 hr recall Questionnaire FFQ	PHQ-9	Increase total vegetable and fruit intake for depression	More population specific studies needed to guide recommendations- (age, gender)
Teasdale et al. (2021) Australia Austria Switzerland	n/a	Fair	Questionnaire NutriMental Screener	n/a	No recommendations, to be first validated nutrition screening tool specific for SMI including MDD population	No feasibility study yet, still in mid phase protocol development
Yin et al. (2021) Sweden	Quantitative Cohort n=49,261	Good	Questionnaire FFQ	ICD-10-F.33 code for MDD	Mediterranean diet can reduce depression risk in women later in life	More population studies needed (gender, ethnicity)

Appendix D

Supplemental Table for Data Analysis: Themes and Comparison

Citation	Purpose to validate tools	Purpose to review existing tools	Purpose to provide recommendations for nutritional psychiatry	Purpose to examine relationship with diet and depression
Bayes et al. (2020)				x
Bayes et al. (2022)				x
Begdache et al. (2019)	x			
Chatterton et al. (2018)			x	
Fresan et al. (2019)				x
Godos et al. (2023)				x
Hancox et al. (2021)		x		
Lahouti et al. (2021)				x
Molendijk et al. (2018)				x
Morkl et al. (2021)			x	
Nouri et al. (2021)				x
O'Neil et al. (2022)			x	x
Parletta et al. (2019)				x
Radavelli et al. (2021)				x
Selvaraj et al. (2022)				x
Shayka et al. (2021)				x
Sun et al. (2021)				x
Teasdale et al. (2021)	x			
Yin et al. (2021)				x

Appendix E**IRB Approval Documentation**

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

June 14, 2023

Laurie Stephens
Folashade Odedina

Re: IRB Application - IRB-FY22-23-1751 IMPLEMENTATION OF NUTRITIONAL SCREENING IN ADULTS (AGES 19-65) WITH MAJOR DEPRESSIVE DISORDER: AN INTEGRATIVE REVIEW

Dear Laurie Stephens and Folashade Odedina,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds that your study does not meet the definition of human subjects research. This means you may begin your project with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research because it will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application. Any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, PhD, CIP
Administrative Chair
Research Ethics Office

Appendix F
CITI Certificate



Completion Date **05-May-2023**
Expiration Date **05-May-2026**
Record ID **55045777**

This is to certify that:

Laurie Stephens

Has completed the following CITI Program course:

Biomedical Research - Basic/Refresher
(Curriculum Group)
Biomedical & Health Science Researchers
(Course Learner Group)
1 - Basic Course
(Stage)

Not valid for renewal of
certification through CME.

Under requirements set by:

Liberty University



101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?w8daf4729-ca74-4562-b5dc-8cb9d44db409-55045777