

Promoting Mental Health through Healthy Eating and Nutritional Care

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Forward

In 2006, Dietitians of Canada partnered with the Canadian Collaborative Mental Health Initiative, creating a toolkit, *The Role of Dietitians in Collaborative Primary Health Care Mental Health Programs*, to help dietitians and other health professionals in their care of clients with mental health conditions. One of the principles enshrined in the Canadian Collaborative Mental Health Charter, endorsed by Dietitians of Canada, was “All Canadians have the right to health services that promote a healthy, mind, body and spirit.” In the same year, the Standing Senate Committee on Social Affairs, Science and Technology recognized the urgent need to transform mental health systems across Canada, releasing the report, *Out of the Shadows at Last: Transforming mental health, mental illness and addiction services in Canada*¹, which led to the creation of the Mental Health Commission of Canada.

In the six years since publication of the initial toolkit, Dietitians of Canada has continued to speak to issues in mental health care. A brief to the newly formed Mental Health Commission of Canada was submitted in 2007, highlighting dietitian roles in mental health promotion and mental health conditions and citing evidence for association between mental health and diet quality. In 2009, the Mental Health Commission of Canada released its first report, *Toward recovery & well-being: A framework for a mental health strategy for Canada*². This year, in 2012, the Commission has outlined its strategy in their second report, *Changing directions, changing lives: The mental health strategy for Canada*³, calling on all Canadians to play a role in improving the mental health system.

Dietitians of Canada is proud to release this new role paper, *Promoting Mental Health through Healthy Eating and Nutritional Care*⁴, a comprehensive document discussing intersections of nutrition with mental health, from promotion to nutrition care and therapeutic approaches. We believe dietitians will continue to play an important role in mental health promotion and care, supporting Canada’s mental health strategy in its strategic directions as outlined by the Mental Health Commission of Canada, helping people to find the right combination of services, treatments and supports.

The World Health Organization has acknowledged “there is no health without mental health”⁵. Health professionals, indeed any people with an interest in nutrition and mental health, will appreciate this extensively referenced, evidence-based resource, complete with many practical tips and links. We hope you will use this comprehensive document, or any one of the three section papers developed, to inform your knowledge and promote nutrition and mental health.

¹ Canada, Parliament, Senate. (2006). Standing Senate Committee on Social Affairs, Science and Technology. M.J.L. Kirby (Chair) & W.J. Keon (Deputy Chair). *Out of the shadows at last: Transforming mental health, mental illness and addiction services in Canada*. 38th Parl., 1st sess., p. 42. Retrieved from <http://www.parl.gc.ca/Content/SEN/Committee/391/soci/rep/rep02may06-e.htm>

² Mental Health Commission of Canada. (2009). *Toward recovery & well-being: A framework for a mental health strategy for Canada*. <http://www.mentalhealthcommission.ca>

³ Mental Health Commission of Canada. (2012). *Changing directions, changing lives: The mental health strategy for Canada*. Calgary, AB: Author. <http://strategy.mentalhealthcommission.ca/download/>

⁴ Davison KM, Ng E, Chandrasekera U, Seely C, Cairns J, Mailhot-Hall L, Sengmueller E, Jaques M, Palmer J, Grant-Moore J for Dietitians of Canada. *Promoting Mental Health through Healthy Eating and Nutritional Care*. Toronto: Dietitians of Canada, 2012. Access at: www.dietitians.ca/mentalhealth

⁵ World Health Organization (2010). *Mental health: strengthening our response*. Fact sheet N° 220. <http://www.who.int/mediacentre/factsheets/fs220/en/>

Executive Summary

Mental health is “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”¹.

Good nutrition is integral to mental health. As experts advising on diet, food and nutrition, Registered Dietitians have an important role in mental health promotion, disease prevention, and treatment for a wide variety of mental health conditions. Dietitians of Canada (DC), the national professional association for dietitians, recognizes that all dietitians work either directly or indirectly in mental health and commissioned this document which examines the various intersections between nutrition and mental health. The overall goal is to support the work of dietitians and to guide future dietetics practice as it relates to mental health. This document also provides policy makers, and other interested groups and individuals, with an evidence-based summary of the current literature about the promotion of mental health through healthy eating and nutritional care.

Process

This document reflects the contributions of an advisory team of dietetics professionals who work in different areas of mental health in Canada and reviewers with expertise in various disciplines. The process included the advisory team identifying concepts and key resources related to mental health promotion, disease prevention, treatment and rehabilitation, as well as special considerations for dietetics and mental health practice. The literature regarding mental health treatment focused on conditions defined by the

forthcoming fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*. A structured literature search for each identified topic was conducted followed by extensive review of more than 800 articles to identify key themes.

An integrative literature synthesis was employed to outline the various intersections between nutrition and mental health and to inform dietetics-related policy and practice. The literature was organized within four key themes:

- Nutrition and its role in mental health promotion and disease prevention;
- Intersections between mental health conditions and dietetics practice;
- Diversity in practice; and
- Nutritional care for mental health populations.

Based on the synthesis of these themes above, five recommendations are presented, to guide the promotion of mental health as it relates to nutrition. Since much of the synthesis pertains to roles in specific areas of mental health, three distinct papers were produced from this comprehensive document, addressing dietitian and health professional roles in different areas of health and mental health care. The documents include:

1. The Role of Nutrition in Mental Health Promotion and Prevention
2. The Role of Nutrition Care for Mental Health Conditions
3. Nutrition and Mental Health: Therapeutic Approaches

All documents are accessible at:

www.dietitians.ca/mentalhealth

Key Findings

Mental health conditions are associated with long-lasting disability and significant mortality through suicide, medical illness, and accidental death. It is estimated that mental health conditions cost the Canadian economy \$51 billion dollars annually. By 2030, mental health issues are expected to be the leading cause of disability in Canada. Current treatments for mental health conditions (e.g., pharmaceuticals) only provide partial benefit. Other approaches, such as targeted nutrition interventions that can maintain the structure and function of neurons and brain centres and therapeutic approaches to modify disordered eating patterns, can effectively augment medical approaches to mental health care.

Nutritional interventions, as part of collaborative and integrative programs aimed at mental health promotion, contribute to positive health outcomes and are cost-effective. Comprehensive mental health promotion interventions that include nutrition education and food skills training components, with a focus on pregnant moms, infants, children, and adolescents, can lead to reductions in neural tube defects, low birth weight, and premature delivery, and can positively affect cognitive development, behaviour, and academic performance. Positive parenting programs that include healthy lifestyle interventions have led to a return on investment in excess of 6% based on reduced use of special education, social, mental health, and criminal justice services. Simulations of healthy worksite programs aimed at mental health promotion have shown returns on investment of 9 to 1. Many nutrition initiatives that Registered Dietitians help facilitate support mental health by enhancing social inclusion, self-reliance, self-determination, food security, healthy body image, and reducing health and social inequities.

Interventions provided by Registered Dietitians to individuals with mental health conditions and their care providers can lead to reduced nutrition-related side effects of psychiatric medications, improved cognition, better self-management of concurrent and comorbid conditions, and improved overall occupational, social, and psychological functioning. Targeted nutritional interventions exist for mental health symptoms such as depression, mania, psychosis, delirium, dementia, disordered eating, sleep problems, and substance use. In addition, therapeutic approaches such as cognitive behaviour therapy, mindful based eating awareness, dialectical behaviour therapy, motivational interviewing, cognitive adaptive training, and applied behavioural analysis used by Registered Dietitians in mental health practice show evidence that food intakes and eating behaviours can be positively modified and lead to enhanced well-being.

Other issues affecting mental health and dietetics practice include food insecurity, use of natural health products, and debate about food addictions. Mental health consumers may have diverse needs related to gender, life stage, culture, history of trauma, and co-occurring conditions. Registered Dietitians can draw on knowledge and skills such as cultural competence, trauma-informed care, and harm reduction, to foster mental well-being, reduce disparities, and strengthen response to diverse communities.

Recommendations

Optimal nutrition supports the mental health of Canadians, and could reduce health and social costs. To better integrate nutritional and mental health services, the following recommendations are made:

1. Advocate for Nutrition and Mental Health in Practice and Policy

Advocacy is needed for nutrition interventions targeted for mental health consumers. Strategies include food security initiatives, healthy-eating education, food skills training (e.g., preparing, cooking, growing food), promoting nutrition literacy (e.g., develop easy-to-understand nutrition labelling of foods), and development of nutrition and mental health educational materials (e.g., diet to prevent mental health problems, how to manage nutritional side effects of psychiatric medications, nutrition guidelines for specific conditions).

Dietitian services are important to all levels of mental health practice: promotion, prevention, treatment, and rehabilitation. Diet therapy should be recognized as a cornerstone of mental health interventions in clinical practice guidelines and standards of care. Adequate funding is needed for nutrition services in mental health care, with monitoring and evaluation for effectiveness and efficiency.

Continued advocacy for nutrition services is needed at broader levels of public health and policy. Government and non-government agencies are recognizing the links between diet and mental health. Public health messaging and social marketing initiatives need to highlight the importance of healthy eating and mental health. Initiatives targeted at building healthy food environments (e.g., sodium reduction, banning trans fats, food guidelines for schools) are important mechanisms to support mental health in the general population. Food policy can be evaluated for impact, effectiveness, and appropriateness

of key food regulatory initiatives. Standardized measurement of the cost of healthy eating should continue to be conducted regionally to monitor trends and advocate for food security and poverty reduction.

2. Developing Mental Health Competency and Training for Registered Dietitians

There is a need to develop and implement mental health content and/or field experience in undergraduate and graduate nutrition programs as well as in dietetic internships, including training in adapted psychotherapeutic approaches (e.g., cognitive behaviour therapy, dialectical behaviour therapy, mindful eating approaches, motivational interviewing), culturally competent care, and identification of nutrition-related side effects of psychiatric medications. More interdisciplinary care is needed for consumers who have mental health conditions and concurrent chronic disease, such as depression and diabetes.

3. Program Planning and Collaboration

Mental health professionals and health care/service providers working with mental health consumers to improve dietary intakes could benefit from increased knowledge of nutrition related to mental health issues.

Credentialed dietetics professionals knowledgeable about mental health issues need to be employed in agencies responsible for developing policy in education, vocation, and health services at federal and provincial levels. Furthermore, participation of dietitians should be integrated into primary and specialty care teams and in vocation, education, and residential programs serving this population. Rehabilitative services (e.g., prisons, group homes) should incorporate healthy eating and culturally diverse food policies that encourage residents to choose foods that promote mental and physical well-being.

Initiatives that include training of para-professionals and peer workers, dietitian services at drop-in centres, shelters, and transitional houses, and use of

technology and telehealth can enhance access to nutrition services. Mental health service staff (e.g., mental health workers, psychiatric nurses) should have easy access to Registered Dietitians for consultation.

4. Screening and Standards in Nutrition and Mental Health

Food and nutrition standards for mental health facilities and programs (e.g., community psychiatric homes, shelters, transitional houses, facilities for substance abuse recovery, food relief programs) and organizations that commission mental health services (e.g., non-profit associations) need to be established. Such standards would define menu requirements and specify when referrals to a Registered Dietitian are needed. These standards should be incorporated into current assessments to ensure implementation.

Nutrition screening initiatives should be implemented for community based programs and services targeted to mental health consumers. Specialized health services need valid and reliable nutrition screening tools for mental health consumers, including for medical and psychosocial factors, anthropometric measures, lifestyle components, and biochemical data.

5. Mental Health and Nutrition Research

More investigative work that examines the role of nutrition in mental health promotion, disease prevention, and mental health condition-based interventions is needed. Adequate data is required to strengthen evidence for the benefits of mental health promotion strategies with a diet component are required. Epidemiological and intervention research will help define diets that can prevent or delay the development of mental health conditions. Research that characterizes dietitians working in mental health (e.g., number of full-time equivalents per consumer base) would help determine and advocate for appropriate service levels. Cost-effectiveness studies

are needed to quantify how specific nutritional interventions in mental health practice are economically beneficial. Finally, the effectiveness of nutritional interventions for mental health consumers needs to be examined (e.g., lifestyle interventions that help manage weight for individuals taking atypical antipsychotics). In order for these investigations to move forward, adequate funds for nutrition and mental health research need to be provided to support investigation of the relationship between diet and mental health and facilitate ongoing, meaningful citizen and civil society involvement in planning nutrition and mental health research.

Table of Contents

Forward.....	iii
Executive Summary	iv
1. Introduction.....	4
2. Mental Health Promotion and Prevention	7
2.1 Nutrition and Mental Health: Proposed Links.....	7
2.2 Nutrition in the Prevention of Mental Health Conditions.....	13
3. Mental Health Conditions.....	21
3.1 Mental Health Conditions and Their Nutritional Implications	22
3.2 Medications for Mental Health Conditions and Nutrition Side Effects.....	28
3.3 Nutrition Screening and Assessment for Mental Health Conditions	30
3.4 Mental Health Conditions and Nutrition Practice	32
3.4.1 Neurodevelopmental Disorders	32
3.4.2 Schizophrenia Spectrum and Other Psychotic Disorders.....	35
3.4.3 Bipolar and Related Disorders.....	37
3.4.4 Depressive Disorders	38
3.4.5 Anxiety Disorders	39
3.4.6 Obsessive-Compulsive and Related Disorders.....	39
3.4.7 Trauma- and Stressor-Related Disorders.....	41
3.4.8 Dissociative Disorders.....	42
3.4.9 Somatic Symptom Disorders	42
3.4.10 Feeding and Eating Disorders.....	43
3.4.12 Sleep-Wake Disorders	51
3.4.13 Sexual Dysfunctions.....	54
3.4.14 Disruptive, Impulse Control, and Conduct Disorders.....	54
3.4.15 Substance Use and Addictive Disorders	55
3.4.16 Neurocognitive Disorders	59
3.4.17 Personality Disorders.....	63
3.4.18 Paraphilias.....	64
3.4.19 Concurrent Disorders and Multiple Mental Health Conditions	64
3.5 Nutritional Care and Mental Health Conditions	65
4. Diversity in Practice.....	67
4.1 Special Considerations	67
4.1.1 Engaging the Mental Health Consumer	67
4.1.2 Trauma-Informed Care	68
4.1.3 Food Insecurity	69
4.1.4 Use of Natural Health Products.....	71
4.1.5 Sex and Gender Differences.....	71
4.1.6 Food Addictions	73
4.2 Special Populations.....	73
4.2.1 Children and Adolescents	73
4.2.2 Older Adults	73
4.2.3 People Living in Rural or Geographically Isolated Regions.....	74
4.2.4 Individuals with Comorbidities.....	74

4.2.5 Individuals with Dual Diagnosis	75
4.2.6 Homeless, Marginally Housed, and Street Youth.....	77
4.2.7 Aboriginal Peoples.....	77
4.2.8 Immigrant, Refugee, Ethno-Cultural, and Racialized Groups.....	78
4.2.9 Lesbian, Gay, Bisexual, Transgender, and Questioning.....	79
4.2.10 Risk Behaviour and Harm Reduction	79
4.2.11 Individuals at Risk of Suicide	80
4.2.12 Individuals Who Are Currently or Were Formerly Incarcerated	81
4.3 Cultural Competence and Safety.....	81
5. Nutrition Care for Mental Health	83
5.1 Models of Mental Health Care	83
5.1.1 Assertive Community Treatment	83
5.1.2 Primary Health Care.....	84
5.1.3 Peer Support Model.....	87
5.1.4 Early Psychosis Intervention	87
5.1.5 Chronic Condition Self Management.....	88
5.2 Therapeutic Approaches in Nutrition Care	89
5.2.1 Transtheoretical Model of Change.....	89
5.2.2 Mindful-Based Eating Awareness	89
5.2.3 Motivational Interviewing.....	90
5.2.4 Cognitive Behaviour Therapy.....	90
5.2.5 Dialectical Behaviour Therapy	90
5.2.8 Emotional Brain Training and Solution-Focused Therapy	91
5.2.7 Cognitive Adaptive Training.....	91
5.2.8 Acceptance and Commitment Therapy.....	92
5.2.9 Applied Behavioural Analysis.....	93
5.3 Challenges of Nutrition and Mental Health Care.....	94
6. Moving Forward	95
6.1 Registered Dietitians in Mental Health Care: Qualified and Cost-Effective.....	95
6.2 Nutrition and Mental Health Practice: Focus on the Future	97
6.3 Recommendations.....	98
References	101
Appendices	
Appendix A: Search Strategy	130
Appendix B: Nutrition and Mental Health Resources.....	134
Appendix C: Medications and Their Nutrition-Related Side Effects	141
Appendix D: Substances of Abuse and Their Effects	153
Appendix E: Nutrition Screening and Care.....	165
Appendix F: Case Examples.....	170

Tables

Table 1: Known Brain Functions of Selected Major Nutrients, Vitamins, and Minerals.....	11
Table 2: Examples of Nutrition-Related Strategies that Can Enhance Mental Health	15
Table 3: Multiaxial System.....	21
Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions	23
Table 5: Examples of Nutrition Screening, Education and Counselling in Mental Health	66
Table 6: Natural Health Products Used for Treatment of Mental Health Conditions and Current Level of Evidence.....	72
Table 7: Behavioural Phenotypes, Patterns, and Co-Occurring Mental Disorder	76
Table 8: A Network of Registered Dietitian (RD) Services in Relation to Primary Health Care	86
Table 9: Successful, Best-Practices Approaches Used by Registered Dietitians.....	96
Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects	141
Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects	153

Figures

Figure 1: Two Continuum Model.....	4
Figure 2: The Intersections of Nutrition and the Mind	8
Figure 3: The Four Quadrant Clinical Integration Model	31
Figure 4: Role of Nutrition in Delirium	61
Figure 5: Food Security - A Continuum	70
Figure 6: Flowchart of Nutrition Care Management for Mental Health Conditions.....	169

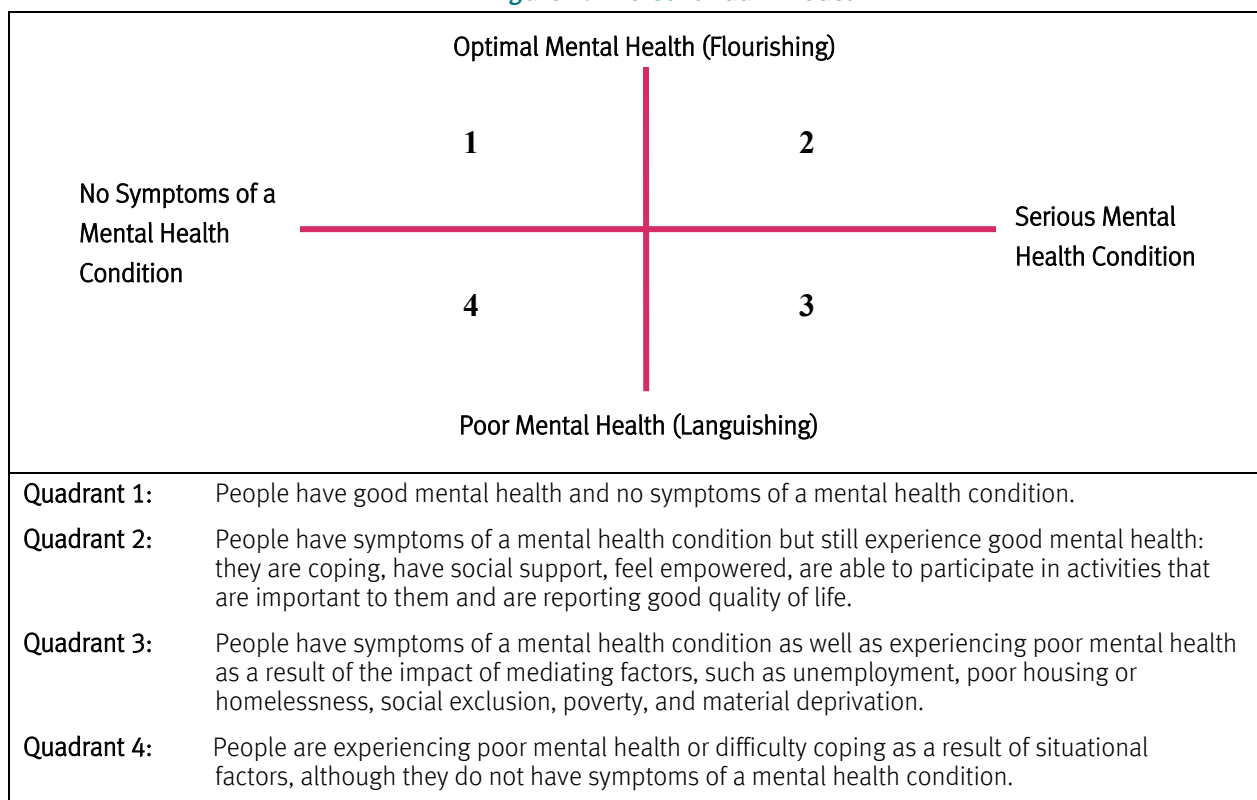
1. Introduction

There is no health without mental health¹. Mental health is not simply the absence of a mental health condition, it is “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”².

Estimates of the prevalence of mental health conditions suggest that, in a one-year period, 10% of Canadians will have used services to address their mental health³. In this document, the term “mental health conditions” is used to acknowledge that there is no one single mental illness, rather a range of conditions with different symptoms and experiences.

According to the Canadian Mental Health Association, Ontario, promoting mental health requires moving beyond the categorization of people as either mentally healthy or mentally ill. Just as a person with a physical condition can live a healthy life, a person can experience periods of recovery and mental well-being in spite of a diagnosis of a mental health condition. Conversely, a person can experience poor mental health but be free of a diagnosed mental health condition⁴. The Two Continuum Model (Figure 1) shows that a person’s mental health can be enhanced regardless of the situation. Each quadrant of this model highlights one of the four possible experiences people may have with respect to their mental health^{4:5}.

Figure 1: Two Continuum Model^{4:5}



In *Mental Health Promotion in Ontario: A Call to Action* (2008)¹, a joint publication by the Canadian Mental Health Association, Ontario, Centre for Addiction and Mental Health, Health Nexus, Ontario Public Health Association, and the University of Toronto, three key determinants of mental health are identified: social inclusion, freedom from discrimination and violence, and access to economic resources¹. When people feel excluded or isolated, when they live in fear of violence or bullying in their home, school, or workplace, and/or if they are very worried about how they are going to feed and shelter their families, their mental health is often the first thing to be adversely affected¹. Anxiety and depression can lead to less productivity at work, substance use as a coping mechanism, and risk of developing chronic physical conditions¹.

Social inclusion is a protective factor for maintaining mental health. Social networks and supports contribute to one's sense of purpose, self-esteem, resilience, and access to resources and information. Feeling included also enhances one's ability to deal with stress. Furthermore, community participation and civic engagement are associated with better self-reported mental health¹.

Discrimination and violence are risk factors for poor mental health. Stigma defined as negative attitudes or beliefs that are held about people who are perceived as different⁶, often leads to discrimination — unfair treatment due to a person's identity, which includes race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, sex, sexual orientation, age, marital status, family status, or disability, including having a mental health condition. Stigma is a reality for people with a mental health condition, and it prevents them from seeking help, hinders recovery,⁶ and creates barriers to a complete and satisfying life.⁷ Stigma, combined with discrimination, creates barriers for people with mental health conditions in employment,

housing, education, and health care, and can result in social exclusion and, often, violence. People with mental health conditions are more likely than the general population to be victims of violence⁸. Living in fear of violence, and the stress and trauma of being a victim of violence, negatively affect mental health. Access to resources such as housing, education, income, and food security (“social determinants of health”) is strongly associated with mental health because it impacts social support, self-efficacy, and socio-economic status¹. Lack of access to economic resources can often result in material deprivation, sustained adversity, and poor mental health¹.

The powerful social and economic forces described here, together with factors related to individual genetics and the physical environment, influence what foods are available, a person's individual capacity to make choices, a person's relationship with food, and ultimately their nutritional and mental health. People with mental health conditions are more likely than others to experience food insecurity. Conversely, being food-insecure negatively affects mental health in many ways: chronic stress when access to food is uncertain, shame and stigma associated with utilizing emergency food relief programs, and anxiety resulting from a lack of control over one's diet.⁹ In addition, people with mental health conditions tend to have a history of trauma exposure which can contribute to various eating issues (e.g., disordered eating). Finally, people with mental health conditions are at higher risk of developing chronic physical conditions, including heart disease, diabetes, arthritis, some forms of cancer, and asthma⁹. At the same time, people living with chronic physical health conditions are also at higher risk of experiencing depression and anxiety. An understanding of the links between mind and body is important when strategies are developed to support people with mental health conditions and chronic physical conditions⁹.

Regardless of the level of mental health one experiences, good nutrition helps provide a foundation to maximize well-being. Nutritional health depends on several elements, including comprehensive health and social policies; nutrition recommendations, standards, and guidelines; a safe and sustainable food supply; and access to nutrition services. As experts advising on diet, food, and nutrition, Registered Dietitians play an important role in mental health promotion, disease prevention, and treatment for a wide variety of health issues. Various complex intersections between nutrition and mental health are detailed in this document and knowledge of these can lead to a better understanding of the contributions that Registered Dietitians can provide.

This paper reflects the contributions of a core advisory team of dietetics professionals who work in different areas of mental health in Canada and reviewers from a variety of disciplines with expertise in various content areas. In the initial stages, the advisory team members identified concepts and key resources to incorporate in this paper. Next, a systematic literature search for each topic area using scientific and professional sources was conducted. Full details of the literature searches and results are outlined in Appendix A. To meaningfully translate the information from the literature into a format that would outline the various intersections between nutrition and mental health, an integrative literature synthesis was used. This research method was selected as it provides a means to inform dietetic practice, policy, and research initiatives¹⁰. Based on the results of the literature search, the information was organized into key themes as outlined in the following four sections of this paper:

Mental Health Promotion and Prevention: highlights the intersections between nutrition, mental health promotion, and prevention of mental health conditions.

Mental Health Conditions: focuses on descriptions of specific mental health conditions and implications for dietetics practice.

Diversity in Practice: outlines the diverse needs of mental health populations and considerations for dietetics practice.

Nutrition Care for Mental Health: describes therapeutic approaches adapted to mental health and dietetics practice.

As a supplement to these four sections, various resources are listed in Appendix B to provide further information about different topics outlined in the document. The final section of this document, Moving Forward, summarizes key themes and makes recommendations for advocacy, competency, and training; program planning and collaboration; standards of care; and research as they relate to mental health and dietetics practice.

Since most of these sections pertain to specific themes in mental health, three distinct papers were produced from this comprehensive document, addressing dietitian and health professional roles in different areas of health and mental health care. The documents, located at www.dietitians.ca/mentalhealth include:

1. The Role of Nutrition in Mental Health Promotion and Prevention
2. The Role of Nutrition Care for Mental Health Conditions
3. Nutrition and Mental Health: Therapeutic Approaches

2. Mental Health Promotion and Prevention

“International evidence is strong with respect to the factors that lead to positive mental health, as well as what governments and communities can do to promote mental health... Mental health promotion policies and programs must address individuals, their connections within the community and the broader environment in which they live.”

Canadian Mental Health Association, Ontario.
Mental Health Promotion in Ontario: A Call to Action¹

Positive mental health is “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community”¹¹. Positive mental health enhances social cohesion and social capital, improves stability in the living environment, contributes to economic development, and is a principle of democratic society^{12,13}. Mental health problems occur across all ages, cultures, and populations. The annual cost of mental health conditions in Canada has been estimated to be \$51 billion¹⁴. Evidence demonstrates that mental health promotion and disease prevention interventions can lead to health, social and economic gains¹⁵. Mental health promotion focuses on promoting the value for mental health and improving the coping capacities of

individuals¹¹. Prevention activities, concerned with avoiding disease, complement mental health promotion. In this section, the intersections among nutrition, mental health promotion, and mental health condition prevention are examined.

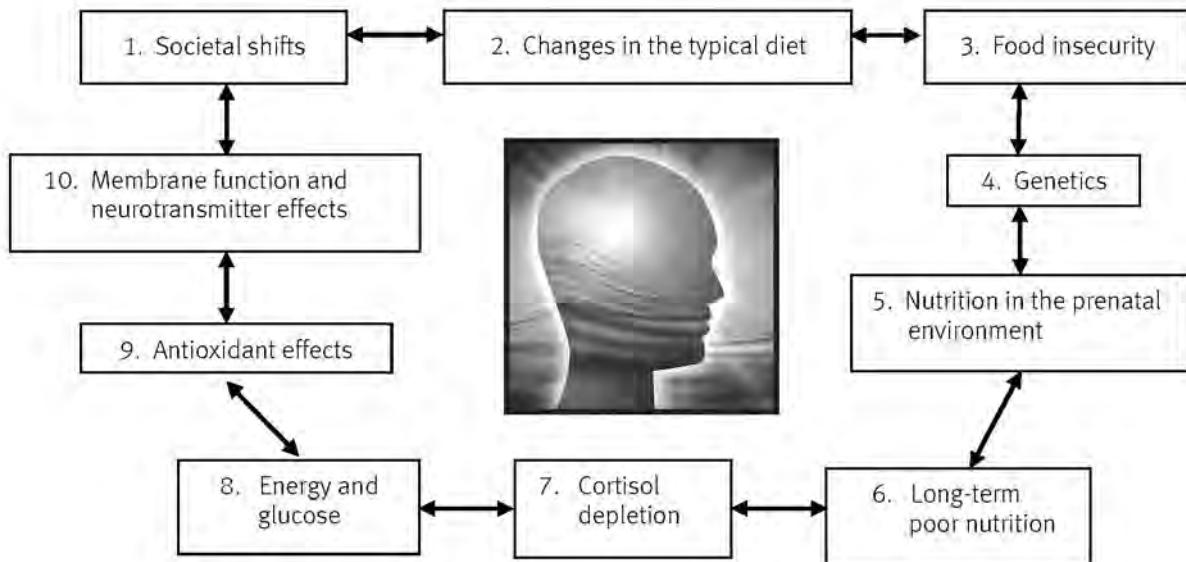
2.1 Nutrition and Mental Health: Proposed Links

Knowledge of how the food we eat is associated with mood, behaviour, and cognition is fundamental to understanding how diet and mental health are intricately related. Current knowledge about nutrition and mental health is based on a variety of evidence from animal behavioural research, neurochemical experiments in vitro, epidemiological studies, and some clinical trials, and it continues to evolve. Based on the current literature, there are at least 10 common interrelated frameworks that help explain the interactions between the food we eat and the functions of the mind (Figure 2). Each of these theories are discussed in the following sections.

1. Societal Shifts

Some observers have speculated that appetite for high-calorie foods has been accelerated by broad cultural and policy developments¹⁶, including policies related to punishment (i.e., mass incarceration), access to housing, and food production, which in turn contributed to many of society’s issues including obesity and mental health conditions. Obesity may be linked to living in neighbourhoods where crime and fear make walking dangerous and impractical¹⁷. The dislocation theory of addiction speculates that the globalization of free-market society has produced a general breakdown in psychosocial integration and responses including disordered eating, addictions and distorted body image (i.e., emaciated body as norm)¹⁸.

Figure 2: The Intersections of Nutrition and the Mind



2. Changes in the Typical Diet

The increased incidence in mental health conditions such as depression over recent years might be linked to the change in our diet over the same time frame, with shifts away from a diet based on a wide variety of whole foods to one that emphasizes more processed foods¹⁹. The changing nutrient content of our food supply could also be considered in support for these hypotheses. Data indicate that the mineral and trace elements of fruits and vegetables have been decreasing over the last 50 years²⁰, possibly due to poor remineralization of the soil. Conversely, some food products now contain substantial amounts of various added nutrients and nutrient supplements are widely used. Some individuals may be sensitive to these changes in nutrient levels as biochemical needs differ. The increasing incidence of mental health conditions is a complex issue associated with a range of biological, social, and economic factors; changes in food consumption may be a contributing factor.

3. Food Insecurity

Because mental health conditions account for a substantial portion of the global disease burden²¹, related factors such as food insecurity have received increased attention. There are currently two main hypotheses to explain why the experience of food insecurity may influence mental health. First, individuals with conditions such as anxiety or depression may have diets that lack critical micronutrients²² known to be associated with mental health symptoms²³; this relationship may be mediated by food insecurity. Second, the experience of food insecurity generates uncertainty, which in turn leads to stress and symptoms of anxiety and depression^{24;25}. For example, some individuals may be especially sensitive to differences in the relative well-being of households in a community and when they experience food insecurity, inequities among individuals are amplified (i.e., the “haves” and “have nots”) and this can create stress²⁶.

4. Genetics

Inborn errors of metabolism can have many effects, including influencing enzyme and coenzyme reactions in the brain. In a review of 50 human diseases attributed to an enzyme having decreased binding affinity for a coenzyme²⁷, it was shown that in the majority of conditions the inborn errors of metabolism could be corrected by feeding the affected person additional cofactors or coenzymes (e.g., vitamins), thereby raising the coenzyme levels and enhancing enzymatic activity. Methylation reactions (i.e., adding a methyl group (CH₃) to a molecule) represent one interface between nutrients and genetic expression. There are hundreds of methylation reactions in our bodies, including those needed for DNA transcription and neurotransmitter synthesis. There is evidence of deficient methylation processes in relation to mental health symptoms, leading researchers to examine compounds called “methyl donors” that transfer CH₃ in the synthesis of important compounds²². For instance, the biochemical interrelationship between folate and cobalamin (Vitamin B₁₂) lies in the maintenance of nucleic acid synthesis and methylation reactions, such as the methylation of homocysteine to methionine and the synthesis of S-adenosyl-L-methionine (SAME)²⁸. Norwegian research²⁹ has shown increased risk for depression in people with a particular genotype that is associated with increased homocysteine and decreased folate.

5. Nutrition in the Prenatal Environment

Human neurodevelopment is the result of genetic and environmental interactions. Epidemiological studies that examined the role of prenatal nutrition relative to mental health conditions have found that prenatal caloric malnutrition, low birth weight, and prematurity increase the risk for neurodevelopmental disorders,

schizophrenia, and schizoid and antisocial personality disorders³⁰.

6. Long-Term Effects of Poor Nutrition

Many individuals are not diagnosed with some types of mental health conditions (e.g., depression) until after decades of life, which suggests that long-latency effects of poor nutrition on the central nervous system affect mental health³¹. In one small study of people with familial bipolar I disorder (n=15)³², proton magnetic resonance spectroscopic evidence of progressive changes in the right hippocampus was found. The correlation between years of having a mental health condition and reduced N-acetyl-aspartate concentrations was quite high, suggesting that the brain is gradually less able to produce this amino acid. However, the direction of causality is unknown; and it may be possible that long-term psychological stress alters nutrient absorption or even directly influences brain development²³. Research on cognitive decline suggests that intakes of fat, sugar, and excess calories contribute to body-wide oxidative stress associated with weight gain, atherosclerosis³³, circulatory deficits in the brain, cognitive decline³⁴, and mental health conditions³⁵.

7. Nutrition and Stress

Cortisol, an important steroid hormone secreted in response to stress, may affect mental health, mood stability in particular. Cortisol secretion levels may be affected by negative mood states³⁶, fatigue³⁷, and “burnout,” as a result of acute and chronic stress³⁸. Psychological factors associated with food intake (e.g., intentional diet restraint) may alter cortisol secretion³⁹ and therefore mental function.

8. Energy Metabolism and Glucose

Glucose is the preferred fuel source for the brain. The roles of glucose include forming acetylcholine and many other neurotransmitters. Glucose utilization enhances cognition and may be affected by fatty acids which can alter both how glucose is used and also insulin sensitivity⁴⁰. Some mental health symptoms may represent a condition associated with decreased mitochondrial energy metabolism^{29;41;42}. Other research suggests that lower brain glucose metabolism is present before the onset of cognitive decline in certain people with Alzheimer's disease⁴³.

9. Antioxidant Effects

Several substances containing antioxidants, such as minerals and vitamins (beta carotene, alpha-tocopherol), polyphenols, and herbal extracts may prevent oxidative stress leading to DNA damage⁴⁴. Research suggests that oxidative stress mechanisms appear to be a common thread in various neurological and emotional conditions such as Alzheimer's disease, anxiety disorders, attention deficit hyperactivity disorder, autism, dementia, depression, fibromyalgia, Huntington's disease, multiple sclerosis, and schizophrenia⁴⁵⁻⁴⁷.

The link between nutrition and immunity also support the role of antioxidants in mental health. Recognition of immune system dysfunction in people with mental health conditions, particularly those with depression or schizophrenia, has led to different hypotheses for their pathogeneses, including infectious and autoimmune factors⁴⁸. Alternatively, dysfunction of the immune system may be secondary to the mental health condition process (i.e., altered neurotransmitter activity) or to long-term pharmacological treatment, or it may be a result of an unrecognized concurrent medical disorder⁴⁹. Repairing the central nervous system is facilitated by both cellular and humoral

components of the immune system and adequate nutrition (i.e., availability of vitamins, minerals, and antioxidants) supports these processes. Some investigators have reported immunological involvement in conditions such as schizophrenia, somatization disorder, mania, depression, anxiety, and conversion disorder⁵⁰⁻⁵³.

10. Membrane Function and Neurotransmitter Effects

Several substances, especially lipids and fatty acids, act on the integrity of the membranes of neurons. Imbalances of these nutrients may alter membrane fluidity, receptor formation and function, signalling and surface activity, and blood-brain barrier integrity and the release of neurotransmitters, hormones, and cytokines. These effects may be especially true for elderly people in whom membrane function declines with age⁴³.

In addition to these theories linking nutrition and mental health, we also know a lot about diet and brain function. One of nutrition's most important contributions to mental health is the maintenance of the structure and function of the neurons and brain centres. The support and maintenance of the brain's functions rely on the interplay between the major and minor nutrients (see Table 1). In addition to these nutrients, many bioactive substances found in food, including cocoa flavanols, isoflavones and resveratrol³⁵, are linked to brain function.

Table 1: Known Brain Functions of Selected Major Nutrients, Vitamins, and Minerals

Nutrient	Brain Function
Major Nutrients	
Carbohydrates	Provides glucose, the preferred energy source for erythrocytes and nerve cells, including those of the brain. Eating carbohydrates triggers the release of insulin that helps blood glucose enter the cells. As insulin levels rise, more of the amino acid tryptophan crosses the blood brain barrier that affects levels of neurotransmitters such as serotonin.
Fat	The lipid concentration of the brain partly reflects the dietary intake. About 35% of the brain/nervous system tissue comprises polyunsaturated fatty acids that include the essential fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). EPA and DHA form phospholipids in brain cell membranes and have important roles in signal transduction.
Protein	Provide amino acids; the precursors of neurotransmitters, and therefore facilitates neurotransmission and neuromodulation. The dietary precursors of serotonin (precursor is tryptophan), dopamine (precursor is phenylalanine), norepinephrine (precursor is tyrosine), and histamine (precursor is histidine) have been the main protein derivatives investigated.
Vitamins	
Thiamine (Vitamin B ₁)	• Functions as a coenzyme in the synthesis of acetylcholine, γ-aminobutyric acid (GABA), and glutamate⁵⁴ • Can mimic action of acetylcholine⁵⁵
Niacin (Vitamin B ₃)	• Nicotinamide adenine dinucleotide (NADH) increases tyrosine hydroxylase activity and dopamine production in pheochromocytoma cells⁵⁶ • Involved in synthesis of serotonin (5-HT)⁵⁷
Pyridoxine (Vitamin B ₆)	• Role in the synthesis of many neurotransmitters (e.g., dopamine, serotonin, norepinephrine, epinephrine, histamine, GABA)⁵⁸ • Deficiency tends to reduce production of serotonin and GABA⁵⁹
Folate, folic acid (Vitamin B ₉)	• Functions as a cofactor for enzymes that convert tryptophan into serotonin and tyrosine into norepinephrine/noradrenaline • Can heighten serotonin function by slowing destruction of brain tryptophan⁶⁰ • Helps form compounds involved in brain energy metabolism⁶¹ • Involved in the synthesis of dopamine^{62;63}
Cobalamin (Vitamin B ₁₂)	• Involved in the synthesis of monoamine neurotransmitters⁶² • Involved in maintaining myelin sheaths for nerve conductance⁶⁴ • Functions in folate metabolism
Pantothenic Acid	• Changes to coenzyme A that helps convert macronutrients into energy • Production of red blood cells, hormones, and nerve regulators⁶⁵ • Needed for the uptake of amino acids and acetylcholine • Is necessary to make vitamin D and works closely with B vitamins such as biotin, niacin, vitamins B₁, B₂, and B₆
Vitamin C	• Acts as part of the intracellular antioxidant network, and is an important neuroprotective constituent⁶⁶ • Acts as a neuromodulator⁶⁷ and enzyme cofactor in noradrenaline and dopamine synthesis⁵⁷
Vitamin A	• Retinoids influence hormone pathways (steroid and thyroid hormones) known to cause mood elevation and depression⁶⁸
Vitamin D	• 1,25-Dihydroxyvitamin D₃ affects cholinergic activity in several brain regions and may have a role in the neuroendocrine regulation of certain aspects of anterior pituitary function⁶⁹
Vitamin E	• Alpha-tocopherol protects cells from damage by free radicals⁷⁰ • May reduce brain amyloid beta peptide accumulation, known to be relevant in Alzheimer's disease⁷⁰

continued...

Table 1: Known Brain Functions of Selected Major Nutrients, Vitamins, and Minerals - continued

Nutrient	Brain Function
Vitamins - continued	
Vitamin K	Involved in the development of the nervous system⁷¹ and affects calcium regulation in the brain through osteocalcin⁷²
Choline	- Essential roles in structural integrity of cell membranes, cell signalling (precursor to acetylcholine), and nerve impulse transmission - Major source of methyl groups for methylation reactions⁷³
Minerals	
Calcium	Important intracellular messenger, cofactor for enzymes⁷⁴ and release of neurotransmitters
Copper	Modulator of NMDA-receptor activity
Chloride	Negatively charged chloride ions cause influx of sodium ions and reverts the brain cell to its resting state
Chromium	Involved in glucose and lipid homeostasis⁷⁵
Iron	- Essential cofactor for the production of ATP⁶⁴ - Plays an essential role in hemoglobin for ensuring there is sufficient oxygen in the brain for oxidative metabolism⁶⁴ - Functions in the enzyme system involved in the production of serotonin, norepinephrine, epinephrine, and dopamine⁶⁰
Magnesium	- Functions as a coenzyme; roles in the metabolism of carbohydrates and fats to produce ATP, and in the synthesis of nucleic acids (DNA and RNA) and proteins⁶⁴ - Important for the active transport of ions (such as potassium and calcium) across cell membranes, and for cell signalling⁶⁴
Manganese	Manganese deficiency results in lowering the catecholaminergic content of the brain⁷⁶
Phosphate	Helps maintain membrane potential and role in energy metabolism⁵⁷
Potassium	In the brain, potassium channels regulate neuronal signalling. Potassium channels may also regulate cell volume and protect neurons under metabolic stress. Role in energy metabolism⁵⁷.
Selenium	Glutathione peroxidase maintains the integrity of the cellular and subcellular membranes. This antioxidative protective system of glutathione peroxidase depends heavily on selenium⁶⁴.
Sodium	Voltage-gated sodium channels allow sodium ions to enter the brain cells⁷⁷
Vanadium	Inhibits Na⁺-K⁺-ATPase pump activity
Zinc	- Roles in protein synthesis, as well as structure and regulation of gene expression⁷⁶ - Serves in neurons and glial cells. Certain zinc-enriched regions (e.g., hippocampus) are especially responsive to dietary zinc deprivation, which can cause learning impairment and olfactory dysfunction^{78,79}

Note: ATP = adenosine triphosphate; DNA = deoxyribonucleic acid; RNA = ribonucleic acid.

*Table adapted from Kaplan BJ, Crawford SG, Field CJ, Simpson JSA (2007). Vitamins, Minerals and Mood. *Psychological Bulletin*, 133(5), 747-760.

2.2 Nutrition in the Prevention of Mental Health Conditions

Disease prevention initiatives are sustainable methods to reduce the effects of mental health conditions. Social and biological sciences have provided insight into the role of risk and protective factors in the development of poor mental health. Many of these factors, like nutrition, are modifiable and provide targets for prevention and promotion.

Table 2 (at the end of this section) highlights examples of nutrition-related mental health promotion and mental health condition prevention initiatives targeted throughout the lifespan, at policy, and to research. In addition, important mental health outcomes from these nutrition-related initiatives are highlighted including increasing psychological well-being, competence and resilience, and creating supportive living conditions and environments.

Nutrients commonly associated with mental health include polyunsaturated fatty acids (particularly omega-3 types); minerals such as zinc, magnesium, selenium, copper, and iron; B vitamins such as folate, vitamin B₆, and vitamin B₁₂; antioxidant vitamins such as C and E²²; and bioactive substances found in foods³⁵. Most of these are available in healthy diets that include dark green leafy and orange-coloured vegetables and whole grains.

There is considerable epidemiological literature in the area of nutrition and the development of neurocognitive disorders such as dementia⁸⁰. Nutrients associated with dementia-related conditions include omega-3 fatty acids, antioxidants (vitamins C and E, and selenium), B-vitamins, iron, copper, and zinc⁸¹. Since neurocognitive disorders are more frequent among older adults, there may be an association with consuming less food at a time when nutrition needs are the same or greater. Epidemiological studies have

shown that older adults have higher rates of nutritional deficiencies than younger age groups. Particular deficiencies have been shown for B-vitamins, vitamin C, vitamin E, selenium, omega-3 fatty acids, and choline. Cognitive decline may be accelerated if nutritional deficiencies are not addressed. Results of nutritional intervention studies in Alzheimer's Disease (AD) have been conflicting^{80;82;83} perhaps due to different biochemical markers being used to measure nutrient deficiency⁸².

The nutrients most widely studied in neurocognitive disorders include many of the B vitamins, vitamin E, the omega-3 fatty acids, vitamin D, and iron. Vitamin B₁₂ and folate affect neurocognitive development and deficiencies may contribute to higher levels of homocysteine and cognitive decline^{84;85}. Evidence supporting the efficacy of vitamin B₁₂, vitamin B₆, vitamin E, folate, thiamin, or niacin supplements in delaying the progression of AD is inconclusive^{84;86-88}. Vitamin E supplementation with more than 1000 mg/day is not recommended for prevention of AD due to possible adverse effects⁸⁷.

Evidence suggests that intake of omega-3 fatty acids by consumption of fatty fish at least once weekly may reduce the risk of developing cognitive impairment and dementia^{83;85;89-92}. However, since fish is also a high dietary source of vitamin D, relationships with mental symptoms may be due to vitamin D deficiency. Data suggest a possible association between vitamin D insufficiency and cognitive function⁹³ and possibly depression, bipolar disorder, and schizophrenia, though study results are mixed⁹⁴.

Both excess and deficient iron intakes are linked to dementia. Elevated iron levels have been found in the brains of people with AD, while observational studies have indicated a link between both excess and deficient iron intakes and dementia⁸¹. Iron deficiency increases the absorption of aluminum in the blood, which may also have harmful effects on the brain⁹⁵.

The relationship between diet and cognition may be due to changes that occur in vascular function³⁵. Cardiovascular risk factors are linked to conditions such as hypertension, dyslipidemia, obesity, diabetes^{83;59;100-103}, and cognitive decline¹⁰⁴⁻¹⁰⁷. High intakes of fat and processed sugar, and excess calories are thought to contribute to body-wide oxidative stress associated with weight gain, atherosclerosis³³, and cognitive decline³⁴. Observational studies (including prospective investigations) suggest that not only diets comprising excess fat (particularly saturated and trans fats) and calories, but also early, midlife, and long-term obesity are associated with an increased risk of mental health conditions^{107;108}. Advanced glycated endproducts (AGEs), a group of endogenous sugar-protein compounds that have proinflammatory properties¹⁰⁹, have been linked with AD¹⁰⁵. External sources of AGE, found in high sugar and fried foods as well as foods exposed to high and dry heat may contribute to the body's pool and promote "cross-linking" of proteins and AD development¹¹⁰.

Studies have reported consistent associations between dietary patterns and the symptoms of anxiety and depression¹¹¹⁻¹¹³. Cross-sectional and prospective, longitudinal studies that compared "healthy" and "unhealthy" diets based on food frequency questionnaires have shown that increased adherence to unhealthy diets (e.g., non-Mediterranean style diets) is associated with new diagnoses of depression¹¹¹, dysthymia, or anxiety disorders¹¹², or high depression scores¹¹³. Mediterranean-style diets are characterized by an abundance of plant foods and include vegetables, fresh and dried fruits, whole-grain cereals, nuts and legumes, and a moderate amount of red wine¹¹⁴.

It is well known that prevention is a logical and cost-effective intervention for eating disorders. Efforts that emphasize health at every size and intuitive eating are

promising practices¹¹⁵. Targeted prevention such as dissonance programs address thin-ideal internalization and challenge body distortions¹¹⁶.

In this section, some of the theories regarding intersections between diet, mental health promotion, and disease prevention have been highlighted. Many possibilities exist to integrate healthy eating, nutrition, and mental health strategies into public health and health promotion policies and programs across various sectors and levels (e.g., local strategies, broad national interventions), which in turn could generate a range of health, social, and economic benefits¹¹⁷.

*Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions**

Target	Examples	Rationale	Mental Health Outcomes
Reproductive and mental health	• Support health-promoting choices for all women of childbearing age, pregnant women, and new mothers, using educational interventions to enhance nutrition, healthy weights, breastfeeding, psychosocial health, positive parent-infant attachment, and parenting skills. • Screen iron status in pregnant women • Targeted prenatal in-home counselling and support for at-risk pregnant women and new mothers (including food supplementation, promotion of life skills, screening for depression, brief interventions to decrease substance use) • Folate fortification programs and supplementation guidelines for women during childbearing years	• Reduce social and environmental risk factors for mental health conditions • Pregnancy outcomes associated with cognitive development	• Improvement of mental health both in the mothers and the newborns • Reduced prevalence of neural tube defects (from increased folate in the food supply) • Reductions in low birth weight and preterm delivery, and long-term reductions in problem behaviours.
Early childhood mental health	• Interventions that combine nutrition (e.g., food supplementation) with counselling and psychosocial care (e.g., attentive listening) • Breastfeeding support • Growth charts to monitor anthropometrics with referral to specialized services as needed • Preschool interventions to promote healthy eating	• Reduce social and environmental risk factors for mental health conditions • Enhance social competence and other protective factors • Prevent weight issues that can impact mental health	• Improved parenting literacy which includes knowledge of development and role of nutrition • Enhanced cognitive functioning • Healthy weight management, improved emotional and behavioural functioning • Positive parenting programs (Triple P) have a return on investment in excess of 6% based on special education, social services, mental health services, and criminal justice services⁹⁶

continued...

Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions - continued

Target	Examples	Rationale	Mental Health Outcomes
Middle to late childhood mental health	• Parent nutrition and food training programs • Food programs and other feeding programs to target disadvantaged children (e.g., school breakfast clubs, weekend food hampers) • School-based ecological interventions and health education (e.g., healthy body image, media literacy prevention programs to prevent eating disorders and obesity, food skills training), and early detection of mental health problems (e.g., eating disorders) • Interventions for non-school contexts (e.g., promote eating together as families, offer only healthy foods and beverages) such as recreation facilities • Positive parenting programs with healthy lifestyle component	• Children spend much of their time at school, which is an efficient setting to influence behaviour • Depression and anxiety are common emotional problems in childhood; and has been related to breakdown of families • Media literacy can help prevent weight-related problems	• Improved parenting literacy which includes knowledge of development and role of nutrition • Enhanced cognitive functioning • Academic improvement, and increased problem-solving skills and social competence • Breakfast clubs are associated with improved behaviour in classrooms⁹⁷ • Healthy weight management, improved emotional and behavioural functioning • Positive parenting programs (Triple P) have a return on investment in excess of 6% based on special education, social services, mental health services, and criminal justice services⁹⁶ • Media literacy
Young adult mental health	• Ecological approaches that promote connectedness through food • Food programs (e.g., weekend food hampers) for disadvantaged individuals • School-based ecological interventions and health education (e.g., healthy body image, food skills training), and early detection of mental health problems (e.g., eating disorders) • Interventions for non-school contexts (e.g., promote eating together as families, offer only healthy foods and beverages) such as recreation facilities • Multi-component programs that include nutrition interventions targeted to at-risk youth and their parents • Perinatal education, skill development and supports for teen mothers • Strategies that prevent, delay and reduce use of substances • Opportunities in volunteering and mentorship related to nutrition and food (e.g., peer support food skills building)	• Children spend much of their time at school, which is an efficient setting to influence behaviour • Depression, anxiety, substance use, and suicide can occur during adolescence; and has been related to breakdown of families • Media literacy can help prevent weight-related problems	• Improved food and nutrition literacy • Media literacy • Enhanced cognitive functioning • Academic improvement, and increased problem-solving skills and social competence • Breakfast clubs are associated with improved behaviour in classrooms⁹⁷ • Healthy weight management, improved emotional and behavioural functioning • Positive parenting programs (Triple P) have a return on investment in excess of 6% based on special education, social services, mental health services, and criminal justice services⁹⁶

continued...

Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions - continued

Target	Examples	Rationale	Mental Health Outcomes
Mental health in adulthood	• Work with primary care physicians to provide mental health promotion and screening of nutrition-related issues • Healthy worksite programs, including how to cope with periods of unemployment or underemployment (e.g., low-cost healthy eating) • Healthy eating and body image education in a university or college setting • Nutrition labelling and education programs • Phone helpline and online services for dietary information • Eating disorder prevention programs • Body image education, screening and detection of mental health conditions	• Workplace stress and unemployment are major stressors • Promote food literacy skills (e.g., label reading) • Weight gain in menopause; can cause distress, and can alter eating habits and body image • Disordered eating reported in adult women	• Healthier, motivated workforce and reduced sickness absences • Simulations of workplace programs (e.g., Web portal, wellness literature, seminars) found returns on investment of 9 to 1⁹⁸ • Worksite prevention strategies can produce annual savings of \$392,055⁹⁹ • Enhanced self-esteem, self-reliance, and self-determination over healthy food choices
Mental health of older adults	• Promote brief primary care interventions during routine primary care for older adults to promote nutrition screening and early intervention, treat vascular disease to prevent/delay dementia, and brief interventions to reduce substance use • Healthy living interventions, including nutrition, in primary care and programs using life review techniques • Work with food retailers to develop “senior-friendly” shopping facilities to maintain the independence of older citizens and allow them to do their own food purchasing	• Older adults are at increased risk for food insecurity, dementia, depression, poor nutrition, and substance use	• Prevent high blood pressure, stroke, and high blood cholesterol levels; reduces the risk of dementia • Promote optimal nutrition • Enhance food security • Prevent substance use which can impact nutritional status

continued...

Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions - continued

Target	Examples	Rationale	Mental Health Outcomes
Foster mental health by creating supportive environments and reducing inequities	- Food security policies and programs (e.g., buying clubs, community kitchens, community gardens) - Healthy food options in congregate meal programs (e.g., in seniors centres, transitional houses, emergency shelters, adults day care programs) - Food and nutrition service standards in facilities and programs - Work with governments around the planning of locations of food establishments, transit, and zoning provisions that enable access to healthy foods - Sufficient food assistance funds that give those on social assistance adequate resources to purchase foods for a healthy diet	- Poverty is a risk factor for mental health conditions - Studies of congregate meal programs indicate nutritional content of menus don't always meet standards - Research shows that convenience stores with limited food selection are more typical in low-income neighbourhoods	Social inclusion, food security, self-reliance, and self-determination over food choices
Community action for mental health	- Work with family-based centres and programs to build capacity to address food security and support nutritional health of children - Train peer support workers about nutrition in programs targeting vulnerable populations such as high-risk pregnant moms, Aboriginals, and seniors - Promote healthy eating by providing healthy menu options in restaurants	- Childhood obesity rates are increasing; carrying excess weight can impact on physical and mental health - Weight bias associated with overweight leads to stigmatization; can reduce quality of life and increase risk for low self-esteem and depression	Social inclusion, food security, healthy weights
Healthy public policy for mental health	- Healthy community policies affecting various sectors to enable access to healthy food choices (e.g., recreation centres, workplaces, day cares, restaurants) - Nutrition labelling to help consumers make healthy food choices - Mental health and nutrition policy - Policies and regulatory frameworks to test foods for a range of contaminants regularly and appropriate actions are taken	- Many food environments are obesogenic; weight issues can impact mental health - Contaminants can affect brain health	Food security, self-determination

Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions - continued

Target	Examples	Rationale	Mental Health Outcomes
Cultural competence and mental health	• Develop culturally appropriate nutrition education materials based on engagement by potential users	• Cultural assimilation can affect mental health • Some populations experience more discrimination and distress • Address specific needs of Aboriginal people and people from diverse cultural and ethnic backgrounds	• Health (nutrition) literacy, self-determination • Reduce health and social inequities
Reorient mental health services	• Facilitate networks and referrals among dietitians and other health providers so that community members have access to a range of nutrition services • Train other providers and professionals (e.g., nurses, social workers, teachers) to extend dietitian expertise • Encourage automatic referral of mental health consumers to dietitians once prescribed psychiatric medications known to cause weight gain and nutrition-related side effects • Develop nutrition risk screening tools for mental health consumers • Provide undergraduate education in nutrition and mental health promotion and prevention • Use Internet-based mechanisms (e.g., email-based campaigns) to promote self-help strategies	• Current nutrition services in mental health are limited • Specific training in mental health promotion and prevention is minimal • Studies suggest that nutrition risk screening is often not performed in mental health populations, and when consumers are high-risk this is usually not detected • Other providers learn practical strategies for promotion of mental health and well-being which are often needed in daily practice	• Reduce health and social inequities • Prevention of mental health conditions
Preventing physical health conditions	• Establish standards for prevention and treatment of individuals with, or at risk for, diabetes and other common conditions seen in mental health consumers	• Comorbid conditions are common in mental health consumers	• Reduce inequities

Table 2: Examples of Nutrition-Related Strategies that Promote Mental Health and Prevent Mental Health Conditions - continued

Target	Examples	Rationale	Mental Health Outcomes
Treatment strategies to enhance mental health	• Include nutrition interventions as part of clinical guidelines for treatment of mental health conditions • Targeted initiatives to address depression experienced by people with chronic conditions and disabilities	• Nutrition is not part of most standards or clinical guidelines for mental health	• Reduce inequities
Research for mental health	• Collect surveillance data that can enable tracking of foods, beverages, and added substances in food products (e.g., caffeine) and relationship to mental health • Encourage and fund research in specialized areas of nutrition and mental health, particularly for vulnerable populations	• There is limited knowledge about the impact of intake of substances (e.g., caffeine), particularly for children • Lack of evidence about certain segments of the population (e.g., some have genetic polymorphisms that are associated with altered rates of metabolism of caffeine) — consumption of these substances within current acceptable levels can present health risk	• Reduce inequities

*Table adapted from:

Dietitians of Canada (2006). *The Role of Dietitians in Collaborative Primary Health Care Mental Health Programs*. Mississauga: Canadian Collaborative Mental Health Initiative

Jané-Llopis, E., and Anderson, P. (Eds.) (2006). *Mental health promotion and mental disorder prevention across European Member States: A collection of country stories*. Luxembourg: European Communities

BC Health Authorities and BC Ministry of Healthy Living and Sport (2009). *Model Core Program Paper: Mental Health Promotion and Mental Disorders Prevention*. Victoria: BC Ministry of Healthy Living and Sport.

3. Mental Health Conditions

“The time is now right for nutrition to become a mainstream, everyday component of mental health care, and a regular factor in mental health promotion ... The potential rewards, in economic terms, and in terms of alleviating human suffering are enormous.”

Dr. Andrew McCulloch, Chief Executive, The Mental Health Foundation

Mental health conditions are associated with long-lasting disability and with mortality through suicide, medical illness, and accidental death. In 2007–2008, Canada spent an estimated \$14.3 billion in public expenditures for mental health services and supports¹¹⁸. By 2030, if trends continue unabated, mental health conditions will be the leading cause of disability in Canada. As current treatments offer only partial benefit¹¹⁹, other options such as nutritional interventions that can augment standard care¹²⁰ need to be integrated.

Mental health conditions may be defined as alterations in the brain or nervous system function that result in differed perception of and responses to the environment. They can take on many forms, and experiences vary among individuals. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM), published by the American Psychiatric Association, provides a common language for the classification of mental health conditions. At the time of writing, the DSM-5 was in its final stages of development; updates are provided at www.dsm5.org. While the DSM represents a medical model approach, it is important to recognize that many individuals may have mental health problems that are not consistent with a formal

DSM-5 diagnosis (e.g., night eating syndrome) (see Figure 1). Some may refer to these as subclinical conditions and they warrant intervention in order to minimize issues and prevent progression to more severe symptoms.

In many clinical mental health settings, a multiaxial system is used to assess a person. There are five axes in the DSM-IV with the first axis incorporating “clinical disorders” and the second covering areas such as personality disorders and intellectual disabilities (see Table 3). The remaining axes include medical, psychosocial, and environmental factors (e.g., problems with support, housing), as well as assessments of functioning for children. Axis I conditions are believed to not improve without psychiatric medication; if left untreated they may be permanently harmful to the brain and nervous system. Axis II conditions (e.g., personality disorders) are primarily learned behaviours and tend to not respond to medication. In the DSM-5, axes I, II, and III will be combined.

*Table 3: Multiaxial System**

Axis I	Clinical disorders, includes all except those in Axis II
Axis II	Personality disorders and mental retardation*
Axis III	Any medical conditions
Axis IV	Psychosocial and environmental factors
Axis V	Global Assessment of Functioning (GAF); rating of 0 to 100 that summarizes overall functioning
*DSM-5 proposes combining Axes I, II, and III (i.e., one single axis)	

3.1 Mental Health Conditions and Their Nutritional Implications

Various factors may mediate the relationships between a mental health condition and nutrition status (e.g., poor food intake, malnutrition, obesity, comorbidities, substance use, income status, and social isolation) (see Table 4). Generally speaking, the relationships between diet and mental health pertain to overnutrition (intake of nutrients in excess of requirements) and undernutrition (intake of insufficient nutrients to meet requirements)¹³². Undernutrition is a well-documented occurrence in care settings. For example, one study¹³³ that compared mental health nurses' judgments of nutritional risk with the risk identified on a screening tool found that nurses did not correctly identify, a significant group of people who were at risk of malnutrition¹³³. Risk of malnutrition was commonly associated with psychosis, and was underestimated in those with depression and those who were middle-aged. Overnutrition leads to excess weight — a common occurrence for those with mental health conditions and which can be due to several reasons¹³⁴, including reduced motivation to address weight gain, impaired access to primary care, side effects of medications, or consumption of excess calories.

In addition to the DSM, there are other ways to think about mental health issues. For example, the biopsychosocial model¹²¹ recognizes the connections between a person's physical health and mental health. One factor (e.g., mood symptoms) may be simultaneously related to interactions of biological (e.g., hormonal changes), psychological (e.g., perception of mood symptoms), and social/environmental factors (e.g., social isolation). The interrelations of social locations and experiences^{122;123} also help in understanding differences in mental health needs and outcomes¹²⁴. For example, individuals who

are "addicted" often lead difficult lives and may have additional co-occurring and stigmatizing health issues. These intersect with social issues associated with their substance use that make behaviour change difficult¹²⁵⁻¹²⁸. Stress is most often related to intersecting factors, such as poverty, unemployment, housing issues, and discrimination¹²⁵; lack of housing and/or unemployment contribute to substance use. Finally, a socio-ecological perspective on mental health suggests that individual and ecological characteristics may interact such that conditions in some geographic areas may have significance for individual experience of mental symptoms and health services use¹²⁹.

Mental health promotion is relevant for everyone, including those with mental health conditions. The Ottawa Charter for Health Promotion outlines a number of actions and strategies that can serve as an organizing principle for taking action¹³⁰: strengthening community action/advocating for change, building individual skills, creating supportive environments, reorienting health services, and developing healthy public policies. For each of these action areas, strategies can be geared to people with mental health conditions — for example, the promotion of self-help, building skills for daily living; participation and advocacy; combatting stigma and promoting community inclusion; shifting the focus of services toward promoting autonomy and connecting with community; and ensuring that policies support consumer capacity, citizenship, and recovery.

*Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions**

Factor	Description of Effect on Nutritional Intake	Nutritional Interventions
Condition-Specific Factors		
Altered circadian rhythm (sleep-wake)	Altered sleep can lead to increased eating and weight gain	- Regular eating pattern with protein in morning meal, snack, and lunch; consume most carbohydrates in the evening - Consume coffee, tea, or any other stimulant, at circadian-neutral times (e.g., near 4 pm)
Anxiety, overactivity	- Unable to sit long enough to eat or eat “on the go” - Increased energy output	- Eat small frequent meals - Limit caffeine - Some anxious individuals may require that one food be fed at a time, with one utensil at a time - Use nutritional supplements as needed
Avoidance or social isolation	- Post-traumatic stress-related dissociation - Isolation may induce overeating - Avoid mealtimes, embarrassed to eat with others, and not shopping for food - Lack of access to health support (e.g., dietitian)	Therapeutic approaches such as cognitive behaviour therapy and peer support (Section 5) that incorporate nutrition support as needed
Catatonia	- Unresponsive to food stimuli - Some refuse all food and drink	- Placing food beside individual may help get them to eat - Tube-feeding or IV hydration may be needed for those refusing all food and drink
Delirium	Delirium associated with poor nutrition	Conduct full nutrition assessment, including serum chemistry, to rule out deficiencies as underlying cause
Dementia	- Increased or decreased food intake - Altered food choices - Consumption of inedible substances - Disturbances in eating processes and behaviour	- Routinely assess nutritional status, including ability to self-feed - Provide verbal and physical assistance at mealtimes as needed - Provide adequate diet; use oral nutrition supplements as needed - Benefits associated with tube feeding unclear
Depression	- Overeating, undereating, comfort eating - Feel unworthy of eating, lack of motivation, or poor energy levels - Severe lack of appetite - No desire to shop or prepare food - Poor food hygiene presenting food safety risks - Exacerbates sedentary lifestyle associated with subsequent weight gain - Somatic delusions of not being able to eat or being physically too ill to eat - Preferences for liquid and/or convenience foods; require less energy to prepare and eat	- Appetite and weight may improve with medication - Encourage a well-balanced diet with protein/calorie supplementation as needed. - Structure eating for mood stability throughout the day - Encourage socialization at mealtimes - Rule out celiac disease; if confirmed, gluten-free diet can improve symptoms - Tube-feedings may be needed for those who refuse food - Total parenteral nutrition (TPN) typically contraindicated as TPN line may be used to inflict self harm (e.g., suicide attempt)

continued...

Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions - continued

Factor	Description of Effect on Nutritional Intake	Nutritional Interventions
Condition-Specific Factors		
Disordered eating and body image	- Anorexia, bulimia, binge eating - May be prone to food fads, use of herbs or steroids, or eating disorder	Multidisciplinary team approach; nutrition therapy focuses on interrupting symptoms, refeeding, correcting nutrient deficiencies and electrolyte imbalances, normalizing eating, restoring weight, and regulating hunger and satiety cues
Disruptive behaviours	May disrupt mealtimes and quality of intake	- Difficult eating and behaviour challenges require multidisciplinary support (e.g., psychologist, occupational therapist, dietitian) - Depending on circumstances (e.g., communal dining setting), individual may need to eat at a different time or in a different location - Rule out celiac disease; if confirmed, gluten-free diet can improve symptoms
Encopresis	- Encopresis is an elimination disorder that involves repeated bowel movements in inappropriate places - Treated by instituting regular bowel evacuation patterns with stool softeners or laxatives	High-fibre diet with fluids to help promote regular bowel evacuation patterns
Mania	- Associated with treatment non-adherence - Elevated or irritable mood, rapid speech, and hyperactivity - Poor intake may result from distractibility - Patients with bipolar disorder are less likely to report that their provider discussed diet habits with them	- Appetite and weight often improve with medication and stabilization of symptoms - Encourage and provide a well-balanced diet in the form of small, frequent meals - Protein/calorie supplementation as needed
Megaphagia	Eating large amounts of food; common feature of Kleine Levin Syndrome	Supportive nutrition care; control eating environment to maximize healthy food choices, and prevent weight gain
Memory or cognitive impairment	- Forgetting to eat - Forgetting a meal has been taken and overeating - Impaired ability to retain new information	- Cognitive adaptive strategies (e.g., adapt environment to provide reminders about meal preparation, mealtimes) - Adapt therapeutic interventions to facilitate recall (e.g., repeat concepts, written recommendations)
Obsessive compulsiveness	May avoid certain foods or food groups	- Consume a well-balanced diet in the form of small, frequent meals - Protein/calorie supplementation as needed - Therapeutic work may help to broaden diet (Section 5)
Panic attacks, recurring	- May use food to soothe anxiety leading to weight gain - May isolate themselves to prevent panic attacks which may limit diet - May use sedating medication to ease symptoms, which decrease motivation to eat and/or promote sleep/drowsiness	- Low-calorie healthy food options - Avoid caffeine as may worsen anxiety - Therapeutic approaches to lessen anxiety

continued...

Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions - continued

Factor	Description of Effect on Nutritional Intake	Nutritional Interventions
Condition-Specific Factors		
Pica	Consume non-nutritive substances	- Assess for nutrient deficiencies, electrolyte imbalances, and toxicity symptoms from ingestion of non-food items - Limit accessibility to items; provide alternative sources of stimulation; behaviour interventions such as reinforcement for eating from a plate - Referral to behavioural consultants for severe cases
Psychotic symptoms	Delusions about food (e.g., food is poisoned) or hallucinations (e.g., person sees bugs on their food), causing refusal to eat	- Allow for delusional beliefs as is practical until medication becomes effective - Rule out possible reversible causes (e.g., electrolyte imbalances) - Provide well-balanced diet
Rumination	Repeated regurgitation of food	- Assess for nutrient deficiencies, electrolyte imbalances, and organ damage - Interventions such as fading food consistency (gradual addition of higher textures), food satiation (provide a food in abundance so as to reach a satiation point and create negative association), differential reinforcement to shape the rumination behaviour, and over-correction (e.g., individual repeatedly performs an appropriate behaviour)
Sensory issues	Some (especially children) may have problems with texture and consistency of foods	- Assess chewing and swallowing - Texture-modified food and fluids as needed
Skin picking	Skin breakdown; can cause sores severe enough to require surgery	Nutrition guidelines for wound healing: 1) 30 to 35 kcal/kg body weight, 2) 1.25 to 1.5 g protein/kg body weight; 3) 30 ml fluid/kg body weight to prevent dehydration; and 4) Balanced diet that meets the RDA for all vitamins and minerals (supplemental nutrition as needed)
Sleep problems/ insomnia	- Can alter intake (usually increased) - Lead to night eating syndrome and weight gain - Fatigue can lead to excess caffeine intake and dehydration	- Well-balanced diet - Consume small amount of complex carbohydrate food (e.g., milk, cheese) one hour before bed - Low-calorie healthy options if night eating an issue - Avoid caffeinated food and drinks, heavy or spicy foods at least eight hours before sleeping; monitor and promote hydration
Substance use	- Reduced food intake - Organ damage alters utilization of nutrients - Malnutrition	- Harm reduction approaches (see Section 5) that help optimize nutritional status - Where appropriate, nutritional interventions that promote recovery
Suspicion	- Undereating - Concern that food or fluid may be altered	- Allow for suspicion until medication becomes effective. Offer nutrient-dense high-calorie foods to prevent weight loss - If feasible, provide a packaged food diet or involve person in food preparation to minimize suspicion

continued...

Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions - continued

Factor	Description of Effect on Nutritional Intake	Nutritional Interventions
Condition-Specific Factors		
Trichotillomania (TTM)	• TTM is the irresistible urge to pull out hair from different areas of the body; can cause skin breakdown • For some with TTM, oral manipulation of hair occurs and can cause significant dental erosion • May ingest hair, leading to formation of hairballs that lodge in the gastrointestinal tract	• Provide balanced diet with supplements as needed to promote skin healing • For hairballs (trichozeboars), check for nutrient and electrolyte imbalances; if complete blockage, may need TPN • With surgical removal of trichozeboars, provide preoperative and postoperative nutrition care to optimize health status and promote recovery
Weight gain	• Common in depression, bipolar disorder, schizophrenia spectrum, and other psychotic disorders • May be related to condition and/or side effect of psychiatric medications	• Evaluate the appetite-stimulating effect of any new medication and treat early to limit weight gain • Evaluate beverage consumption and feelings of satiety • Discuss normal portions, encourage consumption of low-calorie foods, and fluids (e.g., water) and increase fibre to increase satiety effects • Relaxation techniques to slow down eating at meals
Withdrawal	• Undereating • Delusions regarding fluid and food • Lack of interest in eating • Ravenous appetite	• For undereating, offer small frequent meals with protein/calorie supplements as needed • For ravenous appetite, establish regular meal patterns with variety of foods. Consume small protein-containing snacks • Limit sweets and caffeine
Other Factors That Impact Nutrition		
Comorbid conditions	• Common ones include dyslipidemia, hypertension, and diabetes • All of these benefit from nutrition interventions	• Integrated approaches to nutrition management needed; see Section 5
Dry mouth	• Side effect of many psychiatric medications • Increased sugar-sweetened and caffeine-containing beverage intakes, which can lead to weight gain • Dry mouth can increase risk for dental caries	• Check fluid intake. Ensure at least 1500–2000 ml of fluid daily • Suggest ice chips, frequent sips of water, and sugar-free popsicles, and carry a water bottle to sip from often • Provide healthy beverage education • Sugarless candy and gum may help stimulate saliva • Artificial saliva substitutes (e.g., Moi-Stir®) can help prevent dental caries • Suggest moisten dry foods with low-fat sauces or broth

continued...

Table 4: Factors that May Affect Nutritional Intake in Populations with Mental Health Conditions and Suggested Interventions - continued

Factor	Description of Effect on Nutritional Intake	Nutritional Interventions
Other Factors That Impact Nutrition		
Excess caffeine intake	Caffeine intoxication defined in the DSM	- Symptoms of intoxication and withdrawal resolve if caffeine ingestion discontinues - Assess and quantify caffeine consumed per day. Educate about sources of caffeine - Moderate consumption of caffeine (less than 300 mg/d)
Food insecurity	Limited income and resources making food access challenging	- Screen for food insecurity - Educate about local food programs available (refer if needed). Multi-pronged approach needed (emergency food relief programs, capacity building)
Hospital admission	- Usual preferences may not be catered for - Alternatively, people may eat a healthy diet and have a social mealtime so that diet improves	Provide diet in accordance with person's health needs and preferences
Medications	- Nutrient-drug interactions - Nutrition-related side effects such as changed appetite, weight gain, gastrointestinal disturbances, and dry mouth. - Refer to Appendix C (Table 10) for detailed description of nutrition-related side effects	- Educate about possible side effects when medication initiated - Monitor side effects and intervene according to symptoms - Metabolic monitoring depending on type of medication (e.g., second generation or atypical antipsychotics) - For gastrointestinal disturbances, adjust amounts and types of fibre and fluids as needed
Physical changes	- Possible swallowing difficulties - Problems feeding self - Conditions requiring therapeutic diets	- Integrated approaches to nutrition management - Assess for chewing, swallowing, and feeding abilities (refer to occupational therapist or speech-language as needed) - Eating aids and assistance as needed
Reliance on outside food sources	Convenience, vending, take-out, and restaurant foods that require little preparation but tend to be higher in fat, sugar, and sodium	Education and skills building on food purchasing and preparation
Self-chosen therapies	- Supplemental plus food sources of vitamins and minerals may exceed safe levels - Some therapies may worsen mental symptoms	- Assess type, dose, and frequency of use; compare to Tolerable Upper Intake Levels of Dietary Reference Intakes - Monitor products individual is taking that may worsen symptoms; educate as feasible
Trauma history	Trauma can lead to sensory issues, hyperarousal, startle, feelings of numbness and altered appetite	Trauma-informed nutritional approaches

* Table adapted from Abayomi J and Hackett A. (2004). Assessment of Malnutrition in Mental Health Clients: Nurses' Judgement vs a Nutrition Risk Tool. *Journal of Advanced Nursing*, 45(4), 430-37 and American Dietetic Association. Dietetics in Developmental and Psychiatric Disorders Dietetic Practice Group (1993). *Clinical Criteria and Indicators for Nutrition Services in Developmental Disabilities, Psychiatric Disorders and Substance Abuse*. Chicago, Ill: The American Dietetic Association

In this section, the intersections of mental health conditions and nutrition are explored using the DSM framework. The reader, however, is encouraged to think about the multiple factors that affect the health of individuals with mental health conditions as discussed here and that are further highlighted in Section 4: Diversity in Practice. It is also important to recognize these differences and the stresses that people with mental health conditions may face in order to support them through what may be the first change in their life. An affirming experience with a dietitian can encourage and increase their motivation to attempt other positive lifestyle changes¹³¹.

It is believed that the individual and collective (social and environmental) determinants of food choice apply to all populations including those with mental health conditions. Individual determinants of personal food choice (physiological state, food preferences, nutrition knowledge, perceptions of healthy eating, and psychological factors) help explain eating behaviour¹³⁵. Collective determinants — including contextual factors, such as the interpersonal environment created by family and peers; the physical environment, which determines food availability and accessibility; the economic environment, in which food is a commodity to be marketed for profit; and the social environment, in which social status (income, education, and gender) and cultural milieu — influence eating¹³⁵. Many hypotheses have also been advanced to explain relationships between mental state and food intake. Eating may be a learned response to certain states because it has become associated with a lessening of unpleasant feelings or symptoms. Or one may be so preoccupied with the unpleasantness of one's mental state that eating is not important¹³⁶. There also appears to be evidence for a biochemical link between mental state and appetite. Some research has focused on the similarities between the criteria for anorexia and

the criteria for major depressive illness¹³⁷, such as disturbance of appetite. This implies that there are common biochemical pathways underlying mood, appetite, and disordered eating behaviour.

3.2 Medications for Mental Health Conditions and Nutrition Side Effects

Psychiatric medications target neurons and neurotransmitters in the brain and central nervous system. Neurotransmitters (e.g., serotonin) are manufactured in neurons (nerve cells) to carry messages from cell to cell, crossing the synaptic gap between the axon (transmitting terminal) of one neuron to the dendrites (receiving terminals) of the next. The chemical structure of each neurotransmitter is designed to fit its receptor. A change in a neurotransmitter's chemical structure, or an imbalance at any point in this complex process, may affect emotions, moods, thoughts, and behaviours. Psychiatric medications help restore the balance of many important neurotransmitters, including serotonin, dopamine, epinephrine, norepinephrine (monoamines), acetylcholine, gamma-aminobutyric acid (GABA), glutamic acid, enkephalins, and endorphins¹³⁸.

Common medications used to treat mental health conditions include antipsychotics, antidepressants, mood stabilizers, and anti-anxiety agents. Many of these pharmaceuticals have anticholinergic and extrapyramidal side effects. Anticholinergic effects are caused when a medication interferes with the neurotransmitter acetylcholine. Muscles and glands may be affected, and lead to altered food intake, confusion, blurred vision, constipation, and dry mouth. There is a network of nerve pathways in the brain known as the extrapyramidal system. This system influences messages sent from the brain to the muscles. Certain medications may disturb this system,

which can lead to involuntary movements such as tremors, or problems with muscle tone and making desired movements (e.g., slowed movement and rigidity as seen with Parkinson’s disease).

Tardive dyskinesia (involuntary movements) is a condition caused by long-term use of neuroleptic medications. Some small trials have shown that tardive dyskinesia (TD) may be prevented by or treated with vitamin E and C supplementation¹³⁹ (the vitamin C works as an antioxidant to the vitamin E’s pro-oxidant effect) as it is thought that the condition is caused by overproduction of free radicals¹⁴⁰. However, more research is needed to support these findings.

The relationships between psychiatric medications and nutritional status include:

1. drug-nutrient interactions where the prescribed medication alters nutrient bioavailability;
2. nutrient-drug interactions where the nutrient alters the effectiveness of the medication;
3. drug-nutrition interaction where nutrient intakes are altered, affecting types and amounts of food consumed; and
4. nutrient-nutrient interaction where one’s nutritional status alters the bioavailability of the nutrient and drug metabolism.

Specific nutrition-related side effects for the different psychiatric medications available in Canada are detailed in Table 10 (see Appendix C). It is important to note that there are limitations to the information presented. First, gaps in the literature exist as to the interacting factors among the use of different medications and their impact on nutrition status. It has been estimated that at least 85% of people with mental health conditions are taking psychiatric medication¹⁴¹; clinical observations have suggested that many people with mental health conditions are

prescribed five or more psychiatric medications (including pain medications)¹⁴². It is also important to note that many individuals with mental health conditions have comorbid conditions that require other pharmaceuticals; their interactions with the psychiatric medications and the effect on nutritional status are also not indicated.

Given the various nutrient-related side effects of psychiatric medications, it is likely that many people taking these are not receiving sufficient micronutrients for optimal functioning. For example, the triage theory indicates that some functions of micronutrients are restricted during shortages and that the functions required for short-term survival take precedence over “secondary” functions¹⁴³. Micronutrient deficiencies (even at the subclinical level) induced by medication may therefore have long-term health effects.

Many psychiatric medications, namely the antipsychotics, are associated with weight gain and metabolic disturbance. Monitoring of fluctuations in weight is particularly important as doses of some medications (e.g., valproic acid) are based on body weight; therefore, careful monitoring of individuals taking those medications should occur as weight changes happen frequently. The use and side effects of antipsychotics in children and youth has attracted attention recently. In a review of psychotic and bipolar disorders in youth¹⁴⁴, reported weight gain was as high as 16.2 kg with use of different antipsychotic medications. Data in youth with autism and disruptive behaviour disorders, available only for some antipsychotics, suggest greater weight gain, possibly due to less prior antipsychotic exposure. Antipsychotic polypharmacy increases the risk for obesity and cardiovascular, cerebrovascular, or hypertensive adverse events. Despite marked weight gain and its greater impact on youth, monitoring rates for

antipsychotic polypharmacy side effects are reported to be low¹⁴⁴.

Some people report more hunger when they take antipsychotic medications. Increasing fibre and low-calorie fluid intake can help achieve feelings of satiety. Behavioural interventions that target lifestyle may help minimize or prevent the effects of the antipsychotics. Such interventions include having one to two sessions per week, varying from 6 to 16 weeks, with sessions that include diet, exercise, and cognitive behavioural strategies such as role playing, goal setting, problem solving, risk-benefit comparisons, and barrier discussion. Some programs also report that keeping food and activity diaries was beneficial^{145;146}.

A high proportion of individuals with mental health conditions often have high blood cholesterol. While lipid-lowering medications are standard treatment for elevated blood cholesterol levels, these drugs can form complexes with lipoproteins and alter the pharmacokinetics of psychiatric medications and worsen mental symptoms^{147;148}. This practice issue identifies the importance of dietary interventions that lower blood cholesterol and present no risks.

3.3 Nutrition Screening and Assessment for Mental Health Conditions

All individuals with mental health conditions should be screened for nutrition issues and be referred as needed for a more systematic assessment by a Registered Dietitian. Appendix E contains examples of screening tools. The purposes of nutritional care management in mental health conditions¹⁴⁹ are to:

- improve or stabilize nutritional status (e.g., identify, prevent, or minimize drug-nutrition side effects)
- identify and correct distorted eating patterns

- optimize medication effectiveness (e.g., prevent or correct nutritional deficiencies)
- enable the individual to function at the highest level of independent living

Some nutrition intervention, including assessment (see Appendix E, Figure 6), is recommended for many mental health conditions. Nutritional implications pertaining to mental health conditions proposed for the DSM-5 are discussed below, with conditions grouped or individually discussed, depending on information available. DSM-5 defined conditions that are due to general medical conditions, unspecified, or are substance induced are not included. One exception to this is the eating disorders section which also details eating disorders not otherwise specified, conditions where the Registered Dietitian has an important role. The general format for each condition or groups of conditions is a description followed by the nutritional implications and suggested interventions where information is available. In Appendix F, various resources related to different conditions are listed and the reader may refer to these for additional information.

Programs targeted at improving symptoms and functioning, such as individualized nutrition interventions, make significant contributions for people with mental health conditions. Collaborative, integrative models of health care (e.g., primary health care) provides a relevant forum to address mental health issues. The Four Quadrant Model for Integrating Health Care for Mental Health (Figure 3) serves as a guideline for assigning treatment responsibility to both specialty mental health agencies and primary care providers such as Registered Dietitians. The model divides the general treatment population into four groupings based on behavioural and physical health risks and status, then suggests system elements to address the needs of each particular subpopulation.

Figure 3: The Four Quadrant Clinical Integration Model¹⁵⁰

High ↑ Behavioural Health Complexity ↓ Low	Quadrant II	Quadrant IV
	Behavioural health clinician/case manager coordinates w/ principal care provider Outstationed nurse practitioner/ physician at behavioural health site Specialty, residential, and inpatient Behavioural health Crisis/emergency department Other community supports	Principal care provider Outstationed nurse practitioner/ physician at behavioural health site Nurse care manager at behavioural health site Behavioural health clinician/case manager External case manager Specialty medical/surgical and behavioural health Residential behaviour health Crisis/emergency department Behavioural health and medical/surgical inpatient Other community supports
	Persons with mental health symptoms could be served in all settings. Base services on the needs and choices of the individual, and the specifics of the community and collaboration.	
	Quadrant I	Quadrant III
	Principal care provider-based Behavioural health consultant/care manager Psychiatric consultation	Principal care provider-based behavioural health consultant/care manager (or specialties) Specialty medical/surgical Psychiatric consultation Emergency department Medical/surgical inpatient, facility-/home-based care Other community supports
	Low ← Physical Health Complexity → High	
Quadrant I: Served in primary care with mental health care staff on site. Principal Care Providers (PCPs) give care services and use screening tools, practice guidelines, and a tracking system that focuses on referrals to the mental health clinician (MHC). The MHC provides consultation to the PCP. Mental health services may include individual or group services, therapy, psycho-education, brief substance abuse intervention, limited case management, and protocols for handling acute episodes or high-risk consumers.		
Quadrant II: Served in a specialty mental health system that coordinates with the PCPs and collaborates with the specialty mental health providers. The specialty MHC provides behavioural health assessment, arranges for specialty services, assures case management related to community supports and access to health care, and creates a communication approach (e.g., email) to coordinate service planning.		
Quadrant III: Served in the primary care/medical specialty system with mental health staff on site. PCPs provide care services, work with medical specialty providers to manage individual health issues (e.g., diabetes), and use standard screening tools and practice guidelines. Primary care or medical specialty-based MHC provide mental health triage and assessment, consultation to the PCPs or treatment services, referrals to community resources, and health education. The PCP prescribes medications and has access to psychiatric consultation.		
Quadrant IV: Served in specialty mental health and primary care/medical specialty systems. PCPs work with medical specialty providers to manage the physical health issues, while collaborating with the mental health system in the planning and delivery of mental health services. The specialty MHC provides assessment and specialty services, assures case management related to supports, and collaborates with the health care system team. In some settings, mental health services may be integrated with specialty provider teams (e.g., mental health clinicians in OB/GYN working with pregnant women who use substances).		

3.4 Mental Health Conditions and Nutrition Practice

Mental health conditions as defined by the DSM-5¹⁵¹ include behavioural or psychological syndromes or patterns, an underlying psychobiological dysfunction, and clinically significant distress (e.g., a painful symptom) or disability (i.e., impairment in functioning). The organization of this section follows the proposed format of the DSM-5. That is, the order in which conditions are presented follow the lifespan, starting with neurodevelopmental disorders, which are often diagnosed in childhood, and progressing through to conditions commonly occur in adulthood. Within each category, the individual disorders are similarly arranged such that those typically diagnosed in childhood are listed first. The order of presentation also attempts to closely situate conditions that are related¹⁵².

3.4.1 Neurodevelopmental Disorders

3.4.1.1 Intellectual Developmental Disorder

Intellectual developmental disorder (IDD) includes both a current intellectual and adaptive functioning deficit with onset during the developmental period¹⁵². Individuals with IDD often experience “secondary conditions” or additional physical and psychological problems that limit enjoyment of life, such as fatigue, weight problems, constipation or diarrhea, cardiovascular disease, swallowing problems, and dental and vision problems¹⁵³. Working with a Registered Dietitian can enhance quality of life by minimizing the effects of secondary conditions and prevent others from developing¹⁵⁴. Individuals with IDD who have swallowing problems are vulnerable to undernutrition, recurrent food aspiration, and respiratory infections. Many will gain weight when

provided with easy-to-eat energy-dense foods or, if this fails, a percutaneous endoscopic gastrostomy (PEG) tube to supplement oral intake. Eating disorders are often an overlooked issue in individuals with IDD. The prevalence of diagnosable eating disorders is estimated to be between 6% and 42% (depending on criteria, methods, sample) for adults living in facilities and 19% for those living in the community¹⁵⁵; some may have multiple eating disorders^{156;157}. Detailed information about eating disorders and appropriate interventions are presented in the section “Feeding and Eating Disorders.” Optimal supervision of individuals with IDD with severe nutrition and dysphagia problems requires a support network linking care providers, the primary health care team, and the local hospital¹⁵⁸.

3.4.1.2 Communication Disorders

Communication disorders include problems related to speech, language, and auditory processing that may range from simple sound repetitions — such as stuttering — to an inability to use speech and language for communication (aphasia). It is estimated that 4% of the preschool population has a significant speech or language disorder and that 8% to 12% of schoolchildren have some form of speech or language impairment¹⁵⁹. Dysphagia (swallowing problems) has been reported to positively correlate with communication disorders^{160;161}. In these instances, the Registered Dietitian can work with the client to develop a nutritionally adequate and texture-appropriate meal plan. People with social communication disorder, defined as an impairment of use of language in social contexts, may socially isolate themselves, which can lead to depression and poor food intake. Nutrition interventions focusing on a balanced and adequate diet can help minimize the effects of poor diet.

3.4.1.3 Autism Spectrum Disorders

Autism spectrum disorders (ASD) are pervasive developmental disorders with the onset usually before 3 years of age. Individuals with ASDs usually have communication, social, and behavioural characteristics in common, with individual differences in levels of functioning¹⁶². In the DSM-5, ASD replaces the diagnoses of autistic disorder, Asperger's disorder, and pervasive developmental disorders not otherwise specified. Autism is recognized as the most common neurological disorder affecting children¹⁶³ and the prevalence of ASD is increasing worldwide^{164;165}. ASD may impact appetite, with increased needs being common. The diets of children with ASD may lack dairy, fibre, calcium, iron, and vitamins D and E¹⁶⁶. Some may respond to increased intake of omega-3 fats, especially docosahexaenoic acid (DHA), ranging from 1 g to 3 g per day. Gluten-free, casein-free diets are often advocated for ASD, but the current evidence is limited¹⁶⁷. The Body Ecology Diet, which proposes restoring and maintaining the inner ecology of the body by eliminating food products that could have disturbed the immune system, is also popular¹³¹, but again the evidence is limited. Some report that gastrointestinal problems are common and a referral to a Registered Dietitian should be made if this is contributing to poor food intake. Difficult feeding behaviours such as limited diet, dysfunctional feeding behaviour, and sensory sensitivities may affect food intake. In these instances, an occupational therapist or speech-language pathologist can assess for swallowing issues, oral motor development, and desensitization. Psychologists or behavioural consultants can assist with food phobias or entrenched behaviours; applied behavioural analysis is commonly used (see Section 5 for a detailed description). Many provincial governments provide funding to assist families with the cost of

purchasing autism intervention services (based on best practices) to promote their child's communication, social-emotional, academic, and functional life skills development. Dietary counselling from a Registered Dietitian is considered an eligible expense¹⁶⁸. Generally speaking, dietitian services are not largely utilized as treatment for autism. This may be due to a lack of awareness of the role of diet or the availability of specialized nutrition services.

3.4.1.4 Attention Deficit Hyperactivity Disorder

Attention deficit/hyperactivity disorder (ADHD) includes inattention (e.g., distractibility), hyperactivity, and/or impulsivity (e.g., fidgeting, excessive running, interrupting others). This condition can affect children and adults — up to 60% of those with ADHD are adults¹⁶⁹. There is a high overlap of ADHD with other conditions, including dyslexia (reading problems), dyspraxia (motor skill problems), and autism spectrum disorders. A challenge of working with people with ADHD is that they may have impaired ability to retain and use new information after counselling. Individuals with ADHD tend to have deficiencies of polyunsaturated fatty acids, zinc, magnesium, and iron. Serum ferritin and zinc levels may be low; supplementation of iron and zinc helps symptoms if there is deficiency^{170;171}. If the child is food sensitive, an additive-free diet (no food colours or preservatives) may improve symptoms¹⁷² but needs to be supervised by a Registered Dietitian to ensure adequacy. Though sugar is thought to cause hyperactivity, research suggests removal of this ingredient from the diet will not improve symptoms. The individual with ADHD should be checked for celiac disease and, if present, a gluten-free diet can improve behaviour¹⁷³. The ketogenic diet has been suggested for ADHD, but the available evidence is only based on animal experiments. Supplementation with magnesium

and iron therapies may help reduce ADHD severity¹⁷⁴. Some studies show lower levels of docosahexaenoic acid (DHA) and arachidonic acid (ARA) in children with hyperactivity¹³¹. For the person who is hyperactive during meals, behavioural management programs may be effective. Children with ADHD are often prescribed stimulants (e.g., methylphenidate or Ritalin) to improve the ability to concentrate. These medications have been shown to reduce growth in children (see Appendix C, Table 9). Height and weight should be monitored (measured at least twice a year) and dietary advice that focuses on consumption of adequate calories from a healthy balanced diet provided. Altering the times and dosages of stimulant medication and taking breaks from their use (e.g., during summer holidays) may help reduce effects on growth¹⁷⁵.

3.4.1.5 Learning Disorders

Learning disorders include difficulties in learning basic academic skills (e.g., reading, writing, arithmetic) that are not consistent with the person's age, educational opportunities, or intellectual abilities¹⁵². The conditions within this category include dyslexia, dyscalculia, and disorder of written expression. The small amount of literature available suggests that excess weight is more prevalent for those with learning disorders; females are more likely to be overweight than males, and the incidence of underweight is higher in men. Individuals with profound disabilities and complex feeding problems are at a greater risk of poor nutrition¹⁷⁶. Many people with learning disorders are unable to understand the written educational tools; targeted, individualized nutrition interventions are therefore needed¹⁷⁷. Best practices guidelines for nutritional care of adults with a learning disability in care settings are available to provide further guidance¹⁷⁷.

3.4.1.6 Motor Disorders

Motor disorders affect the ability to produce and control bodily movements. They include developmental coordination, stereotypic movement, Tourette's, chronic motor or vocal tic, and provisional tic disorder. Developmental coordination disorder includes motor performance that is below expected levels, given the person's age and previous opportunities for skill acquisition. The motor performance issues may include coordination problems, poor balance, clumsiness, dropping or bumping into things; delays in achieving developmental motor milestones (e.g., walking, crawling) or acquiring basic motor skills (e.g., throwing, running, jumping, printing). Stereotypic movement disorder includes repetitive, seemingly driven, and apparently purposeless motor behaviour (e.g., hand shaking or waving, body rocking, head banging). Tourette's, chronic motor, provisional tic, or vocal disorders include variations in frequencies of motor and vocal tics. A tic is a sudden, rapid, recurrent, nonrhythmic motor movement or vocalization. It is estimated that 1 out of 100 individuals may have tic disorders¹⁷⁶; these are commonly associated with attention deficit hyperactivity and obsessive-compulsive disorder¹⁷⁸. Children with developmental coordination disorder are more likely to be overweight than other children their age and this is thought to be due to not wanting to participate in sports¹⁷⁹.

For those with stereotypic movement disorders, the environment may need to be changed (e.g., types of utensils used at mealtimes) so that it is safer for individuals who may cause injury to themselves. For individuals with motor disorders, it is recommended that a thorough nutrition assessment be conducted, including analysis of the texture of foods. It can be difficult to engage such individuals in voluntary actions in daily life¹⁸⁰ and most find food to be highly

motivating¹⁸¹. Eating skills can be improved through use of a prompting and reinforcement strategy¹⁸² and guided eating¹⁸³.

3.4.2 Schizophrenia Spectrum and Other Psychotic Disorders

One in 100 Canadians has some form of schizophrenia spectrum or other psychotic disorder¹⁸⁴. The different types are described here.

3.4.2.1 Schizophrenia, Schizophreniform Disorder, and Schizotypal Personality Disorder

Schizophrenia includes a range of behaviours that affect not only the lives of people with the condition but also the lives of the people around them. Different subtypes are defined according to the most predominant characteristics at each point in time and a person may be diagnosed with different subtypes during their lifetime. The most common subtype is paranoid schizophrenia; others include disorganized, catatonic, undifferentiated, and residual schizophrenia¹⁵². Schizophreniform disorder includes the symptoms of schizophrenia (e.g., delusions, hallucinations, disorganized speech, or disorganized or catatonic behaviour); full development of the condition from symptom onset is rapid. The prevalence of schizophreniform disorder is equally distributed between the sexes, with peak onset between the ages of 18 and 24 years in men and 24 and 35 years in women¹⁸⁵. Individuals with schizotypal personality disorder have trouble with relationships and disturbances in thought patterns, appearance, beliefs, and behaviour. Schizotypal personality disorder differs from schizophrenia in that disconnection from reality and hallucinations usually do not occur. For people with schizotypal personality disorder, major depressive disorder or another

personality disorder (e.g., paranoid personality disorder) is common¹⁸⁶.

3.4.2.2 Psychotic, Delusional, and Schizoaffective Disorders, Attenuated Psychosis Syndrome, and Catatonic Disorders

Hallucinations are false perceptions and can be visual (seeing things that aren't there), auditory (hearing), olfactory (smelling), tactile (e.g., feeling sensations such as bugs crawling on the skin), or taste-related. Delusional disorder includes well-organized, logically consistent delusions, but no other psychotic symptoms¹⁵². Schizoaffective disorder is described as a mood disorder (e.g., major depressive or manic episode) combined with psychotic symptoms characteristic of schizophrenia¹⁵². Attenuated psychosis syndrome is a new category in the DSM-5 that reflects the observation that young people who eventually develop psychotic disorders first manifest less severe symptoms over many years. Therefore, early detection and treatment can prevent more serious consequences¹⁸⁷. Catatonic disorders include a range of behaviours from not speaking, moving, or responding to being overexcited or hyperactive, sometimes mimicking sounds (echolalia) or movements (echopraxia) around the individual. Occasionally, an individual may assume unusual body positions, limb movements, or facial contortions, sometimes resulting in a misdiagnosis of tardive dyskinesia. Some may need to spend time in a hospital so that their basic needs such as nutrition will be provided for until they are better.

Schizophrenia spectrum and other psychotic disorders are considered the most severe of the DSM-5 conditions. Adding to their complexity are the common physical and psychiatric comorbidities that occur, including metabolic syndrome, cardiovascular disease, chronic obstructive pulmonary disease,

Type II diabetes, tuberculosis, HIV, hepatitis B and C, periodontal disease¹⁸⁸⁻¹⁹⁰, anxiety, depression, post-traumatic stress disorder, obsessive-compulsive disorder¹⁹¹, and substance use^{192;193}. Some studies also suggest an elevated risk of lung and esophageal carcinomas related to smoking and alcohol consumption¹⁹¹. All of these comorbidities have nutritional implications.

Some research suggests that individuals with schizophrenia tend to have diets that are higher in energy and fat, and lower in fruits and vegetables, fibre, vitamin C, and beta-carotene^{194;195} compared with the diets of those without the condition. Investigations of lifestyle habits of individuals with schizophrenia indicated that those living in high-care settings (e.g., care staff present) consumed more fast food than those in low care (e.g., community settings). The dietary habits of individuals in both levels of care tended to be worse than the general population. In addition, although all people with schizophrenia in this study had seen a general practitioner in the previous year, few had received diabetes and lipid profile screening¹⁹⁶. These results suggest that people with schizophrenia do not improve their diet only with the provision of healthy food as was the case in high-care settings. In addition, secondary care services must address physical health monitoring and provide interventions to improve and sustain a healthy diet.

Treatment of schizophrenia spectrum and other psychotic disorders includes antipsychotic medications, psychotherapy, and social skills training. Nutritional interventions are usually related to symptoms (e.g., catatonia) or side effects of medications (e.g., weight gain associated with antipsychotics). Antipsychotic treatment is associated with metabolic side effects that include various degrees of weight gain, dyslipidemia, and susceptibility to Type II diabetes¹⁹⁷. Up to 70% of those taking antipsychotics

gain weight, sometimes as much as 31 kg in the course of clinical treatment. Clozapine and olanzapine may cause the most weight gain, whereas ziprasidone and aripiprazole the least. The prevalence of metabolic syndrome in a large sample clinical trial of individuals with schizophrenia was indicated to be 44%¹⁹⁸.

A system of metabolic monitoring (e.g., blood glucose, blood lipids, weight, waist circumference, diet, activity, blood pressure, tobacco use, and signs and symptoms of diabetes) is recommended for those taking antipsychotic medications. To address issues that arise from metabolic assessments, collaborations must occur among psychiatrists, primary care physicians, diabetes specialists, occupational therapists, dietitians, and activity recreation therapists¹⁹⁹. Some studies have suggested that an a priori increased risk of obesity²⁰⁰, impaired fasting glucose (while not taking drugs) and insulin resistance^{201;202} seems to be associated with the diagnosis of schizophrenia. This would suggest that people with schizophrenia would likely benefit from screening tests for impaired glucose tolerance and Type II diabetes for early detection and lifestyle interventions, including diet counseling, be provided as needed.

For individuals with hallucinations related to smell and taste, nutrition-related concerns include loss of pleasure from eating, which can lead to changes in weight and difficulty in avoiding health risks such as spoiled food²⁰³. Flavour enhancement of food may help make the food more enjoyable. In addition, people with taste dysfunction need to beware of overindulging in seasonings like sugar and salt to compensate for a lack of taste in food. Finally, those with altered taste and smell senses are advised to cook with measuring devices, including thermometers and timers, to avoid relying on aroma and taste to determine food quality and readiness²⁰⁴.

The prevalence of celiac disease in schizophrenia has been reported to be double that of the general population, suggesting that testing for this condition is warranted and, if confirmed, a gluten-free diet started²⁰⁵. Results of studies of omega-3 fatty acid supplementation in this population are not conclusive²⁰⁶.

3.4.3 Bipolar and Related Disorders

Bipolar disorders include a history of manic, mixed, or hypomanic episodes, usually with concurrent or previous history of one or more major depressive episodes. Mania is an abnormally elated mental state, typically characterized by feelings of euphoria, lack of inhibitions, racing thoughts, diminished need for sleep, talkativeness, risk taking, and irritability. In extreme cases, mania can induce hallucinations and other psychotic symptoms¹⁵². Bipolar disorders may be classified as bipolar I, bipolar II, or cyclothymia, depending on the severity of symptoms. The estimated lifetime prevalence of bipolar disorder indicates that over 500,000 Canadians likely have this condition²⁰⁷. Up to 65% of people with bipolar disorder meet the criteria for at least one comorbid mental health condition²⁰⁹; the most common include anxiety, substance use, attention deficit hyperactivity disorder (ADHD), and personality disorders. ADHD has a bidirectional relationship with bipolar disorder (ADHD occurs in up to 85% of children with bipolar disorder, and bipolar disorder occurs in up to 22% of children with ADHD)²⁰⁹. Suicidal behaviour in bipolar disorder is among the highest of any mental health condition²¹⁰.

The cyclical nature of bipolar disorder presents unique challenges for nutritional care. During mania, large amounts of sugar, caffeine, and food may be consumed or there may be periods of not eating. If the individual is in a controlled environment, measures

can be put into place to ensure healthy foods are available in order to prevent weight gain from overeating.

With mood instability, contact with health care providers may be infrequent^{211;212}, leading to increased risk of developing a chronic condition. Depressive episodes can lead to increased risk of cardiovascular disease through the effects of a sedentary lifestyle^{213;214}. Compared with those without a mental health condition, people with bipolar disorder are more likely to report poor exercise habits and suboptimal eating behaviours such as having fewer than two daily meals and having difficulty obtaining or cooking food²¹⁵. Antipsychotic medications are often prescribed as treatment for this condition, which contributes to weight gain and metabolic disturbance¹⁹⁷ as detailed in the previous section on the schizophrenia spectrum and other psychotic disorders. Celiac disease, which is associated with increased prevalence of depressive and disruptive behaviours, should be tested for²¹⁶. If the individual is taking lithium, caffeine-containing drinks such as tea and coffee should be minimized as they can reduce lithium levels. Selenium, folic acid (folate), omega-3 fatty acids, and tryptophan have all been implicated in keeping moods stable. A diet rich in these nutrients should be tried before considering supplements. Supplementation with 1 g to 3 g of omega-3 fatty acids (eicosapentaenoic acid and docosahexaenoic acid) daily may help with depressive episodes²¹⁷. If folate supplementation is warranted, it may mask a deficiency of vitamin B₁₂; therefore, supplementation with vitamin B₁₂ should also occur.

3.4.4 Depressive Disorders

Within the group of depressive disorders are chronic depressive (dysthymia), disruptive mood dysregulation, major depressive, and premenstrual dysphoric disorders. Depression is manifested by a combination of symptoms that interfere with the ability to work, study, sleep, eat, and enjoy pleasurable activities. Disabling episodes of depression commonly occur several times in a lifetime. Dysthymia involves long-term (two years or longer) less severe symptoms that keep one from functioning normally or from feeling good. Some forms of depressive disorder exhibit slightly different characteristics or they may develop under unique circumstances and include psychotic depression (depression accompanied by psychosis), postpartum depression (new mother develops a major depressive episode within one month of delivery), and seasonal affective disorder (onset of depression occurs during the winter months when there is less natural sunlight)²¹⁸. Canadian estimates of lifetime prevalence of major depression are 12.2%²¹⁹. Almost all chronic health conditions are associated with major depression, particularly those characterized by inflammation and pain.

Depression often leads to weight changes as appetite may increase or decrease. For some, overeating or comfort eating may occur and lead to weight gain. The tendency in this population to carry excess weight may be exacerbated by a preference for higher-calorie liquids and/or convenience foods as well as a sedentary lifestyle. Other individuals with depressive disorders may undereat due to feelings such as not being worthy enough to eat, lacking motivation or energy to prepare foods, or somatic delusions of not being able to eat. Reduced food intake leads to nutrient inadequacies and weight loss. Tube-feedings may be needed for those who refuse food. Total parenteral nutrition (TPN) is usually not

recommended as the TPN line may be used to inflict sepsis or other harm (e.g., suicide attempt). A well-balanced diet with protein/calorie supplementation as needed and structuring eating for mood stability throughout the day may help. Poor food hygiene (e.g., keeping refrigerated foods out at room temperature for prolonged periods) presents food safety risks so advice may be given to care providers to assist the person with keeping food safe. Because celiac disease is associated with an increased prevalence of depressive disorders, it is recommended that testing be done to rule it out. Finally, depressive disorders may coexist with an eating disorder, thereby requiring behavioural interventions to normalize eating.

Several studies have examined relationships among different nutrients and depression. Low intakes of omega-3 fatty acids, fruits, and vegetables, and high consumption of refined sugar and processed foods have been shown to increase the risk of depression²²⁰. Folate (with vitamin B₁₂) and omega-3 fatty acids (eicosapentaenoic and docosahexaenoic acid) supplementation may be beneficial as an adjunct treatment^{217;221}. Tryptophan is thought to be a factor in depression, but results of studies that have examined levels of this amino acid in depressed and non-depressed people have been conflicting. Observational studies suggest a relationship between depression and low vitamin B₆, vitamin B₁₂, and folate status^{222;223}. Much of the evidence regarding folate deficiency in mental health conditions is based on studies conducted before Canadian federal agencies mandated the requirement of folate fortification of all enriched grain products²²⁴. While these programs appear to have reduced the prevalence of neural tube defects²²⁵, their efficacy in reducing the prevalence of hypofolatemia in people with mental health conditions has not been evaluated. After folate fortification programs were introduced, many

laboratory protocols removed screening of folate status. However, evidence suggests that folate levels in mood disorders remain a concern²²⁶, including studies that suggest that some people with depression have a specific genotype that reduces blood levels of this nutrient²²⁷.

3.4.5 Anxiety Disorders

Anxiety disorders are a group of conditions in which anxiety and avoidance behaviour are prominent, including separation anxiety disorder, panic disorders, agoraphobia, specific phobias, social anxiety disorder (social phobia), and generalized anxiety disorder. Anxiety disorders affect 12% of the population, causing mild to severe impairment²²⁸. Separation anxiety disorder involves excessive anxiety when a child is, or is expecting, to be separated from home or a loved one (such as a parent or a caregiver)²²⁹. People with panic disorder first have some type of panic attack that activates the body's built-in alarm system, engages the survival ("fight or flight") response, and leads to a series of physical and cognitive symptoms (e.g., shortness of breath, dizziness, trembling, sweating, nausea, abdominal distress, depersonalization, hot flashes or chills, fear of dying, losing self-control, or feelings of imminent danger)²³⁰. After that initial experience, the individual worries about having other attacks and what it could do to them. Because of this, they usually avoid things that make them anxious. The avoidance behaviour is called agoraphobia. For instance, if a person has a panic attack at a grocery store they might be fearful of going shopping again. If they have another panic attack at the grocery store they might simply avoid going grocery shopping and instead order food by phone or via the Internet. A specific phobia is an unmanageable fear of specific objects, animals, or situations (e.g., flying, snakes, heights, doctors).

Social anxiety disorder or social phobia is the most common anxiety condition²³¹ and is described as being afraid of being appraised or judged negatively by others and, as a result, feeling embarrassed or humiliated. These fears are out of proportion to the actual situation. Symptoms may include blushing, sweating, rapid heart rate, dry mouth, and fear of losing track of a conversation. With generalized anxiety disorder, the individual experiences chronic and debilitating anxiety but does not necessarily experience panic attacks, or have phobias or obsessions; symptoms include feeling restless, difficulty concentrating, muscle tension, sleep difficulties, gastrointestinal discomfort, sweating, and feeling easily fatigued or irritable.

Two main types of treatment are effective with anxiety disorders: medications (e.g., antidepressants, benzodiazepines) and cognitive behaviour therapy. Like the depressive disorders, anxiety disorders may increase or decrease appetite, which in turn affects body weight. People with social anxiety disorder can become afraid of eating in front of anyone and therapeutic approaches may be needed to help the person overcome these fears. Currently, the evidence is inconclusive on omega-3 fatty acid supplements for anxiety disorders; however, individuals may respond to increased intake of omega-3 fats, through diet, to 3 g per day¹³¹.

3.4.6 Obsessive-Compulsive and Related Disorders

Obsessive-compulsive disorder (OCD) includes recurrent obsessions or compulsions that interfere significantly with personal or social functioning. Performing compulsive rituals may release tension temporarily, and resisting them causes tension. Individuals with body dysmorphic disorder (BDD) or "imagined ugliness" cannot stop thinking about a flaw

in their appearance; the flaw is either minor or imagined and usually concerns the skin (e.g., acne, scars, colour), hair (e.g., thinning, excess body hair), or nose (e.g., large, crooked). The person may spend a lot of time focusing on it by, for example, frequently picking at their skin, excessively checking their appearance in a mirror, hiding the flaw, comparing their appearance with that of others, or seeking reassurance from others about how they look.

Compulsive hoarding is now being considered as a separate condition and is described as persistent difficulty in discarding or parting with personal possessions, accumulating a large number of possessions that prevent normal use of personal areas (e.g., home, workplace), and distress or impairment in important areas of functioning (including maintaining a safe environment for self and others). It is estimated that compulsive hoarding occurs in 2% to 5% of the population and it can lead to public health issues²³².

Trichotillomania (TTM) is an irresistible urge to pull out hair from the scalp, eyebrows, or other areas of the body. Hair pulling from the scalp often leaves patchy bald spots which may be disguised. The prevalence of this condition is conservatively estimated at 1%²³³. TTM has also been linked with mood, anxiety, and substance use disorders²³³. Individuals with a skin picking disorder pick their skin repeatedly, which can cause sores severe enough to require surgery²³⁴. Common areas include the face, head, cuticles, back, arms, legs, hands, and feet. The skin may be picked with fingers or tools like tweezers or scissors, or bitten. Skin picking disorder occurs more frequently in women.

Oral manipulation of hair occurs in about 48%²³⁵ of those with TTM and can cause significant dental erosion. At least 5% of people with TTM ingest hair (trichophagy), which may result in the formation of hairballs, termed trichobezoars²³⁶, that lodge in the

gastrointestinal tract²³⁷ and lead to gastrointestinal obstruction, gut perforation, acute pancreatic necrosis, obstructive jaundice, hypochromic anemia, vitamin B₁₂ deficiency, and weight loss²³⁹, and require surgical removal. The goals of nutritional interventions for trichobezoars include optimizing nutritional status pre- and post-operatively.

For all of the obsessive-compulsive-related disorders, behavioural techniques and medications such as selective serotonin reuptake inhibitors, tricyclic antidepressants, antipsychotic medications, and mood stabilizers may be used. Habit-reversal therapy is effective for hair pulling and skin picking. In habit-reversal therapy, the person learns to be aware of the times, cues, and situations in which they pull their hair or pick their skin. They practise movements such as knitting that redirect their urges and receive social approval for their efforts to interrupt the hair pulling. With TTM and skin picking disorders, skin breakdown may occur and may require medical nutrition therapy for wound healing that includes:

- calories equal to 30 to 35 kilocalories per kilogram of body weight;
- 1.25–1.5 grams of protein per kilogram of body weight for positive nitrogen balance;
- 30 ml of fluid per kilogram of body weight to prevent dehydration; and
- a balanced diet that meets the Recommended Dietary Allowances for all nutrients.

Supplemental nutrition may be needed to meet these dietary requirements²³⁹. Those with OCD may avoid specific foods or food groups and, when they seek diet-related help, may want specific direction (e.g., “just tell me what to eat”) to lessen the stress that the daily activity of eating can induce. The Registered Dietitian can provide guidance for a balanced healthy diet while empowering them to make their own food decisions.

Natural health products for OCD may modulate key pathways involved in the pathogenesis of OCD (glutamatergic and serotonergic pathway dysregulation), and emerging clinical evidence appears to tentatively support the value of certain products with known active constituents which modulate these pathways: N-acetylcysteine, myo-inositol, glycine, and milk thistle (*Silybum marianum*). The serotonin precursor tryptophan is unlikely to be of use in treating OCD; 5-HTP may possibly be a more effective precursor strategy. However, there is currently no clinical evidence regarding the efficacy of either of these substances. Currently, the balance of evidence does not support the use of St. John's wort (*Hypericum perforatum*) in OCD²⁴³.

3.4.7 Trauma- and Stressor-Related Disorders

Trauma- and stressor-related disorders include conditions such as reactive attachment disorder, disinhibited social engagement disorder, post-traumatic stress disorder, acute stress disorder, or adjustment disorders. Reactive attachment disorder (RAD) is a rare condition where there are problems in emotional attachments to others, usually before the age of five. In the DSM-5, it is subdivided into reactive attachment disorder of infancy and early childhood and disinhibited social engagement disorder. Often, a parent brings a child to the doctor with concerns such as severe colic, feeding difficulties, failure to gain weight, unresponsive behaviour, preoccupied and/or defiant behaviour, hesitancy in social interactions, or inappropriate familiarity with strangers. Treatment involves close and ongoing collaboration between the child's family and a multidisciplinary team²⁴⁰.

Post-traumatic stress disorder (PTSD) develops following exposure to an extreme traumatic stressor involving direct personal experience of, witnessing, or

learning about a distressing event. Examples of such events include military combat, assault, kidnapping, hostage situations, terrorist attack, incarceration, disasters, accidents, abuse, and life-threatening illness. Approximately 40%-60% of people with PTSD have symptoms that become chronic and comorbidities such as major depression, anxiety, or substance abuse are common. Treatment involves pharmacological agents and psychosocial therapies that are sequenced and staged (early, middle, and late) to first control symptoms such as flashbacks, nightmares, and depression; treat comorbid conditions; and then explore the trauma extensively²⁴¹.

Acute stress disorder involves the development of severe anxiety, dissociative behaviour, and other symptoms after exposure to an extreme traumatic stressor. Individuals with acute stress disorder have a decrease in emotional responsiveness, often find it difficult to experience pleasure in previously enjoyable activities, frequently feel guilty about pursuing their usual life tasks, have difficulty concentrating, feel detached from their bodies, experience the world as unreal or dreamlike, or have increasing difficulty recalling specific details of the traumatic event (dissociative amnesia).

Adjustment disorder is an emotional and behavioural reaction that develops within three months of a life stressor (e.g., marital, financial, school problems) and that is stronger than would be expected for the type of event. Some of the symptoms include agitation, conduct disturbances, and depressed mood. Symptoms of adjustment disorder usually do not last longer than six months, unless the stressor continues to be present (e.g., illness or living in a dangerous neighbourhood). On occasion, symptoms can progress to thoughts of suicide.

The effects of trauma — such as sensory issues, hyperarousal, being easily startled, feelings of

numbness — can affect appetite and eating. Mealtimes may be associated with extreme stress if there has been a history of force-feeding with or without vomiting²⁴². The Registered Dietitian may incorporate a variety of therapeutic interventions (see Section 5), including elements of trauma-informed care, that can help to normalize eating. Nutritional guidelines that include a focus on foods rich in antioxidants such as vegetables, fruit, whole grains, beans, lentils, nuts, seeds, vegetable oils, garlic, and green tea may help counteract the effects of stress.

3.4.8 Dissociative Disorders

Dissociative disorders include sudden, temporary alterations in identity, memory, or consciousness, separating normally integrated memories or parts of the personality from one's dominant identity. Conditions within this group include depersonalization/derealization (Dp/Dr) disorder, dissociative amnesia, and dissociative identity disorder¹⁵². When an individual experiences depersonalization they feel detached, like an outside observer of their body. When someone experiences derealization they feel as if the world around them is unreal, dreamlike, distant, or distorted. DP/DR disorder commonly occurs with anxiety disorders and substance misuse²⁴⁴. Dissociative amnesia occurs when a person blocks out certain information, usually associated with a stressful or traumatic event, leaving him or her unable to remember important personal information. The memories still exist but are deeply buried and cannot be recalled. A person with dissociative identity disorder has two or more distinct personalities, each having unique memories, characteristic behaviour, and social relationships.

Dissociation can lead to overeating or undereating as hunger and satiety cues may be lacking, and it is believed that there is a relationship

between dissociation and eating disorders²⁴⁵. Food issues and dissociation can reinforce each other. Dissociation can aid the food problems and having problems with food can make an individual more vulnerable to dissociation. Therefore, a two-pronged approach — working on reducing the dissociation, and on understanding and resolving the drive behind the food issues — may facilitate change. It is thought that mindful eating interventions would benefit those with dissociation and food issues; however, specific studies are lacking.

3.4.9 Somatic Symptom Disorders

Somatic symptom disorders include somatic symptoms or concerns that are associated with significant distress and/or dysfunction. Somatic symptoms are the body's way of remembering some sort of behaviour or conditioning (e.g., a veteran may react abruptly to sounds that resemble gunfire)²⁴⁶. Some conditions within this group include complex somatic symptom disorder (CSSD), simple somatic symptom disorder, illness anxiety disorder, functional neurological disorder (conversion disorder), and factitious disorder. CSSD includes a combination of distressing symptoms and an excessive or maladaptive response to these symptoms or associated health concerns. Simple somatic symptom disorder is like CSSD but symptom duration is shorter. Illness anxiety disorder (hypochondriasis without somatic symptoms) includes high illness anxiety with minimal somatic symptoms. A person with functional neurological disorder (previously known as conversion disorder) may have blindness, paralysis, seizures, difficulty swallowing, or other nervous system symptoms that cannot be explained by medical evaluation. Individuals with factitious disorders may falsify, exaggerate, simulate, or induce medical and/or psychological impairment in themselves and/or

others. While a pre-existing medical condition may be present, deceptive behaviour may lead others to view such individuals as more impaired than they are.

Pseudocyesis is a false belief of being pregnant and is associated with objective signs of pregnancy (e.g., abdominal enlargement, weight gain, amenorrhea, nausea, breast secretions). This rare condition is considered a somatic symptom disorder not otherwise specified and is most commonly encountered in women, although there have been a few cases in men²⁴⁷. This condition illustrates the interaction between mind and body with complex involvement of cortical, hypothalamic, endocrine, and psychogenic factors. Proposed mechanisms for the pregnant appearance include the effect of stress on the hypothalamo-pituitary-adrenal axis, constipation, weight gain, and the movement of intestinal gas. The causes of weight gain in this condition may also be due to ingestion of large quantities of water²⁴⁸. There are no general recommendations regarding treatment with medications for this condition; some may be given medications to treat cessation of menstruation. A psychiatrist and gynecologist offer initial treatment with psychotherapy provided as follow-up. Some may need antipsychotics which present further indications for nutrition support that will prevent weight gain.

Somatic symptoms can have various effects on nutrition as they can impact a person's ability to eat, sleep, and function normally. Symptoms such as sore throats, poor appetite, sleeping problems, and abdominal pain may lead to self-imposed dietary restrictions and eating issues. In addition, the feedback loop between physical and mental symptoms adds to the complexity of treatment for individuals with somatic symptom disorders. For example, a person who has somatic symptoms of depression will experience loss of appetite and insomnia. These symptoms then affect the mind. A

person who has not slept well will find it difficult to perform at their personal best and will make poor food choices. Poor food intake contributes to fatigue which then affects a person's mood. Some people with somatic symptom disorders may have psychogenic dementia and disturbance of any of the senses which may also affect food intake. For example, those with functional neurological disorder might have symptoms associated with loss of senses and swallowing ability and may need assistance at mealtimes or texture-modified diets. Pain is often a primary somatic symptom that can prevent an individual from sleeping and eating properly. This has a negative impact on the person's immune system and ability to fight disease. Some findings suggest that people with functional neurological disorder may have possible immune dysfunction⁵³. For those with pseudocyesis, a plan for healthy weight loss may be needed if the weight gain is a concern and does not resolve after hormones are balanced. In summary, interventions used by a Registered Dietitians who work with individuals with somatic symptom disorders will depend on the symptoms presented and require skills that can integrate a nutrition care plan focusing on the physical and mental aspects of the condition.

3.4.10 Feeding and Eating Disorders

3.4.10.1 Eating Disorders

This group of conditions includes anorexia nervosa, bulimia nervosa, and binge eating disorder and is diagnosed based on psychological, behavioural, and physiologic characteristics²⁴⁹. Eating disorders have morbidity and mortality rates that are among the highest of any mental health condition²⁵⁰. In the past, binge eating disorder was classified as eating disorders not otherwise specified. For the DSM-5, it is likely that binge eating disorder will be considered a separate condition and in the eating disorders not

otherwise specified, descriptions of eating problems such as purging disorder and night eating syndrome may be included. Orthorexia nervosa, described as a condition that causes people to have a pathological obsession with eating an extremely pure and healthy diet which leads to important dietary restrictions, is gaining increased attention.

A Registered Dietitian may be the first to recognize an eating disorder²⁴⁹. Risk factors that precede eating disorders tend to be sex, ethnicity, early childhood eating and gastrointestinal problems, elevated weight and shape concerns, negative self-evaluation, sexual abuse and other traumas, and other psychiatric conditions such as depression. Athletes involved in sports where a lean physique is typical are also high risk.

Anorexia Nervosa

Anorexia nervosa (AN) involves the refusal by the individual to maintain a minimally normal body weight, intense fear of gaining weight, and exhibition of a significant disturbance in the perception of the shape or size of the body. The person maintains a body weight that is below a minimally healthy level for age and height (e.g., less than 85% of expected weight). Persons with this disorder may have an intense fear of weight gain, even when they are underweight. They may diet or exercise too much, or may use other methods to lose weight. Many factors contribute to the development of AN, including genes, hormones, and social attitudes. Risk factors for anorexia include trying to be perfect or overly focused on rules; being more worried about, or paying more attention to, weight and shape; having eating problems during infancy or early childhood; being overly

conscious of certain social or cultural ideas about health and beauty; having a negative self-image; and having an anxiety disorder as a child. AN usually begins during adolescence or young adulthood. It is more common in females, but may also be seen in males.

Although amenorrhea (i.e., loss of three consecutive menstrual cycles) is currently required for the diagnosis of AN, the importance of this symptom is unclear, and as such, the eating disorders workgroup of the DSM-5 has considered removing it as criterion²⁵¹. AN can be classified into two subtypes based on the DSM-IV-TR: the restricting subtype and the binge-eating/purging subtype. People with AN who rarely binge eat or purge but maintain a fairly regular pattern of caloric restriction may be classified as having the restricting subtype, whereas those who regularly engage in binge eating and/or compensatory behaviour to prevent weight gain will be diagnosed as having the binge-eating/purging subtype²⁵². Many of those with the restricting subtype will eventually develop binge eating, with at least one-third of people with AN restricting subtype crossing over into bulimia nervosa (BN)²⁵³. Crossover to binge eating and BN typically occurs within the first five years of the condition²⁵³. Women with AN who develop BN are likely to relapse back into AN²⁵³.

The outcomes associated with AN are poor as only 35% to 85% recover and recovery times range from 57 to 79 months²⁵⁴. AN is one of the most medically serious mental health conditions²⁵⁵ due to the physical consequences of severe weight

loss and psychological comorbid conditions that contribute to mortality. Suicides represent a large portion of the deaths from AN²⁵⁶. Depression, a consequence of poor caloric intake and low weight, is frequently comorbid with AN and often resolves with refeeding²⁵⁷. Anxiety symptoms are common and often precede the development of the condition²⁵⁸.

Nutrition interventions for AN require close monitoring and treatment as needed for dehydration, electrolyte disturbances, renal problems, cardiac compromise, and refeeding syndrome. Rapid development of hypophosphatemia during refeeding may lead to refeeding syndrome, characterized by rapid shifts in fluids and electrolytes, including hypomagnesemia, hypokalemia, gastric dilation, and severe edema. Although relatively rare, this syndrome may result in delirium, cardiac arrhythmia, coma, and death²⁵⁹. Gradual initial refeeding of the severely underweight person can help prevent refeeding syndrome.

The treatment goal for AN is to restore healthy body weight and eating habits. A weight gain of 0.5–1.5 kg per week is considered safe and may be achieved by increasing social activity, reducing physical activity, and using schedules for eating. Many individuals with AN start with a short hospital stay and continue to follow up with a day treatment program. A longer hospital stay may be needed if the person's weight is below 70% of their ideal body weight for their age and height. For severe and life-threatening malnutrition, the person may

need enteral feeding (tube-feed) or total parenteral nutrition (TPN).

Care providers who are usually involved in treatment programs for AN include nurse practitioners, physicians, dietitians, pharmacists and counsellors. Different types of therapy (see Section 5 for more details) are used to treat people with AN, including individual cognitive behavioural therapy, group therapy, and family therapy. Support groups may also be a part of treatment. Medications such as antidepressants, antipsychotics, and mood stabilizers may help when given as part of a complete treatment program.

Bulimia Nervosa

Bulimia nervosa (BN) is a condition in which a person binges on food or has regular episodes of overeating and feels a loss of control. The affected person then uses various purging methods, such as vomiting, laxatives, enemas, diuretics, or excessive exercise to prevent weight gain. Health professionals will encounter people with BN more often than those with AN, because BN has a higher prevalence (in women it ranges from 1.0% to 1.5%). However, often secretive and lacking obvious physical features such as emaciation, people with BN may avoid detection, with only a minority seeking treatment²⁶⁰. BN typically occurs in women aged 16–22 years; however, it may also occur in older persons. BN can be classified into two subtypes: the purging type, which is characterized by episodes of binge eating (an inordinately large amount of food in a short period of time, eaten in an out-of-control

fashion), followed by compensatory behaviour, such as self-induced vomiting, laxative abuse, and diuretic abuse; and the nonpurging type, which is characterized by excessive exercise, fasting, or strict diets²⁵². As with AN, people with BN may place undue emphasis on their body shape and live in fear of gaining weight²⁵². Currently, if binge eating and purging occur in the context of low weight and amenorrhea, AN is diagnosed. Although crossover from AN to BN is common, crossover from BN to AN is relatively rare unless the person was originally diagnosed as having AN²⁵³.

Many more women than men have BN. The affected person is usually aware that her eating pattern is abnormal and may feel fear or guilt with the binge-purge episodes. Signs of BN include cavities, gum infections, dental erosion, dry mouth, broken blood vessels in eyes (from strain of vomiting), pouch-like look to corners of mouth due to swollen salivary glands, rashes and pimples, small cuts and calluses across tops of finger joints from inducing vomiting, electrolyte imbalances, and dehydration. People with bulimia rarely have to go to the hospital, unless binge-purge cycles have led to anorexia, drugs are needed to help them stop purging, or major depression is present. Most often, a stepped approach is used. Support groups may be helpful. Cognitive-behavioural therapy and nutritional therapy are the preferred first treatments for bulimia that does not respond to support groups. Antidepressants may also be included as part of the treatment plan depending on individual need.

Binge Eating Disorder

For the DSM-5, binge eating disorder (BED) will be recognized as an independent diagnosis. BED is characterized by the consumption of large amounts of food in a two-hour period, accompanied by a perceived loss of control²⁵². Additional symptoms include feeling uncomfortably full, eating rapidly, eating alone, eating when not hungry, and feeling disgusted afterward²⁶¹. BED, or compulsive eating, is often triggered by chronic dieting and involves periods of overeating, often in secret and often carried out as a means of deriving comfort. Symptoms include periods of uncontrolled, impulsive, or continuous eating; sporadic fasts; or repetitive diets.

The prevalence of BED in community samples is 2% to 3%²⁶⁰ but is much higher in weight-management settings (30%) and among those who are severely obese (50%)²⁶². BED occurs in both men and women and affects many diverse populations and a broad age range (those aged 25–50 years)²⁶⁰. Like people with BN, those with BED have distorted attitudes about eating, shape, and weight, as well as mood symptoms such as depression and personality disorders. The disorder affects about 2% of the general population and 8% of people who have excess weight²⁶⁰. Because BED involves both weight and eating-disorder concerns, researchers and professionals in both the obesity and eating disorders fields perceive treatment goals differently. Eating disorders experts believe binge eating is best treated by traditional approaches, such as helping people reduce or eliminate bingeing,

improve self-esteem and body acceptance, and treat underlying psychological problems such as depression and anxiety. Obesity experts believe that tackling psychological problems without addressing excess weight is not helpful. BED often presents in people seeking weight-loss surgery and is a contraindication for these interventions. The Registered Dietitian should screen for disordered eating and treat as needed. If a BED is present, a discussion with the person about challenges of having BED and need for lifestyle changes pre- and post-surgery will be required²⁴⁹.

3.4.10.2 Nutritional Interventions for Anorexia Nervosa, Bulimia Nervosa, and Binge Eating Disorder

Nutritional care as part of a multidisciplinary team approach is important in the treatment of eating disorders. A variety of counselling techniques are utilized (see Section 5) to treat these disorders and often include aspects of cognitive behavioural therapy, dialectical behavioural therapy, motivational interviewing, and mindfulness. Antecedents of food behaviours are explored and nutrition intervention supports experimentation with new behaviours and adoption of healthy eating patterns^{249;263}. Eating disorders are often found with conditions such as depression, anxiety, body dysmorphic disorder, chemical dependency, or personality disorders which require additional counselling skills²⁶⁴.

Treatment by a Registered Dietitian addresses various aspects of eating pathology and focuses on interruption of symptoms, refeeding, correction of nutrient deficiencies and electrolyte imbalances, normalization of eating, weight restoration, regulation of hunger and satiety cues, and addressing drug-

nutrient interactions. Psychoeducation is provided on topics such as set-point weight, hydration and nutrient needs, cognitive distortions about food and weight, social eating, metabolism, and physiological risks of problematic coping behaviours such as purging, excessive exercise, and substance abuse. Therapies such as yoga and stress management may lead to alternative thoughts and behaviours to reduce food preoccupation, mealtime anxiety, and disorders related to food^{265;266}. Tele- or Internet- health care can offer potential sources for help for individuals with bulimia nervosa and binge eating disorders²⁴⁹.

3.4.10.3 Eating Disorder Not Otherwise Specified and Night Eating Syndrome

Most people presenting to clinical settings have an eating disorder not otherwise specified (EDNOS), a category designated in the DSM for eating disorders of clinical severity that fall outside the diagnostic criteria of the other eating disorders²⁶⁷. For example, EDNOS would be the formal diagnostic label to identify night eating syndrome (NES). Other examples of EDNOS include females who meet all criteria for AN but who continue to menstruate, people who meet all criteria for BN but with less than twice-weekly frequency of binge eating, or people of normal weight who use compensatory behaviours after ingesting small amounts of food²⁵². Failure to meet the criteria for AN or BN does not rule out the existence of an eating disorder. In fact, those with EDNOS have been found to have a high level of symptoms comparable to that of people with AN and BN²⁶⁷.

Night eating syndrome (NES) was initially described by Stunkard et al.²⁶⁸ as early as the 1950s as a syndrome consisting of morning anorexia, evening hyperphagia, and insomnia. Prevalence rates increase with increasing adiposity and have been estimated at 1.5%–5.2% in the general population,

6%–14% in people seeking outpatient treatment for obesity, and 8%–42% in people seeking bariatric surgery^{269,270}. Typically viewed as a long-term circadian shift in eating behaviours, NES may be exacerbated by stress²⁷¹. People with NES typically engage in more frequent eating episodes (9.3 versus 4.2 in 24 hours), consume a larger percentage of their daily calories between 8 pm and 6 am, and experience more frequent nighttime awakenings²⁷². However, their overall caloric intake does not differ from that of controls. They tend toward carbohydrate-rich nighttime snacks with a high carbohydrate-to-protein ratio (7:1)²⁷². Up to 40% of night eaters may engage in binge-eating episodes, especially in obesity treatment-seeking populations, although comorbidity for both clinical disorders is relatively low in the general population²⁶⁹.

The primary physical complications related to NES are obesity or limited ability to lose weight. For those suspected to have NES, questions about nighttime eating behaviours should be asked. Assessment should focus on evening hyperphagia and/or nocturnal ingestions (occurring after the evening meal), initial insomnia, and awakenings from sleep. Combined with initial insomnia, ingestion of 25%–50% of daily caloric intake after the evening meal would most likely signify an NES²⁷⁰. Registered Dietitians can work with the individual to encourage regular meal consumption earlier in the day, emphasizing a shift in timing of caloric intake overall and increased protein intake.

3.4.10.4 Feeding Disorders

Pica

Pica is defined by DSM-IV-TR (2000) as: (a) consumption of non-nutritive substances for more than one month, (b) consumption of non-nutritive items inappropriate to

developmental age, (c) eating that is not part of a culturally sanctioned activity, (d) behaviour that is severe enough to require independent clinical attention during the course of another disorder. The DSM-5 includes notation that pica can be diagnosed at any age²⁷³. Examples of non-food items consumed include ashes, balloons, burnt matches, chalk, cigarette butts, clay, cloth, crayons, detergent, dirt, feces, fuzz, grass, ice from freezer/ice cubes, insects, lavatory fresheners, metal, newsprint, paint chips, paper, plant leaves, pencil erasers, plastic, baby powder, powder puffs, sand, soap, starch, string/thread, toilet tissue, and twigs. Food-related items of pica include baking soda, chewing gum, cocoa leaves, coffee grounds, oyster shells, and tomato seeds.

Although pica behaviour has been described for centuries, the true cause is not known. Nutritional, sensory, physiological, neuropsychiatric, cultural, or psychosocial perspectives²⁷⁴ offer different explanations. Nutritional theories support the attribution of pica to mineral deficiencies, especially iron and zinc. The sensory and physiological theories relate to the finding that many people with pica state that they enjoy the taste, texture, or smell of the items they are eating. Geophagia has been used to alleviate nausea and provide satiety²⁷⁴. Addictive behaviours have been postulated as in some individuals pica continued even after the mineral deficit was resolved. However, this may be a learned behaviour pattern rather than an addiction. To support the neuropsychiatric theories, some evidence has shown that pica may be part of the

obsessive-compulsive disorder spectrum; case reports describe the pica as ritualistic behaviours that resulted in a relief of tension²⁷⁵.

The prevalence of pica is unknown although it is most commonly associated with those of low socioeconomic status, with iron-deficiency anemia, and in dementia, psychosis, autism, compulsive spectrum disorders, or with intellectual disabilities²⁷⁶. It has been noted in 8.1% of pregnant African-American women in the United States²⁷⁷ and 8.8% of pregnant women in Saudi Arabia^{274;278}. Katsoufis et al.²⁷⁹ found pica in 46% of the 86 children undergoing pediatric dialysis.

Diagnosis of pica may be challenging as the person may be too embarrassed to report these behaviours or they may not think they are noteworthy. Toxicity symptoms such as from lead²⁸⁰ may occur due to the ingestion of non-food items and precautions need to be taken to limit accessibility to items, especially potentially harmful substances.

Complications of pica include heavy metal poisoning, hyperkalemia, nutrient deficiencies (e.g., iron, zinc), obstructions resulting in perforations or peritonitis, excess caloric intake (e.g., from eating starch), failure to thrive, achlorhydria, dental injury, or parasitic infestations²⁷⁴. The formation of bezoars has been associated with pica²⁸⁰. Bezoars (also described in Section 3.8.6.2) are an agglomeration of food or foreign material in the intestinal tract. They can be classified by their content as trichobezoar (hair) or phytobezoar (plant material), but may fall into a miscellaneous category

including fungal agglomerations, food boluses, chemical concretions, and foreign bodies. Common complications are abdominal pain, intestinal obstruction, weight loss, vomiting, ulcers, perforation, invagination of the intestine²⁸², cholestasis, malnutrition, and protein-losing gastroenteropathy²⁸³. Trichobezoars require surgery; pre- and post-operative nutritional interventions will optimize health.

Current treatments aim to decrease pica by: 1) bringing the eating under appropriate stimulus control (i.e., reinforcing and allowing eating of appropriate food based on its location); 2) providing alternative and competing sources of stimulation (i.e., noncontingent or contingent access to food); and/ or 3) establishing alternative responses (such as discarding items) once potential pica materials are contacted²⁷⁶. Behavioural approaches that combine reinforcement and response reduction are effective in reducing pica for those with intellectual disabilities²⁷⁶. A referral for mental health consultation to construct multi-component interventions may be needed for more severe pica.

Rumination Disorder

Rumination disorders involve repeated regurgitation of food over a period of at least one month. Regurgitated food may be re-chewed, re-swallowed, or spit out¹⁵². Rumination, regurgitation, and psychogenic vomiting are common in people with an intellectual disability, males, and individuals with autism. The social, nutritional, and physical consequences include social withdrawal, halitosis, lethargy, malnutrition,

dehydration, electrolyte abnormalities, anemia, renal damage, dental erosion, and aspiration pneumonia²⁸⁴. There is evidence for the effectiveness of dietary and behavioural treatments including fading food consistency, food satiation, differential reinforcement, overcorrection, and, as a last resort, aversive approaches such as lemon juice¹⁵⁵. In a case study of habit reversal to treat rumination by a child²⁸⁵, diaphragmatic breathing procedures implemented immediately following meals eliminated rumination, per self-monitoring and parent smelling child's breath for the presence or absence of rumination after meals.

Avoidant/Restrictive Food Intake Disorder

Avoidant/restrictive food intake disorder (ARFID) is defined as an eating or feeding disturbance (i.e., limited to apparent lack of interest in eating, avoidance based on the sensory characteristics of food (e.g., texture, taste, or colour), or concern about adverse consequences of eating) that leads to persistent failure to meet appropriate nutritional and/or energy needs.

ARFID is associated with significant weight loss (or failure to gain weight or faltering growth in children), nutritional deficiency, dependence on enteral feeding, or marked interference with psychosocial functioning. ARFID is being recommended as a new eating disorder for DSM-5 and would replace and expand "feeding disorder of infancy or early childhood" to reflect the fact that the problem can occur across a range of ages. Unpublished data suggest 10%–15% of adolescents being treated for eating

disorders meet criteria for ARFID¹⁵². Nutritional interventions for AFRID would require that of a Registered Dietitian specially trained in eating disorders as part of a multidisciplinary team. People with ARFID do not have an intense fear of gaining weight or getting fat, but the behaviour can become so severe, they may need tube-feeding.

3.4.11 Elimination Disorders

The elimination disorders include encopresis and enuresis¹⁵². Encopresis, also called fecal incontinence, involves repeatedly having bowel movements in inappropriate places after the age when bowel control is normally expected. Enuresis, commonly called bed-wetting, involves the release of urine into bedding, clothing, or other inappropriate places. These conditions can occur during the day or at night, may be voluntary or involuntary, and may occur together. Primary enuresis occurs when a child has never established bladder control and may be related to malformations of the urinary system, developmental delays, hormonal imbalances, genetics, or psychological stressors. Children with voluntary elimination disorders are treated for the underlying psychiatric issue using behaviour modification, drugs, and other psychiatric interventions. Encopresis is treated by instituting regular bowel evacuation patterns with stool softeners or laxatives; a high-fibre diet with fluids may be helpful in these instances.

3.4.12 Sleep-Wake Disorders

Sleep-wake disorders are chronic disturbances in the quantity or quality of sleep that interfere with a person's ability to function normally¹⁵². They are categorized as either dyssomnias or parasomnias. Dyssomnias pertain to the amount, quality, or timing of sleep, whereas parasomnias are related to abnormal behavioural or physiological events that occur while sleeping. Dyssomnias include primary insomnia (difficulty getting to sleep or staying asleep), primary hypersomnia (excessive sleepiness), breathing-related sleep disorder, circadian rhythm sleep disorder (environmental disruptions to an individual's internal 24-hour-clock that affect sleep patterns), and narcolepsy (sudden attacks of REM sleep during waking hours).

3.4.12.1 Insomnia Disorder

A person with insomnia disorder is dissatisfied with sleep quantity or quality. For primary hypersomnia/narcolepsy without cataplexy, the predominant complaint is unexplained hypersomnia or/and hypersomnolence (sleepiness in spite of sufficient nocturnal sleep). A recent double-blind, placebo-controlled clinical trial examined whether nightly administration of melatonin and mineral supplements improved primary insomnia in long-term care facility residents (78.3 ± 3.9 years). The sample included 43 participants with primary insomnia, half received food supplements (5 mg melatonin, 225 mg magnesium, and 11.25 mg zinc, mixed with 100 g of pear pulp) and half received a placebo (100 g pear pulp), every day for eight weeks, one hour before bedtime.²⁸⁶ Measures of sleep quality and total sleep time indicated the food supplement group had considerably better overall sleep quality. However, more research is needed to determine the generalizability of the findings.

3.4.12.2 Kleine Levin Syndrome

Kleine Levin Syndrome (KLS) is rare and includes recurrent episodes of hypersomnia and varying degrees of behavioural or cognitive disturbances, compulsive eating behaviour, and hypersexuality²⁸⁷. The disease predominantly affects adolescent males. A person with KLS has recurrent episodes of severe hypersomnia (2–31 days) plus one or more associated features: cognitive abnormalities such as a feeling of unreality, confusion, hallucinations; abnormal behaviour such as irritability, aggression, behaviour that is out of character for the individual, binge eating, or hypersexuality. The symptoms are interspersed with long periods of normal sleep, cognition, behaviour, and mood. Food cravings and megaphagia are elements of a KLS episode. During an episode, about 75% of individuals will eat large amounts of all foods presented to them, with a preference for sweets and atypical foods. Increased food intake can be "three times the usual diet" or "six to eight meals a day" and lead to weight gains of 3–14 kg^{288;289}. Management for KLS is mainly supportive with attention to skin, bowels, bladder, and nutrition during phases of impaired consciousness and withdrawal²⁹⁰. Some may take stimulants for sleepiness²⁹¹ or lithium. Dietitians, in collaboration with a multidisciplinary team, can help in the treatment of KLS by controlling eating environments during episodes to maximize healthy food choices and prevent unnecessary weight gain.

3.4.12.3 Narcolepsy/Hypocretin Deficiency

Narcolepsy/hypocretin deficiency symptoms include recurrent daytime naps or lapses into sleep as well the presence of: 1) cataplexy or brief (few seconds to two minutes) episodes of sudden bilateral loss of muscle tone with maintained consciousness; and/or 2) hypocretin deficiency, as measured using cerebrospinal fluid measurements. Hypocretin is a neurotransmitter that regulates sleep and appetite²⁹². Many people with narcolepsy experience additional symptoms, including cataplexy, hallucinations and other unusual perceptual phenomena, and sleep paralysis, an inability to move for several minutes upon awakening. Parasomnias include nightmare, sleep terror, and sleepwalking disorders. Features of parasomnias can include bruxism (teeth grinding) and enuresis (bed-wetting).

Studies reported that some people with narcolepsy have excess weight but whether this is because they eat more is a matter of debate^{293;296}. Some studies suggest both lower basal metabolism and subtle changes in eating behaviour lead to positive energy balance and weight gain²⁹⁷. In a pilot study of 13 people with narcolepsy (7 “typical” people with cataplexy and suspected hypocretin deficiency; and 6 people with “atypical” narcolepsy that were HLA negative or without cataplexy), and 9 healthy controls matched for age, sex, and ethnicity, results showed that those with narcolepsy had excess weight and lower basal metabolism. Only participants with “typical” narcolepsy tended to eat less than the controls. Plasma glucose, cortisol, thyroid, and sex hormone levels did not differ between groups, while prolactin levels were twice as high in participants with narcolepsy. People with narcolepsy also had more frequent features of bulimia nervosa (independent of depression) suggesting a mild eating disorder²⁹⁷.

Other research has also suggested that binge eating occurs in people with narcolepsy²⁹⁸.

Eating carbohydrates is thought to aggravate sleepiness in people with narcolepsy. A small study that examined the effect of a low-carbohydrate, high-protein, high-fat diet (the Atkins Diet) over eight weeks on daytime sleepiness in people with narcolepsy found some improvement (18%) on the Narcolepsy Symptoms Severity Questionnaire²⁹⁹. However, this type of diet could promote the development of osteoporosis, kidney stones, or other problems. Medications such as clonazepam and carbamazepine, which have nutrition-related side effects, may be used in the treatment of parasomnias.

3.4.12.4 Obstructive Sleep Apnea Hypopnea Syndrome

Obstructive sleep apnea hypopnea syndrome (OSAHS) symptoms include snoring, snorting/gasping or breathing pauses during sleep and/or symptoms of daytime sleepiness, fatigue, or unrefreshing sleep despite sufficient opportunities to sleep. OSAHS often coexists with other conditions such as obesity, metabolic syndrome, cardiovascular conditions, Type II diabetes, and nonalcoholic fatty liver disease.

Since obesity is common in OSAHS, nutrition might play an independent role in the modulation and development of the condition. Current treatment of OSAHS is based on weight reduction and continuous positive airway pressure (CPAP). Bariatric surgery is a measure that significantly ameliorates OSAHS in people who are morbidly obese, but its indications remain limited³⁰⁰. Specific nutritional supplements have been proposed for the modulation of oxidative and inflammatory aspects of OSAHS, mostly with inconclusive results³⁰¹. A diet rich in pro-oxidants and limited in antioxidants can exacerbate the tissue injury typical of OSAHS, thus contributing to cognitive

decline³⁰². A diet study of military veterans with and without OSAHS found significantly lower intakes of antioxidants (vitamin E, folate, vitamin C) among in the OSAHS group³⁰³. Management of OSAHS remains centred on weight reduction and CPAP, with nutritional supplements as an adjuvant treatment.

3.4.12.5 Primary Central Sleep Apnea, Primary Alveolar Hypoventilation, and Circadian Rhythm Sleep Disorder

Primary central sleep apnea includes excessive daytime sleepiness, frequent arousals and awakenings during sleep or insomnia complaints, and awakening short of breath. With primary alveolar hypoventilation, a person does not take enough breaths per minute, symptoms are usually worse during sleep, and periods of apnea are usually present¹⁵². Circadian rhythm sleep disorder is a persistent or recurring pattern of sleep disruption resulting in alterations in internal sleep- and wake-related rhythms over a 24-hour period. The sleep disruption leads to insomnia or excessive sleepiness during the day, resulting in impaired functioning. The circadian clock is “set” primarily by visual cues of light and darkness that are communicated along a pathway from the eyes to the suprachiasmatic nucleus (SCN). Time cues, known as zeitgebers, include meal and exercise schedules and can affect circadian rhythms.

Treatment for this group of disorders can involve lifestyle changes such as regular eating, sleeping, waking, and exercising, which can all keep the biological clock in rhythm. Recommendations for dietary therapy to treat circadian rhythm sleep disorder include eating protein as part of the morning meal, snack, and lunch, and consuming most carbohydrates in the evening. Other suggestions include consuming coffee, tea, or any other stimulant at circadian-neutral times (i.e., around 4 pm)³⁰⁴.

3.4.12.6 Disorder of Arousal, Nightmare Disorder, Rapid Eye Movement Behaviour Disorder, Restless Legs Syndrome, and Substance-Induced Sleep Disorder

Arousal disorders are parasomnia disorders likely due to abnormal arousal mechanisms. The “classical” arousal disorders are sleepwalking (somnambulism), sleep terrors, and confusional arousals. Nightmare disorder includes repeated events of extended, extremely dysphoric and well-remembered dreams involving efforts to avoid threats to survival, security, or physical integrity. On awakening, the person rapidly becomes oriented and alert. The dream experience causes significant distress or impairment¹⁵². With rapid eye movement behaviour disorder there are repeated episodes of arousal during sleep associated with vocalization and/or complex motor behaviours which may result in injury to the individual or bed partner. These behaviours arise during REM sleep and therefore usually occur more than 90 minutes after sleep onset. Upon awakening, the individual is completely awake, alert, and not confused or disoriented. Rapid eye movement behaviour disorder may precede the development of neurodegenerative diseases such as Parkinson’s disease³⁰⁵. Restless legs syndrome is a night-time neurological disorder, with throbbing, pulling, creeping, unpleasant sensations in the legs and an uncontrollable urge to move them³⁰⁶.

Treatment of these conditions include good sleep hygiene and lifestyle changes/activities that may reduce symptoms, include avoiding caffeine (in beverages, chocolate, appetite suppressants); heavy, spicy, or sugary foods; alcohol; and tobacco from 4 to 6 hours before bedtime. Vitamin and mineral supplements may be needed to correct deficiencies (e.g., iron, folate, and magnesium). A light snack before bed, such as warm milk and foods high in the amino acid tryptophan, may help with sleep³⁰⁷.

3.4.13 Sexual Dysfunctions

Sexual dysfunctions cover a wide variety of conditions, including erectile dysfunction, premature or delayed ejaculation, vaginal spasms, pain during intercourse, and problems with sexual desire (libido) and response (e.g., orgasm) that lead to marked distress or interpersonal difficulty³⁰⁸. Modifiable health behaviours, including physical activity and weight, are associated with a reduced risk for erectile dysfunction (ED) among men. Obesity and metabolic syndrome may be a risk factor for ED as abnormalities of the vasodilator system of penile arteries play a role in ED. Men with ED may regain their sexual activity by adopting certain health behaviours, including a Mediterranean-style diet and regular exercise³⁰⁹. In a study of sexual function in sexually active premenopausal women with hyperlipidemia, but without cardiovascular disease, compared with an age- and smoking status-matched female population without hyperlipidemia, lower mean global Female Sexual Function Index (FSFI) scores for women with hyperlipidemia were observed. Further analyses identified age, body mass index, HDL cholesterol, and triglycerides as independent predictors of an FSFI score³¹⁰. A variety of supplements have been suggested for these conditions, including vitamin C, vitamin E, zinc, essential fatty acids, and B-complex vitamins, which are thought to increase blood flow and libido. However, the research is inconclusive.

3.4.14 Disruptive, Impulse Control, and Conduct Disorders

The disruptive, impulse control, and conduct disorders include oppositional defiant disorder, pyromania, kleptomania, intermittent explosive disorder, conduct disorder, and dyssocial personality disorder. Typically, people with these conditions feel some type of increasing anxiety before committing the action, like

pressure building up. After the action, they feel relief, despite dangerous consequences¹⁵². People with impulse control disorders often have other problems such as substance use, depression, bipolar disorder, obsessive-compulsive disorder, panic disorder, bulimia, phobias, post-traumatic stress disorder, and antisocial personality problems³¹¹⁻³¹³.

Oppositional defiant disorder includes a persistent pattern of angry and irritable mood along with defiant and vindictive behaviour. Pyromania is the repeated act of deliberately setting fires, usually at random locations, after which the person feels relieved or excited. A person with kleptomania steals things that are of no financial or personal value. Intermittent explosive disorder may be described as sudden and unexpected lashing out at other people in a very hostile way. People with conduct disorder exhibit patterns of conduct that are not generally acceptable (e.g., aggression, lying, vandalism, defiance, truancy, stealing) and tend to have increased rates of criminal convictions, substance abuse, and other psychological problems in their late adolescence and early adult life. In preschool children, this may be defined as oppositional defiant disorder, while in early adolescence it is often called conduct disorder³¹⁴. Features of antisocial personality disorder (dyssocial personality disorder) are impairments in personality functioning (self and interpersonal), and the presence of pathological personality traits. Impairments in self-functioning include those of identity (e.g., ego-centrism; self-esteem derived from personal gain, power, or pleasure) or self-direction (e.g., goal setting based on personal gratification; absence of prosocial internal standards). Impairments in interpersonal functioning include those of empathy or intimacy. Pathological personality traits occur in the domains of antagonism (e.g., manipulative, deceitful,

hostile) and disinhibition (e.g., irresponsibility, impulsivity, risk taking).

The research on treatments for disruptive, impulse control, and conduct disorders has largely focused on the use of cognitive behavioural therapy and on medications. Antidepressants have often been used to treat kleptomania³¹⁵ and intermittent explosive disorder³¹⁶. A randomized, placebo-controlled trial of a multinutrient supplement in a prison setting showed significantly lowered antisocial and violent behaviour³¹⁷. However, it may be questionable to generalize these results to non-prison contexts and disruptive, impulse control, and conduct disorders. It has been suggested that dietary trans fatty acids (dTFA) may be associated with aggression. Use of clinical trial data that include baseline dietary (dietary survey) and behavioural (i.e., Overt Aggression Scale, Life History of Aggression, Conflict Tactics Scale, self-rated impatience and irritability) assessment of 945 men and women indicated dTFA were associated with greater aggression³¹⁸. In these observational studies, confounding is a concern and roles of natural vs synthetic dTFA were not separated.

3.4.15 Substance Use and Addictive Disorders

Substance use and addictive disorders are associated with a host of health and social problems. Disorders in this category fall within substance use disorders, substance intoxication, and substance withdrawal classifications. Problems identified with the DSM-IV division of abuse and dependence led to studies of the structure of abuse and dependence in a variety of general population and clinical settings. This section begins with substance use disorders, intoxication, and withdrawal. The effects of various substances of abuse are highlighted and nutritional implications are detailed. Finally, gambling disorders are discussed.

3.4.15.1 Substance Use Disorders, Intoxication, and Withdrawal

The substance use disorders include conditions usually defined by the type of substance used (e.g., alcohol, illicit drugs, misuse of prescription or over-the-counter medications, tobacco). Substance use disorders generally include a maladaptive pattern of substance use leading to significant impairment or distress, tolerance (e.g., increased need for the substance to achieve the same effects), and withdrawal. Characteristics of intoxication include recent use of the substance with clinically significant problematic behavioural or psychological changes (e.g., impaired motor coordination, euphoria, anxiety, sensation of slowed time, impaired judgment, social withdrawal) that developed during, or shortly after use. Unlike substance use disorders, substance intoxication excludes tobacco use and includes caffeine intoxication.

Caffeine intoxication includes recent consumption of caffeine, usually in excess of 250 mg (e.g., more than two to three cups of brewed coffee) and symptoms such as restlessness, nervousness, excitement, insomnia, diuresis, gastrointestinal disturbance, muscle twitching, rambling flow of thought and speech, tachycardia or cardiac arrhythmia, or psychomotor agitation. Approximately half of the reported cases of caffeine intoxication occur among adolescents³¹⁹. Generally speaking, substance withdrawal entails cessation of (or reduction in) use of the substance after heavy and prolonged use and brings with it a wide variety of negative symptoms ranging from nausea to seizures. Substance withdrawal applies to all substances listed under substance use disorders and include caffeine.

3.4.15.2 *Substances of Abuse and Their Effects*

The nutritional impacts of substance use disorders largely depend on the substances used, as well as the amounts and length of time used. In Appendix D (Table 11), the various classes of drugs that may be abused are outlined, along with their effects. In addition, herbal products as potential substances of abuse are included.

Canada's *Controlled Drugs and Substances Act* regulates hallucinogens, depressants, stimulants, and anabolic steroids. With the exception of anabolic steroids, controlled substances may be abused to alter mood, thought, and feelings. Drugs are distinguished by their effect on the central nervous system (depressants or stimulants), by their primary ingredient (e.g., poppy plant for opioids), or how they are used (e.g., inhalants). Individual drugs within a class can have differing medical uses, effect duration, or methods of ingestion. However, drugs within a particular class typically share similar effects, overdose risk, and withdrawal symptoms. Although considered a hallucinogen, the prevalence and unique features of cannabis are outlined in a separate section (Table 11). Inhalants are abused drugs but, due to their widespread use for a number of legitimate purposes, are not controlled substances.

For adult Canadians, the drug of choice (80% report consumption) is alcohol. Cannabis is the most widely used illicit drug followed by, in order of consumption rates, LSD or hallucinogens, cocaine and crack, speed, and heroin. In Canada, tobacco is the leading preventable cause of death³²⁰. Substance use is frequently concurrent with a mental health condition³²¹; concurrent disorders are discussed later in this section.

The effects of the various substances lead to primary and/or secondary malnutrition. Primary malnutrition occurs when essential dietary nutrients

are displaced by the caloric content of alcoholic beverages or because of associated medical disorders. Secondary malnutrition might be the result of impaired digestion, absorption, and/or metabolism of nutrients caused by gastrointestinal complications; damage to the pancreas, liver, and kidneys; bone marrow changes; and hormonal alterations³²². Nutritional problems in the central nervous system and brain are secondary to liver impairment. The alterations in the central nervous system appear to be mainly the result of thiamin deficiency. Weight loss is common, resulting from decreased food consumption and/or the effects of alcohol on the body. Decreased food consumption might also be due to intake of caffeine-containing beverages and smoking tobacco³²³.

The abuse of substances is associated with deficiencies of many nutrients, including thiamin; niacin; folate; pantothenic acid; biotin; vitamins B₆, B₁₂, C, A, D, E, and K; zinc; calcium; magnesium; iron; potassium; and selenium; and imbalances in amino acid storage and protein synthesis¹⁴⁹. Zinc deficiency results in a loss of sense of taste and decreased sense of smell, which in turn impacts food consumption. Viral hepatitis resulting from poor nutritional status results in further reduction of food intake due to nausea and vomiting. Ketoacidosis can result from protracted vomiting and abstaining from food. People who consume large amounts of alcohol may experience hypoglycemia (which may occur when a fasting or malnourished person consumes alcohol) as a result of impairment of the body's ability to control blood glucose levels. High levels of homocysteine are associated with chronic alcohol abuse but research is needed to determine whether or not nutritional supplementation will correct these abnormalities. Dental problems such as tooth decay, gum disease, and loss of teeth can affect food intake. Those who

abuse alcohol tend to have an increased risk of mouth and larynx cancer¹⁴⁹.

Some substances have additional specific nutrition-related issues. With cannabis use, individuals crave and consume foods with poor nutrient content. Cocaine is associated with increased incidence of eating disorders, compulsive overeating, and immunosuppression from the effects of both the cocaine and also HIV infection that may occur from needle sharing. Since amphetamines suppress appetite, abuse can lead to severe malnutrition. Hepatitis C has been correlated with the use of amphetamines. Complications of steroid use can include altered liver function, increased blood pressure, heart disease, decreased HDL and increased LDL, and degeneration of tendons. It is not unusual for a person who is abusing steroids to have an underlying mental health condition such as body dysmorphia or bulimia. Depressants may decrease secretion of stomach acid, decrease activity in the small and large intestines, constrict gall bladder ducts, and alter blood lipids, glucose, and calcium status. Treatment of narcotic addiction, especially heroin, is typically done by using another opiate (e.g., methadone). The prescribed opiate has nutrition-related side effects including appetite and weight changes.

3.4.15.3 Detoxification, Withdrawal, and Recovery

Approaches to recovery range from abstinence to a harm-reduction model. Some programs have degrees of flexibility regarding abstinence, while others have a zero-tolerance policy that mandates lifetime abstinence. Whatever the program, three elements are the cornerstone of nutrition counselling³²⁴: unconditional positive regard, empathy, and genuineness. A multidisciplinary team approach that includes self-concept, health, and nutrition

counselling are all essential. The nutritional goals of recovery are to correct nutritional deficiencies, reduce the severity and length of withdrawal, reduce or prevent negative substance substitution patterns, achieve an optimal diet, and enhance outcomes.

Nutrition care can be offered in inpatient or outpatient settings, with careful monitoring. During detoxification (when the body eliminates the psychoactive substance), maintaining fluid and electrolyte balance is important as vomiting is common. Hyperventilation may cause respiratory alkalosis, which together with low blood magnesium may cause withdrawal seizures¹⁴⁹. Twelve to 48 hours after discontinued substance use, symptoms of withdrawal — including loss of appetite, diarrhea, increased blood pressure, temperature, and pulse, as well as chills and fever — may worsen. Two to four days after discontinued substance use, new symptoms such as muscle spasms, hemoconcentration, and increased blood sugar may emerge. Four to five days after the substance was last used, symptoms usually start to subside. During withdrawal, the Clinical Institute Withdrawal Assessment for Alcohol (CIWA-A) is usually administered and, depending on the score, the diazepam loading protocol for alcohol withdrawal implemented; this includes the provision of 100 mg of thiamin by injection then 100 mg by mouth for three days³²⁵. A multivitamin/mineral supplement may also be provided. If the gastrointestinal tract has been severely damaged, short-term intravenous nutritional therapy may be required to bypass the gut³²⁶.

Alcohol and drug use prevents the body from processing two amino acids, tyrosine and tryptophan. They are responsible for the production of the three neurotransmitters adrenalin, dopamine, and serotonin which are essential for emotional stability, mental clarity, and general well-being³²⁷. Some research

suggests use of amino acid supplementation to restore serotonin, dopamine, enkephalins, taurine, and gamma-aminobutyric acid³²⁸. Supplementation with phenylalanine, a precursor of tyrosine, has been shown to increase mood and motivation, and to indirectly decrease drug cravings³²⁹. Tryptophan supplementation during the early stages of alcohol detoxification may reduce the number and intensity of withdrawal symptoms and may possibly improve cognitive functions³³⁰.

A key concept in recovery is the HALT principle: “Don’t get too **H**ungry, too **A**ngry, too **L**onely, or too **T**ired.” Dietitians can provide practical ways to avoid hunger through meal scheduling and time management, and work with clients to understand why they allow themselves to get hungry, and how to avoid this. Diet modifications should include offering small, frequent, nutritious meals and snacks with adequate fluids and minimized caffeine intake. Relapses among cocaine- and alcohol-dependent people can be prevented with adequate intakes of omega-6 and omega-3 foods³³¹. High-dose vitamin and mineral supplementation for the water-soluble vitamins (e.g., one to three times the recommended amounts) and provision of fat-soluble vitamins at the recommended levels may be indicated for nutritional repletion in the early stages³³². During withdrawal and recovery, some individuals may try to substitute other substances which can trigger relapses, like anti-cholinergic hallucinogens, which naturally occur in plants, foods, and herbs. Mescaline from the peyote cactus³³³, *salvia divinorum*, nutmeg, and mace all contain small amounts of the psychoactive ingredient myristica oil³³³. Other people may consume excess sugar or sweet foods, caffeine, food (compulsive overeating), or nicotine. These substitutions can compromise nutritional health, perpetuate the behavioural aspects of addiction, and cause weight

gain³³⁴. People taking protection drugs such as Antabuse need to avoid foods with alcohol (e.g., flavour extracts, cooking wines, ciders, vinegars)³³⁴.

For those withdrawing from nicotine, weight gain is often a concern. A Cochrane Review of interventions designed to reduce weight gain after smoking cessation concluded that weight-management education alone is not effective and may reduce abstinence. Personalized weight-management support may be effective and maintain abstinence. One study showed a very low-calorie diet increased abstinence but did not prevent weight gain in the longer term³³⁵.

For those who have experienced caffeine intoxication, the focus of nutrition intervention should include keeping a daily log of all items consumed (food, beverages, medications) to ascertain the sources of caffeine, followed with education about caffeine sources, including yerba mate and guarana.

A varied diet with high quality protein (lean meat, fish, and vegetable proteins), fruit and vegetables, essential fats (oily fish, nuts), and drinking lots of water³³⁶ helps the recovery process.

3.4.15.3 Gambling Disorder

A person with a gambling disorder has persistent and recurrent maladaptive gambling behaviour that may include preoccupation, a need to gamble with increasing amounts of money to achieve the desired level of excitement, repeated unsuccessful efforts to control gambling, concealing the extent of involvement, and jeopardizing finances and significant relationships. It is estimated that about 76% of Canadians have participated in gambling in the past year; about 4% of adults may be considered moderate risk or problem gamblers³³⁶. A significant number of people affected by problem gambling may also have a substance use disorder, attention deficit hyperactivity disorder, depression, and/or anxiety. The

effects of gambling can include money problems which can in turn affect food access, or lead to anxiety, depression, poor sleep, ulcers, and bowel problems. To help the individual optimize their nutrition, short-term food relief programs may need to be accessed and specialized diet approaches may be required to minimize the effects of secondary health problems.

3.4.16 Neurocognitive Disorders

The neurocognitive disorders include delirium, mild neurocognitive disorder, and major neurocognitive disorders. The mild and major neurocognitive disorders include subcategories that relate to the conditions they are associated with (e.g., Alzheimer's, vascular disease, frontotemporal lobar degeneration, traumatic brain injury, Parkinson's disease, Huntington's disease). In general terms, mild neurocognitive disorders are the intermediate stage between normal cognition and dementia.

3.4.16.1 Delirium

Delirium is a disturbance in level of awareness and reduced ability to direct, focus, sustain, and shift attention. It is a temporary mental health condition that is common in hospitalized older adults and is frequently undiagnosed by health care professionals. It is associated with greater risk of death, increased risk of developing dementia, increased length of hospital stay, increased likelihood of long-term care placement, decreased probability of returning to the former level of functioning, and increased costs to health care providers. Delirium is challenging to assess as it can be mistaken for, or exist along with, other mental health conditions³³⁷ such as dementia and depression. Delirium differs from dementia and depression in that the symptoms begin within a short

period of time, from hours to days, and can last from a few days to up to 12 months³³⁸. The symptoms may fluctuate and may not be present continuously. Symptoms include inability to focus, rapid or incoherent thinking, disorientation, hallucinations, agitation, drowsiness, or stupor, and can be mistaken as natural deterioration due to age³³⁷.

The prevalence of delirium among seniors admitted to hospital has been estimated at 10%–70%, depending on the population studied and the method used^{337;339;340}. An estimated additional 15%–25% will develop delirium following admission. Despite the significant prevalence, it has been reported that 32%–67% of seniors with delirium will not be detected³³⁷. Delirium that occurs in community-dwelling older adults is estimated to occur in 6%–7% of this population; more than 95% of family members and care providers indicate that they have no knowledge of delirium³⁴¹.

A diagnosis of delirium requires determining the underlying reasons. A variety of medical conditions, treatments, and substances can cause delirium, including systemic infections, hypoglycemia, the post-operation period, alcohol (use and withdrawal), benzodiazepenes, antidepressants, antipsychotics, and lithium³³⁷. Polypharmacy is common among seniors and this contributes to the risk of delirium³⁴².

Figure 4 outlines the various ways that nutrition and delirium intersect, including the presence of certain conditions that can alter nutrition status, micronutrient deficiencies (e.g., trace elements, antioxidants, vitamin B₁₂)³⁴³, low serum protein, and polypharmacy. Delirium is often a symptom of refeeding syndrome (RFS), a pattern of electrolyte disturbances occurring after the reintroduction of nutrition to the person with nutrient deficits³⁴⁴. Altered levels of magnesium, phosphate, and potassium have been found in people with delirium. Phosphate, potassium, and magnesium are important

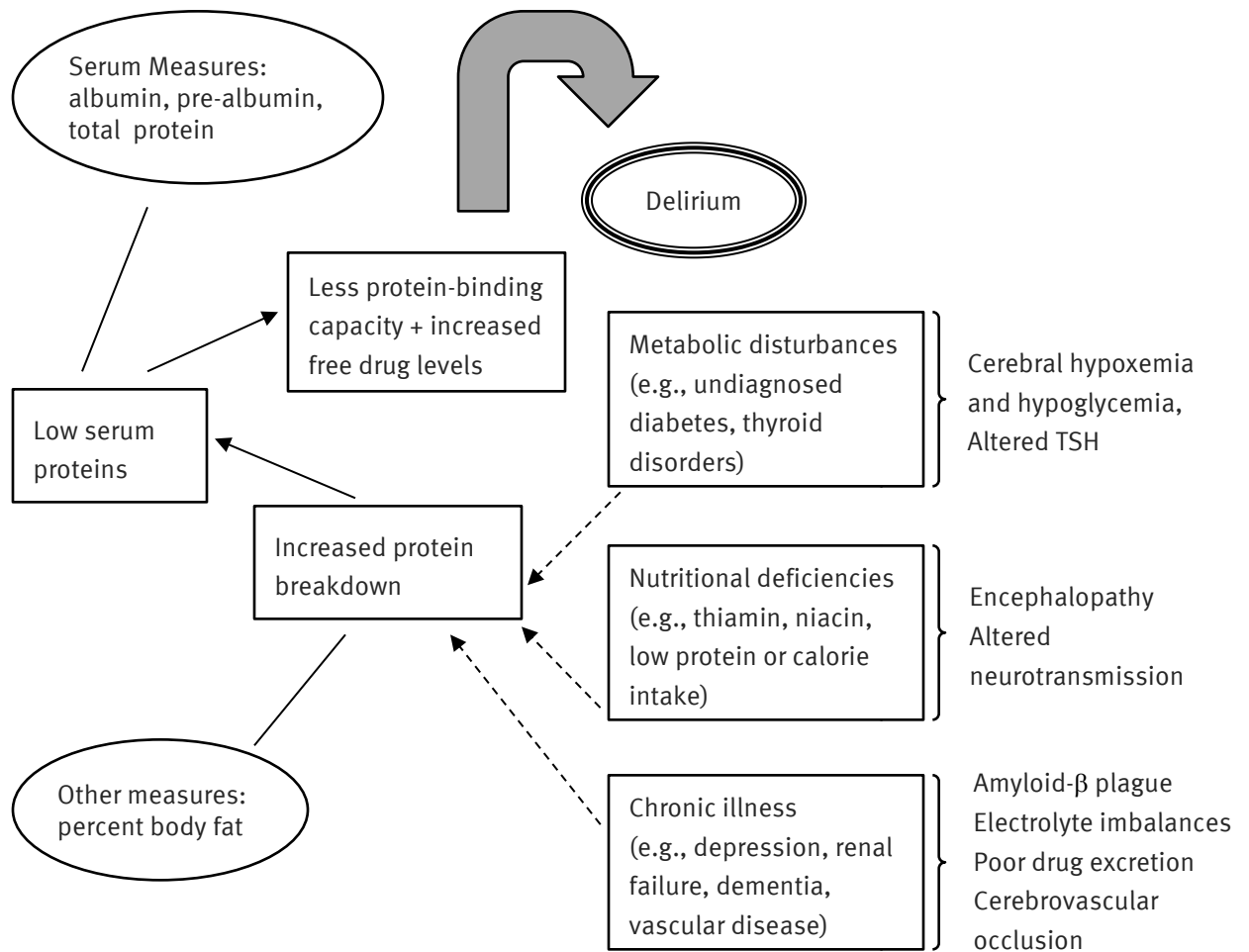
to neuronal functioning because of their involvement in energy metabolism and their roles in maintenance of membrane potential³⁴⁵. RFS is an important cause of morbidity and mortality in persons with severe malnutrition and wasting. Those at risk must be recognized, and must have biochemical indicators monitored and any vitamin and electrolyte deficiencies corrected through slow and progressive supplementation with adequate energy requirements³⁴⁶.

The treatment of delirium includes ensuring quality care such as receiving proper food, water, and sleep³³⁷. Guidelines for the treatment of delirium from Canada³⁴⁷ and the United Kingdom³⁴⁸ include the following clinical nutrition guidelines:

- Establish and maintain normal fluid and electrolyte balance, normal glucose levels, and an adequate intake of nutrients. Biochemical abnormalities should be promptly corrected.
- Older persons with delirium are at risk for micronutrient deficiencies (e.g., thiamin), especially if they use alcohol and/or have evidence of malnutrition. A daily multivitamin should be considered.
- Establish and maintain a normal elimination pattern. Aim for regular voiding during the day and a bowel movement at least every two days.
- Address dehydration and constipation by ensuring adequate fluid intake and encouraging the person to drink.
- Offer subcutaneous or intravenous fluids, if necessary, and take precautions when managing fluid balance in people with comorbid conditions (e.g., heart failure or chronic kidney disease).

Serious health risks are associated with dementia; prevention should be the primary aim in managing this condition. The increased long-term risk to people who develop delirium highlight the need for proper recognition of this common disorder. Delirium may accompany malnourishment and therefore care should be taken to reintroduce nutrition gradually to avoid refeeding syndrome. Nutrition therapy provided by a Registered Dietitian can help reduce the risk of delirium and is a component of the multidisciplinary approach to treatment.

Figure 4: Role of Nutrition in Delirium



Adapted from: Kenneth R. Culp and Pamela Z. Cacchione (2008). Nutritional Status and Delirium in Long-Term Care Elders. *Appl Nurs Res.* 2008 May; 21(2): 66–74.

3.4.16.2 Mild and Major Neurocognitive Disorders

People with mild neurocognitive disorder have minor cognitive deficits in one or more of the same domains as major neurocognitive disorder but can function independently (i.e., have intact instrumental activities of daily living), often through increased effort or compensatory strategies. This condition is a focus of early intervention. Major neurocognitive disorders have the same characteristics as the mild classifications, but the cognitive decline is significant. Dementia describes a clinical syndrome with acquired impairment in multiple neuropsychological and behavioural domains, including memory, cognition, visuospatial skills, and language³⁴⁹. Dementias are the most common mental health conditions affecting Canadian seniors, but they can also occur in younger adults. The global prevalence of dementia is predicted to double every 20 years³⁵⁰. Alzheimer's disease (AD) is the most common form of dementia and represents 64% of all Canadian dementia cases.

Dementias often lead to changes in eating behaviour such as increased or decreased food intake, altered food choices, the consumption of inedible substances, and disturbances in eating processes³⁵¹. For example, a person with dementia may forget whether they have eaten, or which meal they should eat. In the early stages of AD, apraxia can affect the person's ability to prepare food or eat with regular utensils. As the disease progresses, sensory and perceptive loss may affect vision and smell which can hamper recognition of food items³⁵². Appetite increase tends to be more common with frontotemporal dementia³⁵³. For persons aged 85 years or older, low nutrient intake, loss of ability to eat independently, lack of feeding assistance, fewer family visits, medication side effects, unrecognized infections, high levels of physical movement, being female, swallowing and chewing difficulties, becoming

bedridden, pressure ulcers, history of hip fracture, and presence of other chronic illnesses³⁵⁴⁻³⁵⁶ can hasten or complicate dementia-associated processes³⁵⁷.

Unintentional weight loss is one of the main hallmarks of AD³⁵⁷ and can continue as the condition progresses^{357;358}. When weight loss occurs, the first priority is to identify and treat the underlying causes by using a multidisciplinary team approach³⁵⁹. Interventions such as a high-energy, high-protein diet; facilitating the ability to self-feed with adaptive equipment such as lip plates, specialized cups, and weighted utensils; guided feeding techniques; or food texture modification can help prevent loss of weight. Oral intake can be affected by sundowning, or changes in level of alertness throughout the day. Providing a higher-calorie, higher-protein meal at these times can help improve nutrient intake. Oral nutrition supplements (ONS) may be particularly useful for those who drink fluids more readily than they consume solid foods^{360;361}. However, the long-term benefits of ONS use are yet to be consistently demonstrated^{362;363}. Evidence-based guidelines for the prescription and monitoring of ONS and for the use of a food-first strategy should be developed, implemented, and evaluated to optimize the nutritional health of those with dementia³⁶¹. For some, weight gain may be a concern and may be alleviated by limiting foods high in calories and low in nutrients.

Evidence supporting the use of vitamins B₁₂, B₆, E, folate, thiamin, or niacin supplements in improving the cognitive function of people with dementia is inconclusive^{58;60;61}. Low serum folate and vitamin B₁₂ levels may be related to cognitive function. Because diets of the elderly can be of poor nutritional quality, B vitamin supplementation with doses that approximate recommended levels should be considered³⁶⁴. DHA supplements may improve dementia, but more research is needed to confirm this³⁶⁵.

About half of people with dementia live in a care facility³⁶⁶. Nutrition goals in these settings include offering nutritionally adequate meals; optimizing nutritional and hydration status; enhancing safety at meals; promoting skin integrity by meeting estimated protein, calorie, and fluid requirements; providing adequate nutrients to maintain bone density and lean body mass; and facilitating eating independence (e.g., verbal and physical mealtime assistance). Swallowing problems may be a concern; speech-language pathologists, occupational therapists, or dietitians can conduct swallowing assessments and implement diet texture modifications as needed. Nutrition status should be routinely screened and assessed and multidisciplinary approaches provided for dietary and environmental care³⁵⁴.

One study of long-term care facilities found inadequacy in 70% or more of residents for folate, magnesium, zinc, vitamin E, and vitamin B₆; inadequacy prevalence was below 50% for protein, vitamin C, and thiamin³⁶⁷. To reduce the risk of nutritional inadequacy, protocols can be put into place, such as standards to monitor and enhance nutritional status (e.g., food and fluid intake records), having a par stock of PRN items for people who may not be alert enough to eat at a standard meal or snack time, and offering family-style meals to improve participation in the meal^{368;359}. The benefits (e.g., survival rates) associated with feeding tubes (percutaneous endoscopic gastrostomy or PEG) in people with dementia remain unclear. Prospective, randomized studies that compare mortality and quality of life in people who receive PEG feedings with that of those who are guided at mealtimes are needed³⁷⁰.

3.4.17 Personality Disorders

The personality domain proposed for the DSM-5 is intended to describe the personality characteristics of all people, whether they have a personality disorder or not and to facilitate assessment and treatment. People with personality traits that impact their care are estimated to comprise 20%–30% of the primary care population³⁷¹. Six personality disorder types (antisocial, avoidant, borderline, narcissistic, obsessive-compulsive, and schizotypal) are defined by criteria based on impairments in personality functioning. The levels of personality functioning are based on the severity of disturbances in self (e.g., in identify and self-directedness) and interpersonal functioning (e.g., empathy, intimacy). Five broad personality trait domains (negative affectivity, detachment, antagonism, disinhibition versus compulsivity, and psychoticism) are defined.

Promising results have been observed for omega-3 fatty acids in borderline personality disorder and hostility. Zanarini and Frankenburg³⁷² conducted an eight-week, double-blind, placebo-controlled study of 1 g/day of ethyl eicosapentaenoic acid (E-EPA) among females diagnosed with borderline personality disorder.

The placebo in this study consisted of mineral oil. Participants receiving E-EPA demonstrated significantly greater decreases in hostility scores and depression ratings compared with those in the placebo group, and no clinically relevant side effects were noted. The dietitian may also draw upon a number of psychotherapeutic approaches (see Section 5.2) when working with individuals with different personality characteristics to optimize their nutrition status.

3.4.18 Paraphilias

Paraphilias are recurrent, intense, sexually arousing fantasies, urges, or behaviours that generally involve nonhuman objects, suffering or humiliation of oneself or one's partner, or nonconsenting persons³⁷³. A clinician would ascertain a paraphilia according to the nature of the urges, fantasies, or behaviours, but diagnose a paraphilic disorder on the basis of distress, impairment, or harm to others. Paraphilias are chronic conditions and a minimal duration of treatment of three to five years is recommended for severe cases³⁷⁴. The paraphilias include exhibitionistic, fetishistic, frotteuristic, pedophilic, sexual masochism, sexual sadism, transvestic, and voyeuristic disorders.

The treatment of paraphilias is based on research that indicates that serotonin and prolactin inhibit sexual arousal, while norepinephrine, dopamine, acetylcholine, enkephalins, oxytocin, gonadotropin-releasing hormone, follicle-stimulating hormone, luteinizing hormone, testosterone/dihydrotestosterone, and estrogen/progesterone stimulate it³⁷³. Treatment for paraphilias includes psychotherapy, self-help groups, and pharmacotherapy. Antidepressants have been used in the treatment of certain types of mild (e.g., exhibitionism) and juvenile paraphilias. Antilibidinal hormonal treatments, such as steroidal antiandrogens (sometimes referred to as “chemical castration”) and gonadotropin-releasing hormone (GnRH) analogues may be used. Antiandrogenic drugs such as medroxyprogesterone (the long-acting contraceptive Depo-Provera) have been used in men to reduce sex drive. Side effects include breast growth, weight gain, and reduction in bone density. Psychostimulants have been used to augment the effects of serotonergic drugs. Dietitians may offer education and support to minimize the side effects of medications.

3.4.19 Concurrent Disorders and Multiple Mental Health Conditions

Concurrent disorders (CD) refers to any combination of mental health conditions and substance use disorders; however, it generally does not include the use of nicotine³⁷⁶. In the U.S. and in some parts of Canada, the term “dual diagnosis” may be used (however, in Canada dual diagnosis means having a concurrent mental health condition and developmental disorder). Other commonly used terms are “co-occurring” or “comorbid” disorders³⁷⁶. The topic of dual diagnosis is covered in Section 4.

Depending on the setting (e.g., community, mental health or addictions services, primary care), and the particular combination of comorbidity being examined, the prevalence of CDs ranges from 20% to 80%³⁷⁷. In Canada, rates of CD have been reported to be 56% among people with bipolar disorder and 47% of people with schizophrenia³⁷⁷. People with serious mental health conditions who also have substance use problems tend to experience a wide range of problems such as more severe mental symptoms, more dramatic effects after using substances, a greater chance of not following treatment plans, physical health problems, higher risk of HIV/AIDS, more experiences of stigma, financial problems, housing instability and homelessness, poor management of personal affairs, relationship problems with family members, and increased suicidal feelings and behaviours³⁷⁸. Groups that tend to have high rates of CD include people who are homeless, have experienced early trauma or neglect, are First Nations or Inuit, or are involved in the criminal justice system³⁷⁹. It has only been in the past two decades that addiction and mental health systems have focused on the provision of treatment and support to meet the needs of people with CD.

Specific information about the nutritional needs of those with CD is lacking and tends to be extrapolated from studies of marginally housed individuals. In a small cross-sectional study of 10 respondents with low to moderate degrees of drug-related problems (measured by the DAST-10) and mood disorders showed that those who scored positively on the DAST-10 had a notably higher proportion of individuals below the EAR for folate (100% versus 60%), thiamin (30% versus 24%), and iron (40% versus 6%)³⁸⁰.

Many people with mental health conditions may have more than one diagnosis; throughout this section common overlapping conditions were indicated where information was available. In a study of 100 people with stable coronary heart disease seeking outpatient treatment, where diagnoses were established by structured interviews³⁸¹, frequent comorbid mental health conditions were detected, with the mean number of comorbid mental health conditions per person being 1.7. Dietitians working with individuals who have concurrent disorders or multiple health conditions can provide the specialized nutrition services needed, including prioritizing needs and addressing the nutritional issues that arise.

3.5 Nutritional Care and Mental Health Conditions

At the beginning of this section, reference was made to primary health care and the Four Quadrant Model. Nutrition services can be offered throughout the spectrum of mental health services (see Table 5). At the foundation of all nutrition services are fundamental principles of care provision which include respecting individual needs; providing a nutritious, adequate, and culturally appropriate diet based on scientific research and consistent with principles of food security; giving ongoing information about individual dietary needs and appropriate foods to meet those needs; respecting the right to choice, including refusal of treatment; and advocating for including people with mental health conditions in population-based diet studies to ensure that findings are useful. In addition, those responsible for food and nutrition planning for individuals with mental health conditions should know the standards of care and understand how to implement them. At a minimum, health-promoting food and nutrition supports, information, knowledgeable encouragement, positive social/instrumental support (e.g., assisting in grocery shopping, cooking) and support of participation in activities that encourage healthy eating and physical activity should be provided. The following two sections examine further aspects of nutritional care. First, the diversity of mental health and dietetics care is discussed (Section 4: Diversity in Practice). Next, therapeutic approaches used in dietetics practice are outlined (Section 5: Nutrition Care for Mental Health).

Table 5: Examples of Nutrition Screening, Education and Counselling in Mental Health

Mental Health Services/Settings	Examples of Nutrition Screening, Education, and Counselling Services
Crisis Interventions: 24/7 crisis telephone and mobile crisis team; crisis respite and residential facilities	• Link nutrition consultation with crisis respite and residential facilities • Screen for nutrition risk; refer to Registered Dietitian as needed
Clinics (Residential and Hospitals): Urgent care walk-in clinic; sub-acute residential, inpatient (voluntary and involuntary); hospital discharge planning, partial hospitalization, and in-home stabilization	• Screen for nutrition risk; refer to Registered Dietitian as needed • Nutrition education for specific conditions and medications • Home visits with Registered Dietitian (e.g., assess food skills) • Encourage automatic referral of mental health consumers to dietitians once prescribed medications known to cause weight gain and other nutrition-related side effects
Housing: Outreach to homeless shelters, jails, corrections, residential services, transitional housing, adult family homes, low-income housing	• Screen for nutrition risk; refer to Registered Dietitian as needed • Skills building in food production (e.g., gardening), meal planning, grocery shopping, food preparation, food safety and storage • Food and nutrition management consultation (e.g., meal service and menu assessment)
Counselling: Individual/family/group counselling; Parent and youth support groups, treatment foster care	• Screen for nutrition risk; refer to Registered Dietitian as needed • Food skills building
Home-Based Care: Services for homebound frail or disabled	• Screen for nutrition risk; refer to Registered Dietitian as needed • Nutrition education for specific conditions and medications • Train caregivers and support personnel (e.g., how to prepare foods for special diets)
School-Based Programs: School-based assessment and treatment, supported or stabilization classroom, after-school structured services; youth tutors/mentors	• Screen for nutrition risk; refer to Registered Dietitian as needed • Nutrition education (e.g., healthy eating, common food myths)
Support Programs: Day treatment (adult, adolescent, child); supported employment/supported education; transitional services for young adults; individual skill building/coaching; peer support	• Screen for nutrition risk; refer to Registered Dietitian as needed • Screen for food insecurity and refer to appropriate services (e.g., community kitchens) • Food management consultation for day treatment programs that offer meals • Food skills building as needed (e.g., label reading) • Train peer workers on providing healthy eating education
Substance Use-Based Services: Specialty substance abuse services; social detoxification/residential; inpatient and outpatient medical detoxification; day treatment, aftercare/12-step groups; narcotic replacement treatment	• Screen for nutrition risk; refer to Registered Dietitian as needed • Food management consultation for residential and day treatment programs that offer meals • Food skills building as needed • Education and counselling on nutrition for recovery

4. Diversity in Practice

“It's clear we're not reaching everybody who is affected by mental illness and health inequities. The need is still great ... We need to honour all of the different marginalized groups as well as look at intersections. We don't want to lose sight of specific groups.”

Brenda Toner, Head of the Women's Mental Health Program, University of Toronto; Co-head of Social Equity and Health Research, Centre for Addiction and Mental Health

Canadian Mental Health Association Network Magazine, 2010

Those with mental health problems often have unique circumstances that can create barriers to health care. Experiences such as alienation, stigma, trauma, and institutionalization can lead to a lack of trust in authority figures (e.g., health care providers) and affect the care the mental health consumer receives³⁸². Strong collaboration in care, respect for the mental health consumer, and building trusting relationships with reciprocal communication all help the consumer to develop empowerment in regards to their health. In this section, some of the special circumstances that arise in mental health and dietetics practice are highlighted. The reader is encouraged to consider these diversities and to critically examine their own perceptions in the context of nutrition care.

4.1 Special Considerations

4.1.1 Engaging the Mental Health Consumer

Over the last 40 years, major changes have occurred in services provided for people with mental health conditions. Deinstitutionalization has led to the development of a number of different systems of caring for people in the community. With these changes has come an awareness of the problems of engaging and maintaining contact with the mental health consumer. Some services, such as crisis outreach, assertive outreach, and early intervention for psychosis have helped to reduce the number of hospital admissions related to mental health³⁸³. However, although overall admissions have been reduced, there has been a rise in the number of involuntary admissions despite there being fewer overall beds³⁸⁴.

Consumers who have dropped out of contact with services usually have more unmet needs³⁸⁵ than those still receiving help. The most commonly reported factors associated with service disengagement are sociodemographic factors including young age, ethnicity, and deprivation; clinical factors such as lack of insight, substance use, and forensic history; and service factors such as availability of assertive outreach provision³⁸⁶. Power differences have also been cited as underlying reasons for disengagement. Social power is the ability to influence others. There are natural power differences in many relationships, including those between teacher and student. While power differences may be beneficial, in the context of mental health work they can prevent a connection with the consumer from being established. While it is important to understand the biological aspects of mental health conditions, recognizing psychological and social factors should be a focus in order to facilitate engagement.

4.1.2 Trauma-Informed Care

It has been estimated that up to 90% of people with mental health conditions have been exposed to multiple types of trauma^{387;388}. Trauma includes physical, sexual, and institutional abuse; neglect; intergenerational trauma; and disasters that induce powerlessness, fear, recurrent hopelessness, and a constant state of alert. The traumatic experiences of persons with the most serious mental health problems are interpersonal in nature, intentional, prolonged, and repeated; occur in childhood and adolescence; and may extend over years of a person's life. They include sexual abuse or incest, physical abuse, severe neglect, and serious emotional and psychological abuse. They may also include the witnessing of violence, repeated abandonment, and sudden and traumatic losses. As adults, these individuals often experience trauma and revictimization through domestic violence, sexual assaults, gang- and drug-related violence, homelessness, and poverty³⁸⁹.

Trauma impacts one's spirituality and relationships with self, others, and environment, and often results in recurring feelings of shame, guilt, rage, isolation, and disconnection³⁹⁰. When a lack of nutrition is part of this equation, it can be difficult to work toward recovery. Most research focuses on traumatic experiences of childhood and their relationship with depression, alcohol and drug abuse, and anxiety, personality, eating, and post-traumatic stress disorders^{391;392}. The highest probability of poor treatment outcomes, relapse rates, and drop-outs in people with eating disorders has been observed in those who experienced childhood trauma³⁹³. Drop-out could represent an expression of victimization or hopelessness that interferes with compliance.

Trauma may impact eating in many ways. Experiences of trauma can lead to sensory issues,

hyperarousal, startle reflex, numbness, and appetite changes. Mealtimes may be associated with extreme stress, especially if there is a history of force-feeding and/or vomiting²⁴². When exposed to trauma, the affected person may eat emotionally, which can lead to weight gain and/or an eating disorder. Emotional eating and compulsive overeating are ways to cope with issues such as stress, depression, and low self-esteem. Emotional eating is a behaviour that can usually be controlled; however, with compulsive overeating, it is difficult for the person to control their impulses to eat.

Trauma-informed care is an approach to engage people with histories of trauma that acknowledges the role that trauma has played in their lives. Trauma-informed care creates a "to do no harm" environment that reflects physical and emotional safety, and that provides a non-judgmental atmosphere where consumers have opportunities to understand the stories of their lives and find validation, learn to trust, and heal and grow. It utilizes transformative knowledge to mentor, coach, and work toward positive changes as the consumer engages in the healing process. Registered Dietitians can create safe and consumer-centred environments with individualized nutrition care plans as means of trauma-informed care. They also engage in collaborative practice to increase awareness of service-use triggers and use approaches that reduce the rate of retraumatization.

4.1.3 Food Insecurity

Food insecurity is broadly defined as limited, inadequate access to sufficient, safe, nutritious, personally acceptable food that meets dietary requirements for a healthy and productive life³⁹⁴. Food insecurity negatively affects all dimensions of individual health and wellness. Those who experience food insecurity are more likely to have multiple chronic conditions, including heart disease, diabetes, obesity, high blood pressure^{395;396}, and impaired ability to work and learn³⁹⁷. Food insecurity is also associated with mental health issues such as higher levels of stress, anxiety, social isolation, eating disorders, social exclusion, distress, depression, and suicidal tendencies^{398;399}, and family effects such as lower levels of positive parent-child interaction⁴⁰⁰. A few studies have examined food insecurity in individuals with mental health conditions. One cross-sectional survey indicated that about 41% of individuals in a psychiatric emergency unit lacked food security and these participants showed a higher level of psychological distress than food-secure individuals⁴⁰¹. Food insufficiency has also been associated with being diagnosed with a clinically defined mental health condition⁴⁰².

Insufficient income underlies the issues of food security and mental health. Comparisons of foods based on calorie per calorie analysis (not nutrients per calorie) have demonstrated that healthy foods are more expensive compared with foods with a high energy content primarily derived from fat and refined sugar. In Canada, people with limited incomes who are food-insecure will often chose cheaper, unhealthy foods because of their higher caloric density^{403;404}. Compounding this issue are trends of rising global food prices and the changing nature of our food supply (e.g., increasing availability of highly processed foods)³⁹⁶. The relationship between food insecurity

and low income also includes contextual barriers that hinder access to healthy food. There are often fewer grocery stores with fresh whole foods in low-income neighbourhoods, and cheaper high-fat, high-sugar, and high-calorie food is often more readily available at nearby convenience stores. Lack of personal transportation and the limitations of public transit are additional obstacles. People living in basic accommodations may have limited preparation and storage facilities, which can reduce their ability to purchase lower-cost bulk foods. Those who are functionally impaired may have reduced ability to prepare and consume food⁴⁰⁴.

Food insecurity screening should be a regular component of nutrition assessment in mental health practice. Questions to ask would be whether the person has worried that there would not be enough to eat because of lack of money, not had enough food to eat because of lack of money, or if they access the services of any food assistance programs (e.g., food bank, soup kitchen, or other charitable agency). There is also a need to advocate for food access services that are dignified, capacity building, and help reduce the income disparity. Dietitians can work at all levels of the food security continuum (Figure 5) to build food access. Some specific capacity building examples include community gardens where people can grow their own food, community kitchens where people can learn food-related skills and connect with their community, and food buying clubs. Resources such as local listings of food programs should be available to mental health consumers. In various regions, standard food costing studies are conducted on a regular basis (e.g., the Nutritious Food Basket) which provides data on the real costs of healthy eating in that area and can help to monitor trends. Those who work with food insecure groups can use this tool as a means to advocate for food security.

Figure 5: Food Security - A Continuum



<i>Short-Term Relief</i>	<i>Capacity Building</i>	<i>System Redesign</i>
Charitable programs: Food banks Soup kitchens Community meal programs Food stamps or vouchers Food recovery programs (e.g., gleaning)	Community gardens Community kitchens Farmers' markets and pocket markets Breastfeeding coalitions Buying clubs Co-op grocery stores Mobile stores Local eating initiatives Farm-to-school programs Farm-to-cafeteria programs Food celebrations Rooftop, balcony, or indoor gardens Urban agriculture Small plot intensive (SPIN) farming Education programs for household food insecurity	Food action coalitions Food policy councils Building supportive food environments Indigenous food sovereignty Food planning Agriculture planning Municipal food policy School food policy Workplace food policy Community economic development related to food Social economic enterprises (food focus) Private sector investment Government investment
<i>Focus on Individual</i>	<i>Focus on Community</i>	<i>Focus on Society/Government</i>

Adapted from Food Security: A Continuum by Food Security Projects of the Nova Scotia Nutrition Council and the Atlantic Health Promotion Research Centre, Dalhousie University June 2005

4.1.4 Use of Natural Health Products

People with mental health conditions often seek a variety of therapeutic alternatives, sometimes without the knowledge of the health professionals who are working with them. Therapeutic options include natural health products (NHP), defined as agents that include constituents such as vitamins and minerals, herbs, homeopathic medicines, traditional medicines, probiotics, and other products like amino acids and essential fatty acids⁴⁰⁵. Surveys suggest that NHP use tends to be higher in those with anxiety and depressive conditions⁴⁰⁶⁻⁴¹¹. Reported prevalence estimates of NHP use range from 50% to 80%⁴¹². The use of NHP may be attributable to many factors, including media interest in the topic, increased availability of various information sources (e.g., the Internet), the perceived efficacy and “naturalness” of the therapies, a desire to reduce side effects of medications, and dissatisfaction with conventional therapies^{413;414}.

From a public health perspective, there is some concern that NHP are rarely studied, weakening the evidence base, and some NHP may interact with conventional management. For example, studies have reported that St. John’s wort combined with trazodone, sertraline, or nefazodone may cause serotonin syndrome⁴¹⁵ and affect the activities of drug-metabolizing enzymes⁴¹⁶. In people with mood disorders, side effects such as mania may occur with the use of dehydroepiandrosterone (DHEA)^{417;418}. Ginseng has been associated with depression and mania in bipolar disorder⁴¹⁹. Melatonin may worsen depression and interact with sedatives and benzodiazepines⁴²⁰. Conversely, increasing numbers of studies indicate that some NHP result in the requirement of lower doses of medications^{68;421-424}.

Table 6 highlights NHP that have been used for mental health conditions and the level of evidence that supports them. A small study of individuals with

mood disorders found that about 15% of the sample used NHP with no psychiatric medication to treat their condition¹⁴¹. For some people (e.g., pregnant women with a mental health condition), NHP may be safer. Since NHP use in this population appears to be quite prevalent, mental health care providers, including dietitians, face the challenge of becoming aware of the potential benefits and adverse effects of NHP.

4.1.5 Sex and Gender Differences

The terms sex and gender do not have the same meaning. Sex refers to biological differences — chromosomes, hormonal profiles, internal and external sex organs — and gender references the characteristics that a society or culture delineates as masculine or feminine. Studies have noted sex and gender differences in different mental health conditions such as depression and bipolar disorder⁴²⁵⁻⁴²⁸, anxiety, substance abuse, and antisocial disorders⁴²⁹ as well as differences in the link between physical and sexual abuse. These may be attributed to diversity in social roles, biology, and issues of diagnosis (e.g., the gendered items such as crying in depression scales)⁴²⁸.

Research findings illustrate the importance of considering sex and gender with respect to lifestyle and health outcomes. Men and women often differ in their knowledge of and beliefs about causes and treatments of various diseases⁴³⁰ and in self-rating of health⁴³¹. Gender may also be related to differences in food choices and in energy and nutrient intake⁴³². All food relations are shaped by various structuring differences, including gender, that define people. Registered Dietitians can help women and men perceive roles, responsibilities, and identities that are related to food and how these may affect them. Other considerations include recognizing differences in practices and beliefs, as well as capacities and skills around food and nutrition.

Table 6: Natural Health Products Used for Treatment of Mental Health Conditions and Current Level of Evidence¹³⁸

NHP	Action	Anxiety	Depression	Bipolar Disorder	Sleep Disorders	Schizophrenia	Alzheimer's Disease	ADHD
Ginkgo Biloba	↑ vasodilation, peripheral blood flow, antioxidant action, ↑ cholinergic transmission by inhibiting acetylcholinesterase; may have anticonvulsant activity through elevation of GABA; inhibits neuronal uptake of serotonin, potentiating serotonergic activity					PR/S	+/C	
Inositol	Insulin signal transduction, intracellular calcium concentration control, serotonin activity modulation, and gene expression	PR						
Kava Kava	Blocks voltage-gated sodium and calcium channels (suppress glutamate release). May block MAO-B metabolism. Sedative and anti-anxiety properties	+						
Melatonin ^a	Hormone produced by pineal gland; regulates circadian rhythms				+/C			
Omega-3 Fatty Acids*	May affect cell membrane composition at neuron synapses and signal transduction; may affect monoamine oxidase		+/S	PR		PR/C/S	PR	PR/C
S-adenosyl-methionine (SAME)	Brain methyl group donor. May ↑ membrane fluidity, influence monoamine and phospholipid metabolism, ↑ turnover of serotonin, norepinephrine, and dopamine		P/+					
St. John's Wort	Inhibit reuptake of serotonin, norepinephrine, dopamine, GABA, L-glutamate	PR/C	+					
Valerian ^b	Interacts with central GABA receptors; causes CNS depression and muscle relaxation				+/(C)			
Vitamins								
Vitamin B ₆ **	See Table 1 for details on actions of these vitamins.		PR/S			PR/S		
Vitamin C						PR		
Vitamin D**						PR		
Vitamin E						PR/S	C	

*Mild to moderate depression only, **May be helpful in drug-induced movement disorders (e.g., tardive dyskinesia), C = contradictory results, P = partial improvement, + = positive, PR = preliminary data, S = synergistic effect

^aMay worsen depression and irritability. Interacts with sedatives and benzodiazepines⁴²⁰; ^bShort-term mild impairments in vigilance, concentration, and processing time for complex thoughts⁴³⁵⁻⁴³⁷. Drug “withdrawal” effect has been reported in those taking high doses⁴³⁸. Some may develop a “paradoxical reaction” leading to nervousness or excitability. Using for longer than two months may result in insomnia⁴¹⁹.

4.1.6 Food Addictions

The discussion of food addiction (FA) in the popular and scientific literature has been pervasive and compelling. Although there is literature about food's addictive properties, FA is not considered a mental health condition. However, it has been implicated in chronic overeating, binge eating, obesity, depression, anxiety, attention deficit hyperactivity disorder, and substance use as well as relapse and treatment challenges⁴³³. This area may be considered controversial, but the dietitian may find it helpful to utilize some of the tools available, such as the Yale Food Addiction Scale⁴³⁴, when working with consumers who believe they have FA and use it to guide approaches to address food-related issues.

4.2 Special Populations

Mental health concerns can occur at all ages, for both sexes and genders, and in different cultures and population groups. Marginality, or the social exclusion from meaningful participation in society, is an experience affecting many people, but particularly those with mental health conditions⁴³⁹. In this section, different marginalized groups and food and nutrition issues they may encounter are discussed.

4.2.1 Children and Adolescents

It is estimated that at least 70% of mental health conditions begin during childhood or adolescence⁴⁴⁰; these include depression, anxiety, disruptive behaviour, ADHD, eating disorders, and developmental disorders. About 5% of those between the ages of 4 and 17 years have extreme impairment⁴⁴¹. There is evidence to suggest that eating disorder issues are becoming increasingly significant in this group.

Numerous mental health promotion and prevention interventions aimed at children and adolescents can provide wide-ranging and long-term impacts⁴⁴²⁻⁴⁴⁵. For example, in 2010, the RAND Corporation's literature review of proven early childhood interventions found returns on investment from \$1.80 to \$17.07 for every dollar spent on mental health programming⁴⁴⁶. Positive economic returns were found for interventions aimed at early childhood education, home visiting, or parent education interventions. Some of the largest net benefits were for programs that undertook long-term follow-up so measurements of the impact on other sectors (e.g., employment, criminal justice) were taken⁴⁴⁶. For children and youth with mental health conditions, developing good nutritional practices is important as they may be at heightened nutrition risk. Helping children develop healthy relationships with food and decreasing the stress and anxiety related to food that can occur within families can be invaluable for the future health of children and youth. Nutrition interventions that promote mental health for children and adolescents need to incorporate family-based approaches that support healthy eating and should address individual needs.

4.2.2 Older Adults

It is estimated that 20% of adults over age 65 have a mental health condition, including dementia, depression, psychosis, bipolar disorder, schizophrenia, and anxiety disorder⁴⁴⁷. Older adults with mental health problems face increased risk of medical illness due to the long-term effects of unhealthy lifestyles, physiological changes, compounding medical conditions, and drug side effects⁴⁴⁸. It has been suggested that individuals with serious mental health conditions are substantially less likely than others to receive appropriate medical care, even when

presenting themselves to a medical facility¹⁸⁸. To promote mental health and sound nutrition for older adults, the consumption of a combination of nutrients available through a varied, low-fat, high-fibre diet should be emphasized. Implementation of nutrition screening will identify individuals who need and should be offered Registered Dietitian services⁴⁴⁹.

4.2.3 People Living in Rural or Geographically Isolated Regions

The health of a community is inversely proportional to the remoteness of its location. Health indicators consistently reveal that significant disparities exist in health outcomes between people who live in northern versus southern regions of Canada, as well as between people who live in Atlantic regions versus the rest of Canada⁴⁵⁰. In most rural areas, the cost of the Nutritious Food Basket exceeds provincial averages. Many rural community agencies also have insufficient funds to hire Registered Dietitians. Strategies that enhance food security, nutrition training for allied health professionals and peer support workers, and options such as access to telehealth-based nutrition counselling services are likely to benefit those who have nutritional issues and are geographically isolated.

4.2.4 Individuals with Comorbidities

Many of the impacts that diet may have on mental health mirror its impacts on physical health because of the interdependence of central nervous, cardiovascular, immune, and endocrine systems. The interplay of biology, illness experience, and the social determinants of health (e.g., income, housing) can increase the likelihood of someone living with a mental health condition developing a co-existing physical condition⁹. Individuals with mental health conditions have been reported to have higher than

expected rates of hypertension (34.1% versus 28.7% in the general population), diabetes (14.9% versus 6.4%), heart problems (15.6% versus 11.5%)^{451;452}, and stroke. Other comorbidities associated with mental health conditions include smoking, chronic obstructive pulmonary disease⁴⁵³, HIV (about 8 times the rate found in the general population), hepatitis B (about 5 times the rate) and C (about 11 times the rate)⁴⁵⁴. Well-controlled studies indicate that eating disorders in adolescent females with Type I diabetes are twice as common as in control groups⁴⁵⁵. The co-occurrence of diabetes and eating disorders presents many unique challenges to health such as the development of depression⁴⁵⁶. The needs of those with comorbid conditions are not being addressed in terms of either prevention or treatment⁴⁵⁷.

There are also a number of conditions that might have mental symptoms. For example, depression may be a symptom of Addison's disease, AIDS, anemia, asthma, chronic fatigue syndrome, chronic infection or pain, colitis, Cushing's disease, congestive heart failure, altered thyroid function, diabetes, hepatitis, cancer, menopause, multiple sclerosis, rheumatoid arthritis, syphilis, lupus, or uremia⁴⁵⁸. A particular challenge in diabetes care is the growing population of individuals with mental health conditions who have recent onset Type II diabetes, often secondary to use of antipsychotic medication⁴⁵⁹. About 12% of those with a mental health condition have Type II diabetes, and an additional 32% are likely to have prediabetes⁴⁶⁰. Treating the mental health condition is essential to stabilize blood glucose levels, but many of the psychotropic medications used in treatment are diabetogenic. Dietitians working in diabetes care can expand their repertoire of skills — especially in communication, rapport building, motivational interviewing, health education, brokering services, contacting local community and

social services, and collaborating with mental health agencies⁴⁵⁹ — to assist those with diabetes and mental health comorbidities.

4.2.5 Individuals with Dual Diagnosis

“Dual diagnosis” is used to describe people who have a developmental disability along with co-occurring mental health condition and behavioural difficulties⁴⁶¹. The term “developmental disability” (DD) has both a narrow and a wide definition. As a narrow term, it refers to people with mental retardation according to the DSM-IV (IQ less than 70, onset before 18, and adaptive living skills deficits). A wider definition of DD would include people with DDs such as autism and fetal alcohol spectrum disorder, with impairment in adaptive living skills, but whose IQ is greater than 70⁴⁶¹. Major causes of DDs include chromosomal abnormalities, genetic or inherited factors such as Fragile X Syndrome, problems of pregnancy and birth including prenatal exposure to alcohol and/or maternal malnutrition, childhood injury or disease, and environmental factors such as poverty resulting in malnutrition or inadequate medical care⁴⁶². Individuals with DD have a high rate of mental health conditions with estimates of 39% in children and 30% in adults reported^{463;464}. The most commonly occurring conditions include major depressive disorder, bipolar disorder, anxiety disorders, dementia, and schizophrenia⁴⁶². Many specific DDs are associated with unique behavioural patterns and mental health conditions⁴⁶⁵, and these may be due to

some underlying commonality such as a specific nucleic acid deficiency⁴⁶⁶. These have been described as behavioural phenotypes, patterns of behaviour that are reliably identified in groups of children and adults with known genetic disorders or syndromes and are not learned. Some common behavioural phenotypes that Registered Dietitians may see in their work are described in Table 7.

Although specialized outpatient and inpatient mental health services are available along with community health and social services, there continue to be significant gaps in services for those with DDs. Those with DDs and their care providers need a comprehensive array of services from early childhood to older adulthood, including prevention, early identification, assessment, diagnosis, intervention, specialized assessment, assistive technologies, education, developmental skill building, behaviour management, and specialized mental health services. Service delivery should focus largely on specialist multidisciplinary teams that are trained in DD and mental health. Interventions need to focus on early engagement; providing easy-to-understand communications; keeping sessions short (15–30 minutes); using modelling, rehearsal, and feedback to teach skills; enhancing family and other supports; monitoring impact of concurrent medications and conditions; and using concrete short-term goals.

Table 7: Behavioural Phenotypes, Patterns, and Co-Occurring Mental Disorder

Behaviour Phenotype	Behavioural Pattern and Co-Occurring Mental Disorders
Autism Spectrum Disorder (ASD)	Pattern of impaired communication and social interaction, restrictive play, and/or stereotyped movements and behaviours. Anxiety, compulsions, and rituals that may result in challenging behaviours are common. Some have hyperactivity and sleep disturbance. There is an association between ASD and bipolar disorder ^{467;468} .
Fetal Alcohol Spectrum Disorder	Permanent neurodevelopmental deficits, growth impairment, and other birth defects. Secondary issues include a high rate of mental health/addiction problems (90%) ⁴⁵⁹ such as suicide attempts, depression, anxiety, and attention deficit hyperactivity disorder (ADHD).
Prader-Willi Syndrome	Development of appetite deregulation in childhood that often leads to morbid obesity ⁴⁷⁰ . They may have associated compulsions and bipolar disorder.
Down Syndrome	Three forms: 1) extra chromosome 21 (95%); 2) translocation of chromosome 21 material (5%); and 3) partial trisomy 21 (rare). Prone to develop hypothyroidism, Alzheimer-like dementia at an earlier age, depression, and anxiety disorders. If depressed, they are more likely to be unresponsive to antidepressants ⁴⁷¹ . Some develop obsessional slowness, an obsessive-compulsive condition ⁴⁷² .
22q Deletion Syndrome	Persons with velo-cardio-facial syndrome (VCFS 22q11 deletion) have characteristic facial features, learning problems, cardiac abnormalities, cleft palate, or velopharyngeal (sphincter separating oral and nasal cavity) incompetence. ADHD, social difficulties, and mood lability are common ⁴⁷³ .
Fragile X Syndrome	In its full form, it affects males, but lesser forms of the condition are found in females. This condition is associated with hyperactivity, some autistic features, ADHD, hyperarousal, anxiety, aggression, and mood lability ⁴⁷⁴ .

Nutrition issues that arise depend on the type and severity of the DD, and may include cardiovascular disease, obesity, osteoporosis^{475;476}, poor food intake, and dysphagia, as well as limited food preparation skills, nutrition and food safety knowledge, and physical activity⁴⁷⁷. Eating problems have been estimated at 35%⁴⁷⁸ in this group and include hearing internal voices that influence food intake, eating non-food or unsafe food items, regurgitating, taking excess fluids, hoarding food, eating very quickly, eating a limited range of foods, hyperactivity, or involuntary movements. For example,

people with Prader-Willi Syndrome may be so driven that they may eat discarded or non-edible foods. Some may need residential care and programs that control all food access. It is important to determine if challenging eating behaviours are linked to underlying medical or mental health problem⁴⁶². Applied Behavioural Analysis (ABA) interventions can address various feeding problems⁴⁷⁹. Other techniques include differential reinforcement, planned ignoring, simultaneous presentation, physical guidance, demand fading, short meal duration, contingent access to reinforcers, time out,

texture fading, swallow induction, visual cues, and positive reinforcement⁴⁸⁰. Dietitians can help design services that enhance the quality of life for individuals with DD by helping them acquire nutrition information⁴⁸¹, skills in food shopping⁴⁸², planning menus⁴⁸³, and preparing food independently⁴⁸⁴.

Primary care guidelines for individuals with DDs⁴⁸⁵ include monitoring weight and height regularly and assessing risk status using body mass index (BMI), waist circumference, or waist-hip ratio measurements⁴⁸⁶. A health promotion program can improve attitudes toward physical activity and satisfaction with life^{487;488}. Individuals with DDs and their care providers should be counselled annually, or more frequently if indicated, regarding guidelines for nutrition and physical fitness^{489;490}.

4.2.6 Homeless, Marginally Housed, and Street Youth

It is estimated that 10,000 Canadians are homeless on any given night; many more are marginally housed or under-housed, mostly in urban centres⁴⁹¹. Homelessness is a major social problem that substantially increases risk behaviour, violence, health inequity distribution, physical and mental health conditions, substance use, and mortality^{395;492;493}. People with conditions such as schizophrenia, substance abuse, and major depressive disorders are more likely to become homeless than the general population⁴⁹¹. Individuals at varying stages of homelessness tend to have higher than average rates of malnutrition, suboptimal intakes of various micronutrients (i.e., vitamins B₁, B₆, B₉, B₁₂, A, C, and the minerals iron, magnesium, and zinc), and consume excess fat^{492;494;495}. Poor health also compounds the risks faced by homeless pregnant women; it has been estimated that about one-quarter of homeless youth are pregnant⁴⁹⁶.

German and U.S. studies of homeless individuals suggest high rates of malnutrition based on body mass index and skinfold measures^{497;498}. Some studies found significant numbers of overweight^{499;500}, although the majority in one study had low BMI and possible muscle wasting⁵⁰¹.

Individuals who are homeless also tend to have high rates of nutrition-related disease, such as diabetes, obesity, and hypertension⁵⁰²; the presence of these conditions presents further challenges in obtaining appropriate foods for consumption. A study of diabetes management among the homeless in Toronto³⁹⁵ indicated that participants had a difficult time dealing with health issues that impact their dietary needs. Most found it difficult to manage diabetes and maintaining an appropriate diet. Nutritional interventions that focus on linking consumers with low-cost meal options, community resources, and support programs; alleviating food insecurity; and providing therapeutic diet counselling as needed can help support the food and nutrition needs of this vulnerable group.

4.2.7 Aboriginal Peoples

Aboriginal peoples describes the members of three distinct cultural groups: 1) First Nations, defined as a person who has registered or is entitled to be registered according to the *Indian Act*; 2) Metis people; and 3) Inuit. Although Aboriginal peoples in Canada are considered within these three cultural groups, it is important to recognize, for example, that there are over 600 unique First Nations governments or bands with distinctive cultures. Aboriginal peoples are more likely to encounter both nutrition⁵⁰³ and mental health issues⁵⁰⁴. Broad social factors that contribute to such elevated levels of risk among Aboriginal People include lower standards of living, poverty, lower levels of education, higher

unemployment rates, and cultural stress. The mental health concerns of Aboriginal peoples are linked to a long history of oppression and cultural trauma. These include the intergenerational scars from the residential school system, loss of control over living conditions, suppression of beliefs and spirituality, loss of political institutions, breakdown of cultural rules and values, and racism. Mental health conditions in this cultural group include depression⁵⁰⁵, suicide, and substance abuse⁵⁰⁶, all of which affect the physical, emotional, and spiritual well-being of Aboriginal peoples, their families, and their communities.

Aboriginal peoples face unique food-security considerations related to the harvesting, sharing, and consumption of traditional food⁵⁰⁷. Aboriginal households experience more general food insecurity (33% are food-insecure versus 9% of non-Aboriginal households) and food insecurity at severe levels (14% versus 3% of non-Aboriginal households)⁵⁰⁸. Access to traditional food has been impacted by transitions to large urban centres and changing lifestyles, increased access to store-bought food, concerns about environmental contamination, changing animal migratory patterns and the decline in some species, and the high cost of hunting and harvesting (e.g., fuel, ammunition, equipment). Those living in geographically isolated communities have additional food-security challenges due to the high cost of store-bought food, limited availability of healthy choices, and inconsistent quality of fresh food. Indigenous food sovereignty (IFS) is a policy approach that addresses the underlying issues impacting Indigenous peoples and their ability to respond to their own needs for healthy, culturally adapted foods. The key principles of IFS include⁵⁰⁹: 1) sacred or divine sovereignty: the right to food is sacred and cannot be constrained or recalled

by colonial laws, policies, or institutions; 2) participatory: IFS is based on the day-to-day practice of maintaining cultural harvesting strategies; 3) self-determination: the ability to respond to needs for healthy, culturally adapted Indigenous foods; and 4) policy: reconcile Indigenous food and cultural values with colonial policies and mainstream economic activities.

Registered Dietitians working with Aboriginal peoples can use nutrition counselling approaches that incorporate and reflect the values and natural helping styles of a culture. Key principles include teaching positive self-image, encouraging and assisting Aboriginal consumers to explore traditional healing practices and to participate in cultural rituals, utilizing family and community-based approaches, and facilitating the use of traditional foods and culinary tradition.

4.2.8 Immigrant, Refugee, Ethno-Cultural, and Racialized Groups

Canada is one of the most diverse countries in the world. Newcomers and ethno-cultural groups contribute to a significant portion of the population. Ethno-cultural communities may be defined as a group of people who share and identify with certain common traits, such as language, ancestry, homeland, history, and cultural traditions⁵¹⁰. According to a report by the Mental Health Commission of Canada and the Centre for Addiction and Mental Health⁵¹¹, persons from these communities are more exposed than the general population to the social determinants of health (e.g., low income, underemployment, isolation) that can put them at higher risk of poor mental health. In addition, their mental health is influenced by migration, minority stress, and language differences.

It is important to acknowledge the diversity within ethno-cultural communities to avoid stereotyping and blaming. Nutritional interventions should be mindful of the power difference in the provider-consumer relationships, of culturally specific power dynamics and levels of hierarchy within families, and the socio-political and historical context in which these people live. It is important to provide culturally competent care. This includes understanding and respecting cultural variations in health beliefs around mental health, and their intersection with perceptions of food and nutrition^{511;512}. In addition, language-appropriate information and services need to be advocated for based on community engagement and development activities⁵¹³.

4.2.9 Lesbian, Gay, Bisexual, Transgender, and Questioning

Individuals who are lesbian, gay, bisexual, transgender, or questioning (LGBTQ) are often at risk for physical, emotional, and social problems. Very limited research has been done on the mental health status of LGBTQ communities. Studies often treat LGBTQ communities as a single population, which may not accurately reflect their diversity. A report by the U.S. Institute of Medicine noted higher rates of disordered eating among adults and youth who were LGB when compared with their heterosexual counterparts⁵¹⁴. Depression, anxiety disorders⁵¹⁴, and suicidal behaviour⁵¹⁵ also appear to be more prevalent. Other concerns include alcohol use⁵¹⁴; chronic nutrition-related diseases such as heart disease, cancers, stroke, diabetes, hypertension, osteoporosis, and HIV infection in gay men⁵¹⁶; and body image in transgender populations (e.g., trying to “bulk up” to create a stereotypically male body)⁵¹⁷. When working with LGBTQ communities, it is

important to be mindful of the history of pathologization and marginalization of this population⁵¹⁸ and current issues that they encounter; this is essential to building empathy and rapport. Until recently homosexuality was still considered a mental health condition under the DSM; gender identity disorder was listed in the DSM-IV, which was changed to gender incongruence in the DSM-5. People who are LGBTQ are subject to institutionalized prejudice, social stress, social exclusion (even within families), hatred, and violence, and may internalize a sense of shame about their sexuality^{515;519}.

A study that explored food choice processes of gay men indicated that many learned to cook at an early age and that this was judged negatively. The process of coming out freed participants to question gender constructions⁵²⁰. The mental and nutritional health of this population can be promoted by considering their social context, ensuring equitable access to dietetic services, providing safe space for nutrition counselling, supporting food security, promoting positive body image, and using inclusive language (e.g., using the term “partner” or “support person” when asking about home life; using gender-neutral words or pronouns such as “them, they, this person,” or asking the person about their preferred pronoun).

4.2.10 Risk Behaviour and Harm Reduction

Poor mental health is closely linked to risk behaviours related to eating (e.g., anorexia), sex, and substance use⁵²¹. The associated harmful consequences of risk behaviours include physical illness, increased risk of infection (e.g., HIV, hepatitis C, and other blood-borne infections), family breakdown, economic issues, criminal involvement, and deaths by overdose or violence^{522;523}. It is important to recognize that people may be led into risk behaviours due to reasons such

as poverty, addiction, lack of education, or abuse. For example, survival sex workers may exchange sex in order to gain access to the basics of life such as food or a place to stay⁵²⁴. Harm reduction is an approach to keep people safe and reduce the rate of death, disease, and injury associated with high-risk behaviours. It involves a range of non-judgmental strategies and approaches aimed at providing and enhancing the knowledge, skills, resources, and supports that individuals, their families, and their communities need to be safer and healthier. Harm reduction includes a range of delivery modes, including fixed sites, mobile and outreach services, syringe vending machines, and pharmacies⁵²⁵.

A key attribute of harm reduction practice is the concept of low-threshold service delivery⁵²⁶. Low-threshold services have minimum requirements for participation and normally address basic health and social needs. For many people, it is impossible to address drug dependence or deal with the multitude of related health problems without first having a safe, stable place to live, and nutritious food to eat. Good nutrition also lessens the adverse effects of using harmful substances. To lessen harms associated with poor nutrition, several practices can be implemented⁵²⁷ and may include providing access to safe and nutritious food through meal programs, including safe fluids (e.g., distilled water) in pick-up kits, encouraging the person to eat throughout the day when using substances, working with the person to arrange to buy their groceries before purchasing substances, helping the person use meal programs (particularly those that give them the opportunity to leave the house), helping with practical matters that can affect access to proper food (e.g., arranging to have a broken refrigerator fixed), facilitating socialization and learning opportunities through group food education programs, helping the person find easily accessible alternatives where they can eat

inexpensively, and providing counselling and education to help minimize the effects of disordered eating practices.

4.2.11 Individuals at Risk of Suicide

Suicide is a complex phenomenon emerging from a dynamic interaction of biological, psychological, social, cultural, and spiritual factors. Conditions associated with suicide include mood disorders, substance use disorders, psychosis, and personality disorders. Factors that protect against suicide include a strong sense of competence and optimism in coping with life's problems and social connectedness. General considerations for working with individuals who may be at risk for suicide include developing a therapeutic alliance, responding proactively to those who drop out from treatment, and, to the greatest extent possible, engaging family members (e.g., spouse, parents) as key collaborators⁵²⁸. Food insecurity and low levels of omega-3s have been associated with suicidal tendencies. The mechanisms explaining the links between the essential fats and suicide include that omega-3 fats are known to change the levels and functioning of both serotonin and dopamine (which plays a role in feelings of pleasure) and low levels of this essential may compromise the blood-brain barrier that protects the brain. Omega-3 deficiency can also decrease normal blood flow to the brain⁵²⁹. A recent review on the role of nutrition in suicide suggested that persons with lower levels of serum cholesterol were found to have greater risk of carrying out suicidal acts, but intervention trials that lowered cholesterol levels had no significant effect on suicidality⁵³⁰.

4.2.12 Individuals Who Are Currently or Were Formerly Incarcerated

In total, just over 251,500 adults were admitted to provincial or territorial jails between 2006 and 2007. The percentage of individuals committed to federal jurisdiction with a mental health condition at time of admission is increasing. Female inmates are twice as likely as male inmates to have a mental health condition at time of admission⁵³¹. In one seven-year study done in British Columbia, over 30% of the corrections population had been diagnosed with a substance use disorder. An additional 26% were diagnosed with a mental health condition unrelated to substance use. More than three quarters were diagnosed with a concurrent disorder⁵³². These figures do not necessarily include alcohol abuse, fetal alcohol syndrome, or developmental disabilities, which are rarely diagnosed.

Addressing physical, mental, and nutritional health issues among individuals who are incarcerated could meet individual needs as well as those of the community^{533;534}. Correctional facilities are important settings for intervention because they allow for a population with a disproportionate burden of disease to be reached efficiently⁵³⁵. Registered Dietitians working in correctional facilities can provide their expertise in areas such as menu development, food services management, nutrition counselling, and food skills training for inmates.

Food insecurity among families in which one member is incarcerated is believed to be prevalent. Incarceration may particularly impact food security of children as their incarcerated parent is no longer a potential source of income. Registered Dietitians can work with families of incarcerated individuals to help with food access and connect them with community and skills building programs.

For those who were formerly incarcerated, the experience of being in prison remains imprinted on their minds and bodies. They also face challenges that could include being under continued surveillance, a sense of dislocation or marginalization, and a need to renegotiate their lives⁵³⁶. Housing support and adequate food are essential components of successful reintegration into the community post-incarceration. Unfortunately, many former prisoners are released only to find themselves homeless or marginally housed⁵³⁷ and experiencing food insecurity. Working within a collaborative framework, the Registered Dietitian can help support those who are reintegrating into the community by offering assistance that supports individual food security and education for any therapeutic needs related to diet.

4.3 Cultural Competence and Safety

The relationships between diet and mental health are complex. Poor diet could be seen as a contributor to mental health conditions. However, poor diet is part of a complex web that may include income, geography, culture, upbringing, institutional history, and substance use. Cultural competence is the application of knowledge, skills, attitudes, and personal attributes to provide care and services appropriate to the cultural characteristics of consumers (i.e., individuals, groups, populations). Cultural competence includes valuing diversity, knowing about cultural mores and traditions of the populations being served, and being sensitive to these while caring for the individual. Cultural safety moves beyond the concept of cultural competence to analyze power imbalances as they apply to health care⁵³⁸. It is important to understand that there are power differences inherent in interactions between dietitians and consumers. Cultural safety requires

that an individual evaluate their own beliefs and attitudes, and be respectful of nationality, culture, age, sex, gender, sexual orientation, and political and religious beliefs. This notion is in contrast to transcultural or multicultural care, which encourages health care providers to deliver service with no or little regard for these aspects of a person.

The dietitian can foster a consumer-centred practice by a variety of means⁵¹⁰:

- considering the cultural significance of eating in order to make education and counselling relevant
- building communication, engagement, and relationships for cross-cultural interactions
- understanding that spatial relationships vary among cultures and among individuals
- fostering consumer-driven problem-solving skills
- utilizing active listening skills that require patience and silence
- drawing upon interpersonal skills to build rapport with family and other support systems
- assessing the role of socio-economic disadvantage, racism, homophobia, or ableism in presenting problems
- using appropriate tools with consumers who may have literacy or language issues
- networking to learn more about services, resources, and cultures from other agencies; working specifically with ethno-cultural groups; and exchanging ideas, expertise, and innovative initiatives with other groups or agencies
- advocating to work toward enhancing access to services
- uncovering any assumptions and limited knowledge about people.

5. Nutrition Care for Mental Health

“Such a (mental health) system will provide people of all ages and their families with a choice among medical, psychiatric, psychological, and other treatment services – whether delivered in primary health care settings, by specialized services, or in a hospital – as well as the ability to choose from a full range of community-based services – including access to peer support and clubhouses, psycho-social rehabilitation, assertive community treatment, case management, supportive housing, employment support, and recreational activities.”

Mental Health Commission of Canada,
Toward Recovery & Well-Being: A Framework for a
Mental Health Strategy for Canada ⁴⁴⁰

Rehabilitation involves working within individuals’ social networks, working with their families, and enabling their access to opportunities in education, occupation, and leisure. Rehabilitation focuses on a sustained and respectful relationship with the individual, and on a longer-term response to their needs. Recovery is an active process through which an individual adapts to living with a mental health condition. During the person’s recovery, the Registered Dietitian would work with them to share an understanding of their life story and help them to draw upon the resources and skills available in rehabilitation services. Fundamental to this process is

working with individuals and their families and care providers to instil and maintain hope. Dietitians can be an integral part of mental health rehabilitation and recovery. For example, a recent study indicated that significant reductions in sugar, calories, and sodium could be implemented when kitchen staff of mental health rehabilitation programs are assisted with menu planning⁵³⁹. This section highlights different models of mental health care and how dietetics practice can intersect with them. To complement this information, specific Canadian programs for mental health that incorporate dietitian services are highlighted in Appendix E. This section also outlines different therapeutic approaches used in mental health that have been adapted to dietetics practice.

5.1 Models of Mental Health Care

5.1.1 Assertive Community Treatment

Assertive Community Treatment (ACT) is consumer-centred, recovery-oriented mental health service intended to facilitate psychosocial rehabilitation for persons who have the most serious mental health conditions and have not benefited from traditional programs⁵⁴⁰. The ACT model of care has been widely implemented in the United States, Canada, and the United Kingdom. ACT teams may support people who have been in the hospital many times, are homeless, have been involved in the criminal justice system, or have a dual diagnosis (both a mental health condition and developmental disability) or a concurrent diagnosis (both a mental health condition and substance use disorder). ACT services are delivered by a multidisciplinary team who provide individually tailored treatment, rehabilitation, and support services. ACT teams are usually mobile, deliver services in locations that are convenient for people, are directed by a coordinator and a

psychiatrist, and include enough staff to work in shifts to cover 24 hours per day, 7 days a week.

A team of professionals whose training includes social work, rehabilitation, counselling, nursing, nutrition, and psychiatry provide ACT services including case management, initial and ongoing assessments, psychiatric services, employment and housing assistance, family support and education, substance abuse services, and other supports critical for an individual to live successfully in the community. Registered Dietitians work with the ACT interdisciplinary team to develop and implement nutrition care plans that can prevent malnutrition, improve nutritional status, and improve or reduce the impact of many conditions such as diabetes, cardiovascular disease, and hypertension.

5.1.2 Primary Health Care

The primary health care (PHC) approach as defined by the World Health Organization is both a philosophy of care and a model for providing health services. The focus of PHC is on preventing illness, promoting health, and the principles of accessibility, public participation, health promotion, appropriate skills and technology, and intersectoral cooperation. Plans for PHC share several general visions for a system that is accessible, better coordinated, consumer centred, comprehensive, and community focused. These visions reflected in dietetics practice are outlined in the following.

Accessibility

Accessibility means that nutrition services are universally available to all, regardless of geographic location. In general, many smaller communities have difficulty recruiting qualified dietitians. Challenges include having insufficient funds to hire a dietitian to

meet service needs and difficulty in maintaining nutrition professionals to work with consumers with very special nutritional needs (e.g., home tube-feeding). Nutrition programs that target informal caregivers, natural helpers, peer helpers, and paraprofessionals may be of particular importance in improving access to appropriate nutrition services. Telemedicine and additional training options need to be considered. Issues of accessibility also pertain to transportation. Transportation support for consumers helps address issues of isolation, distance from professional resources, and lower utilization of services in rural areas. However, simply providing a transit pass may not be sufficient, particularly for those with mental health challenges. Other options, such as home visits, may be more beneficial as the context in which the mental health consumer lives is visible and interventions can be individualized.

Collaborative Structures

Collaboration means that people from various disciplines (e.g., mental health, education, financing, housing, employment, immigration) function interdependently to meet the needs of consumers. It also means that all key stakeholders, including consumers, should be involved in mental health care. Collaborative practice involves consumer-centred care with a minimum of two caregivers from different disciplines working together with the care recipient to meet that individual's health care needs⁵⁴¹. Examples of interdependent care include ad hoc collaborations that are developed to deal with issues of immediate concern and

then disbanded after the resolution of the problem, and brokered service models where a dietitian has developed informal relationships with other providers and, through referral or interagency service agreements, has obtained access for the consumer to nutrition services without reciprocal collaboration. Initiatives might also provide diverse services in one setting with complete integration of operations. In such collaborative efforts, services are streamlined, a permanency of service integration occurs, and collaboration outside the core service group with such services as shelters, drop-in centres, and other advocacy groups or service providers are enhanced. Table 8 outlines how dietitians from a variety of settings can provide complementary services related to the key elements of PHC. Sufficient staffing in each setting is essential to provide the required care.

Richness of Collaboration

The mental health consumer has diverse and interrelated sets of determinants of health and needs a number of potential team players to support them. Dietitians collaborate with many community partners, including:

- Housing programs and services (e.g., shelters and drop-ins)
- Immigrant/refugee services
- Police, corrections, legal aid
- Hospital discharge planners
- Public health
- Programs for veterans
- Home-care services
- Employment/vocational services
- Public guardian and trustees office
- Addiction recovery programs
- Social services
- Community psychiatric facilities
- Mental health agencies (children, adult)
- Rehabilitation programs
- Volunteer organizations/ advocacy groups
- Schools, preschools, and daycares
- Religious groups
- Long-term care facilities
- Meals on Wheels
- Food programs (e.g., food banks, community kitchens, community gardens, buying clubs)
- Support groups
- Recreation programs
- Specialized services (e.g., for diabetes and dyslipidemia)

Consumer and Family Centredness

Consumer participation means that consumers are encouraged to participate in making decisions about their own health, identifying the health needs of their community, and considering the merits of alternative approaches to addressing these needs. However, some special challenges may limit their input. For example, stigmatizing factors may make it difficult for mental health consumers to advocate for themselves. Some strategies to enhance consumer centredness include inclusive meetings between consumers and providers, involvement in programs (e.g., peer helpers), having advocate officers available to consumers, enabling the consumer to self-refer, and providing the option of home-based care. Most consumers utilizing primary care services bring family members to their appointments, thus presenting an opportunity for family-focused care, which leads to better individual and family outcomes⁵⁴⁴.

*Table 8: A Network of Registered Dietitian (RD) Services in Relation to Primary Health Care**

		Key Elements of Primary Health Care (PHC)			
Dietetic Practice Settings	% Dietitians in Practice Setting**	Range of Comprehensive PHC Nutrition Services Provided	Utilizes Population Health Strategies	Collaborative Practice	Affordable and Cost Effective***
Community Health Centre model; RD a salaried member of the interdisciplinary team	6%	Full range	√	√	√
Public Health	26%	Population health promotion and disease prevention services including for mental health	√	√	√
Home Care	20%	Services for “homebound” consumers at risk or with existing physical and/or mental health conditions	Services for “homebound” consumers	√	√
Ambulatory/Primary Care Practice	15%	Services for consumers at risk or with existing physical and/or mental health conditions	Services for consumers at risk or with existing medical conditions	√	√
Consulting/Private Practice	33%	√	Work with individuals, groups, facilities, and programs; can provide population health services	Dietitian maintains consumer record and liaises with other care providers as needed	Fee for service is a barrier; insurance coverage available in some instances

*Adapted from Table 2 – *Dietetics Practice – A Complementary Network of Services Relative to Key Elements in Primary Health Care*⁵⁴²

**% of dietitians in each practice setting based on approximation derived from DC’s Skills and Practice Registry relative to the number of DC members working in a primary health care setting (N=1390) in 2001

***Potential for savings relative to decreased hospitalization and long-term disability as a result of nutrition intervention is well documented⁵⁴³

5.1.3 Peer Support Model

Peer support has been defined as “any organized support provided by and for people with mental health problems.” Peer support is sometimes known as self-help, mutual aid, co-counselling or mutual support.⁵⁴⁵ Formalized peer support begins when a person with lived experience, *and* specialized training, assumes a unique, designated role within the mental health system to support another individual’s expressed wishes. Specialized peer support training is peer developed and delivered; endorsed by consumers, survivors, peer support organizations, and consumer councils; and rooted in principles of recovery, hope, and empowerment. The success of peer support could be due to the informed perspective of people with a chronic illness, who are familiar with the “system”; the possibility of recovery is embedded among those helping one another.

Given the shortcomings in the social determinants of health for this population (income, housing, and food access), strategies to support self-management and prevention must be accessible, affordable, and practical. Mental health peer support workers know and understand this reality and have experience in supporting people to improve their health and quality of life under difficult circumstances. Mental health peer support organizations operate across Canada in a wide variety of formats including⁵⁴⁶:

- unfunded self-help meetings, drop-in peer support and social recreational programs
- consumer councils of general and psychiatric hospitals
- alternative businesses, or social purpose enterprises
- survivor-operated and survivor-delivered mental health services
- academic research and evaluation units and groups

- housing, crisis supports, and warmlines
- training programs; recovery, leadership skills
- political and legal advocacy and lobbying groups
- historical remembrance and recognition projects and activities
- peer support training programs and worker associations
- local, provincial, national, and international networks
- arts and cultural activity groups
- specialized peer support (e.g., those who have experienced trauma or substance abuse)

The evidence base for the effectiveness of general peer-run initiatives in mental health populations includes reductions in hospitalization and symptom distress, as well as improvements in social support and quality of life⁵⁴⁷. There is a need for more sophisticated analyses of nutrition-related peer-led interventions that recognize the diversity of approaches (e.g., different style of peer leading) and their suitability in different situations. Generally speaking, results on social, psychological, and behavioural outcomes are positive⁵⁴⁸. Dietitians offer skills and knowledge that can be accessed by peer-led programs related to nutrition such as food skills training, breastfeeding support, community kitchens, and school-based nutrition education.

5.1.4 Early Psychosis Intervention

Psychotic episodes are most commonly associated with conditions such as schizophrenia, schizophreniform disorder, bipolar disorder, and major depression (with psychotic features). Such conditions often arise in late adolescence or early adulthood and can decrease quality of life, shorten life expectancy, increase risk of other mental and physical health conditions, and forestall opportunities for educational, vocational, and social

advancement⁵⁴⁹. Many health regions throughout Canada have developed Early Psychosis Intervention (EPI) programs whose goals are to recognize the early signs and symptoms of psychosis so that effective treatment can be started as soon as possible.

EPI programs provide services and education intended to promote wellness, reduce socially isolating behaviour, and restore previous levels of functioning. Clinical services are offered for those who are experiencing their first psychotic episode, have a suspected psychosis, have a family history of psychotic disorder, or are experiencing a recent deterioration in ability to function. Some EPI programs have specific standards and guidelines that recognize the need for Registered Dietitians who, along with other health care providers, conduct a comprehensive physical examination upon program admission, and periodically as new circumstances dictate. Furthermore, these guidelines indicate that all consumers should be engaged in positive lifestyle activities, including those related to diet, exercise, good sleep hygiene, and substance use reduction⁵⁴⁹.

5.1.5 Chronic Condition Self Management

Chronic Condition Management (CCM) is a health care approach that emphasizes helping individuals to maintain their independence and health as much as possible, through prevention, early detection, and management of chronic conditions. Chronic Condition *Self*-Management (CCSM) is the CCM process in which the consumer engages⁵⁵⁰. In a given year, a person with a chronic condition may visit a family physician for 1 hour, specialists for 1 hour, and allied health professionals (e.g., physiotherapist, occupational therapist, dietitian) for 10 hours, and manage on their own at all other times⁵⁵¹.

The three main models of CCSM⁵⁵² are the Stanford Model, the Expert Patients Programme, and the Flinders Model. The Stanford Model uses peer

educators to build self-efficacy, a concept that can benefit people with mental health conditions, and assumes people with chronic disease have similar concerns that can be effectively managed, with specific skills and training. One Stanford Model program delivers a series of workshops in which techniques are taught for dealing with chronic disease, such as exercise, medication use, nutrition, improving communication with family and friends, reducing stress, as well as evaluating doctor-recommended treatments. The Expert Patients Programme promotes knowledge by teaching skills necessary for people to effectively manage their own chronic conditions, with support from physician team members. Finally, the Flinders Model emphasizes a role for health professionals in building self-efficacy and actively engaging people, using principles of cognitive behavioural therapy (CBT) during interactions. The focal point of each approach is an empowered person with skills and confidence, managing aspects of their mental health condition, collaborating with health care provider.

An example of a Canadian CCSM program for mental health is the Canadian Mental Health Association's Bounce Back initiative. This evidence-based program was designed to help adults experiencing symptoms of mild to moderate depression, low mood, or stress, with or without anxiety. Bounce Back offers two forms of help. The first is a DVD (available in English, Mandarin, and Cantonese) providing practical tips on how to recognize and deal with depressive symptoms. The second is workbook-based with telephone coaching (available in English and Cantonese). Bounce Back community coaches assist in the teaching of problem-solving and other skills to overcome difficulties such as inactivity, unhelpful thinking, and avoidance. CCSM programs such as these can include sound nutritional advice and coaching to help manage mental health symptoms.

5.2 Therapeutic Approaches in Nutrition Care

The goals of dietitians working in mental health are to positively affect the stress circuitry in the brain and to optimize nutritional health. The approaches described in the following pages can be carried out by dietitians and highlight their specialized knowledge and skills.

5.2.1 Transtheoretical Model of Change

The transtheoretical model (TM) or stages of change model has been used for years to alter addictive behaviours. The TM describes behaviour change as a process in which the individual progresses through a series of six distinct stages of change: precontemplation, contemplation, preparation, action, maintenance, and relapse⁵⁵³. Research data have shown that the value of the TM is in determining at which stage an individual is and then using the change processes appropriate to that stage.

5.2.2 Mindful-Based Eating Awareness

Mindful eating has been incorporated into nutrition counselling as an alternative to prescriptive meal plans. Mindful eating is based on the premise that people who misuse food are not experiencing the sensual pleasure of food and do not understand hunger or satiety cues. As a result, a compulsive pattern of eating can occur. Mindful eating counselling comprises three elements: provide eating experiences, direct attention to the act of eating, and witness without judgment or goals the emotional and physical responses that resulted before, during, or after the eating experience⁵⁵⁴. Mindfulness-based eating awareness training⁵⁵⁵ (MB-EAT) was developed to treat binge eating disorder. Based on the Mindfulness-Based Stress Reduction (MBSR)

program⁵⁵⁶, it is a nine-session group intervention including mindfulness and meditation exercises to promote awareness and acceptance of bodily sensations, including hunger and satiety cues. Other exercises involve mindful eating of foods typically included in binges (e.g., cookies), and focusing on eating behaviours, emotions, and the textures and tastes of foods eaten. Participants learn to do mini-meditations, in which they stop for a few moments at key times during the day, to practise nonjudgmental awareness of thoughts and feelings. Efficacy of MB-EAT has been supported in a non-controlled trial⁵⁵⁵. Mindfulness-based cognitive therapy (MBCT) derived from MBSR has been applied to binge eating⁵⁵⁷. Mindful eating may be of benefit to people with mental health conditions as food may be a means to deal with negative emotions, cravings, and aversions. MBCT has been used in individual and group counselling for weight loss, disordered eating, and concurrent eating – substance use disorders. A case study of mindful eating to treat food restriction in anorexia showed a decline in restriction, an increase in BMI from 17.9 to 19.5, and increases of about 1,500 calories/day⁵⁵⁸. One randomized controlled trial, with 46 women with substance use disorder, compared mindful awareness in body-oriented therapy (MABT), combining manual and mind-body approaches over eight weekly sessions, with treatment as usual (TAU). With MABT, eating disorder symptoms and bodily dissociation remained improved at nine-month follow-up⁵⁵⁹. A systematic review of eight studies in which mindfulness was applied in eating disorder treatment concluded evidence was supportive⁵⁶⁰. Treatment outcomes for 38 individuals with concurrent binge eating and substance abuse disorders following 16 weeks of group MABT found significantly improved measures of binge-eating episodes, disordered eating, alcohol and drug addiction severity, and depression⁵⁶¹.

5.2.3 Motivational Interviewing

Motivational interviewing is a counselling method that focuses on exploring and resolving ambivalence about behaviour change, with techniques intended to increase intrinsic motivation so that consumers can express the rationale for making changes. Persuasion and support are key elements⁵⁶².

Motivational interviewing has been applied in nutritional interventions for mental health consumers and has been shown to support behaviour change^{563;564}. Jones et al.⁵⁶⁵ used motivational interviewing to enhance cognitive behavioural therapy for a group of people with bipolar disorder and found that the combination led to a decrease in substance use, sustained at the six-month follow-up⁵⁶⁵. A systematic review and meta-analysis of 12 randomized control trials examining motivational interviewing and weight loss in people who were overweight or obese⁵⁶³ concluded that motivational interviewing enhanced weight loss. Comparison of motivational interviewing and behavioural intervention with behavioural intervention alone was significant, compared with motivational interviewing versus minimal intervention. Motivational interviewing seems to increase adherence to behavioural intervention. Since many psychiatric medications have weight implications, further studies on weight-management programs using motivational interviewing with a mental health population are needed.

5.2.4 Cognitive Behaviour Therapy

As the name suggests, in cognitive behaviour therapy (CBT) the focus is on the way people think ("cognitive") and act ("behavioural"). The concept behind CBT is that thoughts about a situation affect how a person feels (emotionally and physically) and how they behave in that situation. Humans give

meaning to events around them, and two people can apply two very different meanings to the same event.

CBT has been used for a variety of mental health problems, including depression and anxiety, and smoking cessation programs to prevent weight gain. It is also used for people with eating disorders, with the strongest evidence of its efficacy being for bulimia nervosa and binge eating disorders⁵⁶⁶⁻⁵⁷⁰. For example, Shelley-Ummenhofer and MacMillan⁵⁶⁷ examined a dietitian-administered CBT program in a population of obese women who met the criteria for binge eating as defined by DSM-IV-TR. The results reported a statistically significant decrease in binge eating and depression and an overall improved body image among the participants. This study suggests that dietitians can be effective at facilitating change in binge-eating behaviours by using a CBT approach. A systematic review of interventions targeting post-smoking cessation weight gain found no evidence that CBT reduced post-cessation weight gain³³⁵. However, there was considerable heterogeneity which can impact findings of association.

5.2.5 Dialectical Behaviour Therapy

Dialectical behaviour therapy (DBT)⁵⁷¹ was designed to help people who considered or attempted suicide, and those with personality disorders. People with eating disorders often have personality disorders and suicidal thoughts, so DBT has been adapted for application to bulimia and binge eating disorder^{572;573}.

DBT is a form of CBT, aimed to help people learn how to change their behaviour. DBT includes both individual and group sessions where the person learns and practises new skills. For example, the therapist may show the person how to deal with conflict rather than avoiding it, and the client can practise the new skill by role-playing a difficult situation with another member of the group.

Skills particularly important for nutritional management are emotion regulation and distress intolerance. DBT for eating disorders consists of regular sessions in group and individual formats. Rationale for this approach is based on the emotion regulation model⁵⁷⁴, which suggests that binge eating functions to reduce aversive emotional states, temporarily reducing distress and thus negatively reinforced. This version of DBT is designed to improve participants' abilities to manage negative affect adaptively and includes training in mindfulness, emotion regulation, distress tolerance, and behavioural chain analysis skills, all applied to binge-eating episodes. The mindfulness skills are taught to counteract the tendency to use binge eating to avoid awareness of negative emotional states. That is, participants learn to observe their emotions without trying to escape them and without self-criticism for having these experiences. This state of mindful awareness facilitates adaptive choices about emotion regulation and distress-tolerance skills for use in place of binge eating. Clinical trials provide strong support for this adaptation of DBT^{573;575}. A feasibility study of group-based DBT for binge eating, conducted at a community clinic with women aged 24–49 with sub- or full-threshold binge eating disorder or bulimia nervosa, showed significant improvement in both binge eating and secondary outcomes with the Eating Disorder Inventory subscales of Bulimia, Ineffectiveness, Perfectionism, and Interpersonal Distrust⁵⁷⁶.

5.2.8 Emotional Brain Training and Solution-Focused Therapy

Emotional brain training (EBT) was developed to treat emotional overeating. It is based on the premise that the drive to overeat and over-restrict food is promoted by stress, so the first step in overcoming

eating disorders is to learn emotional processing tools so that the daily stress of life eases. The next step is to re-encode the circuits that trigger strong emotional drives to overeat or over-restrict food. The goal of EBT is to move up the brain's emotional set point to a state of balance and reward, which includes authenticity, vibrancy, integrity, intimacy, spirituality, and freedom⁵⁷⁷. Currently there is little empirical research about EBT's effectiveness; funded studies are in progress.

Solution-focused brief therapy (SFBT), also called solution-focused therapy and solution-building practice therapy, was developed in the late 1970s. SFBT is goal directed, and focuses on solutions rather than on the problems that prompted consumers to seek therapy. The SFBT approach assumes that all consumers have some knowledge of what would make their life better, even though they may need help describing the details of their better life. All therapy is a form of specialized conversations. With SFBT, the conversation is directed toward developing and achieving the person's vision of solutions. Techniques that help clarify those solutions and the means of achieving them include looking for previous solutions, exceptions (e.g., "What is different about the times when this is less of a problem?"), present- and future-focused questions, and compliments (e.g., validating what clients are already doing well). In the United Kingdom, Jacob⁵⁷⁸ has written about the use of SFBT for eating disorders.

5.2.7 Cognitive Adaptive Training

Cognitive adaptive training (CAT) is a compensatory approach designed to work around cognitive deficits by creating external systems in the person's natural environment to support improved functioning. In recent years, the systematic use of compensatory strategies has been applied to individuals with

schizophrenia. CAT is a treatment based on the principle that impairments in executive function (i.e., the ability to plan and carry out goal-directed activity) in schizophrenia lead to one of three behavioural styles: 1) apathy; 2) disinhibition; or 3) a combination of apathy and disinhibition⁵⁷⁹. The mixed behavioural style is characterized by trouble both initiating behaviour and becoming easily distracted during task behaviour, thus undercutting completion of functionally relevant tasks (e.g., preparing meals). Apathy may be treated by providing individuals with cues in the environment that prompt them to begin each step in a sequenced task. For example, environmental supports may include placing signs and tools for daily activities directly in front of the person (e.g., placing a bowl and spoon on a table), checklists with tasks broken down into specific steps, and electronic devices to provide auditory prompts. People with disinhibited behaviour benefit from the removal of distracting stimuli and the reorganization of their environment. For example, rather than having a cupboard full of food choices, an intervention might include separating foods by types into bins labelled with each day of the week and removing foods that are not used. For people with mixed behaviour deficits, a combination of interventions that cue initiation and prevent distraction is offered (e.g., placing individual food bins on a kitchen counter). The use of CAT has been documented in a case study⁵⁸⁰ of a woman with schizophrenia, poorly controlled Type I diabetes, and limited funds (“Ms. L”). Ms. L. attended an adult day treatment program where she received two nutritious meals and two snacks daily. Her food record showed that her diet consisted mostly of high-carbohydrate items. She received education about food choices using the nutritional guidelines for diabetes, including cultural consideration of Ms. L’s Hispanic dietary preferences. Together, the therapist and Ms. L. developed

nutritious meal plans, and practised shopping at her local grocery store using a shopping list. To supplement grocery purchases, monthly visits were made to a food bank and vegetables (e.g., tomatoes, green beans, squash) were planted in pots on her apartment balcony, with reminder signs to water the plants. The produce of these plants was harvested during weekly visits until Ms. L began to pick the produce on her own. Ms. L’s grandmother, who typically prepared high-carbohydrate foods for visits, also received education regarding favourite foods. These interventions resulted in weight loss (15 lb) and one diabetes medication discontinued.

5.2.8 Acceptance and Commitment Therapy

While cognitive-behavioural therapy, interpersonal therapy, and dialectical behaviour therapy treatment approaches for eating disorders are effective, some do not respond to these interventions, suggesting that alternatives are needed. Acceptance and commitment therapy (ACT)⁵⁸¹ is based on an experiential avoidance model, which suggests that many forms of disordered behaviour are related to attempts to avoid or escape aversive internal experiences. ACT emphasizes nonjudgmental acceptance of thoughts and feelings while changing overt behaviour to work toward valued goals and life directions. A case study⁵⁸² and self-help manual⁵⁸³ describe the application of ACT to anorexia nervosa. The intervention includes several mindfulness- and acceptance-based strategies for working with fat-related thoughts, images, and fears. For example, the thought parade is a mindfulness exercise in which the participant imagines that their thoughts are written on cards carried by marchers in the parade. Their task is to observe the parade of thoughts, such as “I’m a whale,” as they come and go, without becoming absorbed in them, believing them, or acting on them. This exercise encourages the nonjudgmental

observation of cognitions, rather than engaging in anorexic behaviours in reaction to such thoughts. This exercise encourages the ability to allow negative thoughts to be present without acting on them, and while maintaining movement in valued directions. As adequate nutrition generally is required to maintain the energy to move in these directions (e.g., being a good friend or doing good work), an important feature of the intervention is the clarification of the person's most important values. A randomized controlled trial that compared standard CBT with ACT showed that the two treatments were differentially effective at reducing eating pathology. CBT produced modest decreases in eating pathology whereas ACT produced large decreases. In addition, ACT appeared to be more effective than CBT at increasing clinician-rated global functioning among those with eating pathology. These findings suggest that ACT is a useful treatment for disordered eating and potentially useful for clinical eating disorders⁵⁸⁴.

5.2.9 Applied Behavioural Analysis

Applied behavioural analysis (ABA) is a general term that describes the extension of operant (focus on observable behaviour in individuals) methods to the modification of behaviour. There are several different behavioural treatments and the major differences between programs are based on specific behaviours targeted for intervention. Behavioural treatments focus on observable, measurable actions of the individual. It is assumed that behaviours are influenced by the environment and change is accomplished by manipulation of that environment. ABA principles are referred to as the ABC's: A = **A**ntecedents, events that happen before the behaviour occurs; B = **B**ehaviour, the specific way a person acts; and C = **C**onsequences, events that happen immediately following the behaviour. As part of the assessment, a functional equivalent of a

problem behaviour or an alternative, acceptable behaviour is determined and intervention focuses on teaching the functional equivalent (appropriate skill) to replace the problem behaviour, changing the antecedents of the problem behaviour, and changing the consequences of the problem behaviour⁵⁸⁵.

Techniques used in ABA include task analysis, in which a task is analyzed into its component parts so that those parts can be taught through the use of chaining. With chaining, the skill to be learned is broken down into the smallest units for easy learning (e.g., a child learning to brush their teeth independently may start with learning to unscrew the toothpaste cap; once learned, the next step may be squeezing the tube, and so on). Prompting, combined with chaining, provides assistance to encourage the desired response. Prompts can include verbal cues (e.g., "Take the toothpaste cap off, Bobby"), visual cues (e.g., point at the toothpaste), physical guidance (e.g., move the hands to unscrew the lid), and demonstration (e.g., take the cap off to show how it is done). Prompts are gradually faded out as the new behaviour is learned. Shaping involves gradually modifying the existing behaviour into the desired behaviour and may be paired with reinforcement. Difficult tasks may be reinforced heavily whereas easy tasks may be reinforced more lightly. Studies of ABA for feeding problems have mainly been done in individuals with autism and results suggest that this technique can be applied successfully, particularly when care providers are included^{586,587}.

5.3 Challenges of Nutrition and Mental Health Care

Throughout this section, different models of mental health care were outlined and the role of the dietitian within these services discussed. In addition, some of the specialized approaches used by dietitians in mental health care were highlighted. While there has been no formal review of dietitian services in mental health care, it is largely believed that current staffing levels are inadequate.

In general, access to dietetics services by individuals and groups varies widely across Canadian communities, due to inadequate numbers of Registered Dietitians for community needs and lack of population needs-based funding mechanisms to support access to nutrition services⁵⁴². It is estimated that approximately 800 Dietitians of Canada members (16% of the total membership) work in a mental health care capacity. In one instance, the staff-to-consumer ratio was reported to be one full-time dietitian for 325 inpatients and nearly 1000 outpatients. Dietitians who work in community facilities report as little as four hours of work per month for 25 residents. Based on existing models of primary health care, it is believed that having one dietitian for every ten medical doctors, or fewer, would enable the dietitian to provide primarily clinical services, with follow-up of a person's status; complete some health promotion activities; and keep waiting lists to less than one month⁵⁸⁸.

Dietitians are also challenged by consumers' access to technology and health information on the Internet. Even if nutrition information is questionable and inaccurate⁵⁸⁹, it may be accepted by the individual who has a mental health condition. This further highlights the need to ensure that mental health consumers have access to credible and individualized dietetic services.

6. Moving Forward

“One of the principles enshrined in the Canadian Collaborative Mental Health Charter, endorsed by Dietitians of Canada, is ‘All Canadians have the right to health services that promote a healthy, mind, body and spirit.’ Dietitians of Canada has been front and centre, keeping us mindful of this important unity.”

Scott Dudgeon, Former Executive Director, and
Dr. Nick Kates, Former Chair,
Canadian Collaborative Mental Health Initiative⁵⁹⁰

The intent of this document is to describe the intersections that exist between the disciplines of nutrition and mental health as a means to guide dietetic practice, policy, and research. This final section describes how the skills of Registered Dietitians are applied to mental health care. In addition, the limitations that exist between mental health and dietetic practice are profiled and recommendations for promoting integration and collaboration among these disciplines are provided.

6.1 Registered Dietitians in Mental Health Care: Qualified and Cost-Effective

Registered Dietitians are licensed health professionals who have special training and practice in many areas of human nutrition. Their skills can be applied to all aspects of mental health, including health promotion, disease prevention, treatment, and rehabilitation. From their education in the science and management of nutrition, and practices based on evidence-based decision making and national standards, the Registered Dietitian can assess clinical, biochemical, and anthropometric measures, dietary concerns, and feeding skills, as well as understand the varied determinants of health acting on intervention plans. In particular, Registered Dietitians are uniquely qualified to work within the multidisciplinary framework of mental health as their training provides the requisite:

- knowledge about the intersections between nutrition and mental health
- skills to develop, implement, and evaluate mental health promotion and disease prevention strategies
- ability to apply clinical knowledge in the nutrition assessment and treatment of the various mental disorders, comorbid conditions, concurrent disorders, and dual diagnoses
- skills needed to adapt psychotherapeutic approaches to achieve individualized nutritional goals
- cultural competence to work with mental health populations with diverse needs
- ability to advocate for and develop relevant policy and practice-based research initiatives

Complex interactions between genes, lifestyle, diet and environment are increasingly demanding that Registered Dietitians become members of multidisciplinary teams in mental health care. Nutrition interventions ranging from nutrition counselling by a Registered Dietitian targeted at high-risk groups to population-wide interventions targeting healthy eating behaviours have been demonstrated

to improve health outcomes and be cost-effective⁵⁹¹. Various examples of successful approaches used by Registered Dietitians have been detailed in best practices documents⁵⁹² (Table 9). Despite the evidence that nutrition interventions offered by Registered Dietitians can promote mental health, dietitians' services in this area are clearly lacking.

Table 9: Successful, Best-Practices Approaches Used by Registered Dietitians

Practice Area	Evidence
Prenatal Nutrition	Programs such as the Canada Prenatal Nutrition Program (CPNP) have been shown to improve long-term health outcomes in children, saving at least \$8 for every dollar invested in the program ^{593;594} .
Nutrition Screening	Nutrition screening identifies those who need to be assessed and reduces costs of institutionalization. A screening initiative for seniors showed that community organizations could identify individuals experiencing diet-related challenges and link them with services to improve nutritional health ⁵⁹⁵ .
Population Health Promotion	A systematic review that examined the effectiveness of nutrition interventions for the prevention or treatment of chronic disease in primary health care identified a number of dietary interventions associated with positive health outcomes ⁵⁹⁶ . Intensive interventions with specific guidance were of greater benefit than brief encounters.
Cardiovascular Health	Clinical practice guidelines establish a clear benefit for dietary interventions in the management of hypertension and dyslipidemia ^{597;598} . Multiple risk factor interventions (diet, exercise, weight loss, and smoking cessation) have demonstrated reductions in cardiovascular risk factors (e.g., blood cholesterol) ⁵⁹⁶ , along with medication therapy.
Prevention of Diabetes	Lifestyle interventions delivered by dietitians that support healthy eating, exercise, and weight loss reduce the risk of developing diabetes by close to 60% in individuals at risk ⁵⁹⁹ and continued to decrease risk even after the intervention stopped ^{600;601} . Lifestyle interventions to prevent diabetes cost less than pharmaceuticals ⁶⁰² .
Prevention of Cancer	About one-third of cancer cases could be reduced by healthy diet choices, being physically active, and maintaining healthy weight ⁶⁰³ . Population health strategies that promote healthy eating, physical activity, and healthy weight reduce cancer risk ⁶⁰³ , as well as heart disease and diabetes risk ^{604;605} .
Prevention of Obesity	For treatment of excess weight, a comprehensive lifestyle intervention that includes a dietitian is recommended ⁶⁰⁶ . Individual and small group counselling is recommended for obesity prevention in adults as lower intensity interventions (e.g., counselling by mail) have not been shown to be effective ^{596;606} . An evaluation of a dietitian-led, individual and group-based intervention for adults with obesity and Type II diabetes demonstrated that in comparison with usual care approaches, the intervention led to modest reductions in health care costs resulting from fewer hospital admissions ⁶⁰⁷ .
Nutrition and Food Services Standards in Facilities	Malnutrition in Canadian long-term care facilities has been shown to be as high as 70% in the cognitively impaired elderly, which increases the likelihood of hospital admission ⁶⁰⁸ . Canadian research found that approximately one hour per resident per month of dietitian time was provided to long-term care residents who went on to maintain their weight. This best practice has the potential to improve quality of life and decrease morbidity and mortality ⁶⁰⁹ .

6.2 Nutrition and Mental Health Practice: Focus on the Future

The information presented in this document demonstrates how the disciplines of dietetics and mental health are interrelated:

- Various theories exist to explain the role of nutrition in mental health.
- Healthy eating and food security initiatives are integral to mental health promotion and disease prevention.
- Specialized nutrition services as part of collaborative care are needed for those with mental health conditions, including those with comorbidities, concurrent disorders, and dual diagnoses.
- The diversity of mental health populations requires skilled professionals who can provide culturally competent nutritional care.
- Psychotherapeutic approaches adapted to nutritional interventions in mental health require the unique skills of Registered Dietitians.

Various case examples of how dietitians are integrated into mental health services exist and are outlined in Appendix C. These initiatives further illustrate the diversity of dietetics and mental health practice and provide information to help advocate for the role of the dietitian.

Various barriers currently limit the potential for dietitians to be fully integrated into collaborative mental health care. Despite the evidence that supports the need for dietitian services in mental health practice, the current supply of nutrition services does not meet the demand⁶¹⁰, largely due to a lack of appropriate financial resources. Other factors contributing to the inaccessibility of nutrition services include a lack of recognition of diet therapy

in clinical practice guidelines for psychiatric care, limited mandates of home visiting programs that do not include mental health clients, limited nutrition training and support being made available to paraprofessionals and peer workers by Registered Dietitians, and telehealth services that are not being used to their full potential. Various other factors also impede progress toward collaborative mental health and dietetics practice. For example, no policy officially recognizes the role of nutrition in mental health and more research is needed to enable understanding of the various roles that nutrition has in mental health. There is also a need to expand the mental health content and/or field experience in dietetics training. Current curriculum and training in mental health for Registered Dietitians is lacking, but the demand for specialized nutrition services in this population continues to increase.

6.3 Recommendations

Diet is a fundamental cornerstone of good mental health. Dietitians understand that an appropriate diet can augment healthy lifestyle interventions aimed at promoting mental health and a variety of medical nutrition interventions can be provided for people with mental health conditions to optimize their quality of life. There is need for more nutrition promotion and treatment services, and secondary care mental health services that routinely provide appropriate dietary intervention.

The following recommendations guide enhanced integration of dietetics and mental health services:

1. Advocate for Nutrition and Mental Health in Practice and Policy

There is a need to advocate for nutritional interventions targeted at the requirements of mental health consumers using multiple approaches. Examples of strategies include food security initiatives, healthy-eating and weight-management education, food skills training (e.g., preparing, cooking, growing food), promoting nutrition literacy (e.g., develop easy-to-understand nutrition labelling of foods), and the development of nutrition and mental health-specific educational materials (e.g., diet strategies to prevent mental health problems, how to manage nutritional side effects of psychiatric medications, nutrition guidelines for specific conditions).

Support is needed to integrate dietitian services at all levels of mental health practice: promotion, prevention, treatment, and rehabilitation. This can be facilitated by recognizing diet therapy as a cornerstone of mental health interventions in clinical practice guidelines and standards of care. Medical nutrition guidelines for mental health could include defining when a referral is needed to a Registered Dietitian such as weight issues, disordered eating behaviours, the presence of comorbid conditions that

would benefit from a therapeutic diet, and suspected nutrient deficiencies. Adequate funding is needed to support nutrition programs and dietitian services. Monitoring and ongoing evaluation of nutrition services in mental health will ensure effectiveness and efficiency.

Advocacy for nutrition services should occur at broader levels that include public health and policy. Government and non-government agencies are recognizing the links between diet and mental health. Public health messaging and social marketing initiatives need to highlight the importance of healthy eating and mental health. Initiatives targeted at building healthy food environments (e.g., sodium reduction, banning trans fats, food guidelines for schools and recreation facilities) are important mechanisms to support the general population's mental health. Food policy can be informed by evaluation of the impact, effectiveness, and appropriateness of implementing key food regulatory measures and monitoring and adapting the food supply to promote mental health (e.g., limiting caffeine content in energy drinks and other beverages). Finally, standardized measurements of the cost of healthy eating in various regions should continue to be conducted as a means to monitor trends and advocate for food security and poverty reduction.

2. Developing Mental Health Competency and Training for Registered Dietitians

There is a need to develop and implement mental health content and/or field experience in undergraduate and graduate nutrition programs as well as in dietetic internships. In particular, training in adapted psychotherapeutic approaches (e.g., cognitive behaviour therapy, dialectical behaviour therapy, mindful eating approaches, motivational interviewing), culturally competent care, and the identification of the numerous nutrition-related side effects of psychiatric medications should be

incorporated into dietetics education. Specialized clinical nutrition skills must be developed among dietitians working with people who have mental health conditions, multiple diagnosed conditions, comorbid conditions, concurrent disorders, and dual diagnoses. There is also need for interdisciplinary nutrition education when clients have mental health conditions and chronic disease (e.g., depression and diabetes). Training programs with technological advances (e.g., website development, social media, hand-held devices to monitor progress of clients) could be use in nutrition care and may benefit dietitians developing tools for practice, different lines of communication, and resources for their clients.

3. Program Planning and Collaboration

Mental health professionals and health care and human service providers are currently working with mental health consumers to improve their diet and could benefit from increased knowledge of nutrition related to mental health issues.

Credentialed dietetics professionals with knowledge of mental health issues need to be employed in agencies responsible for developing policy in education, vocation, and health services at the federal and provincial levels. Furthermore, the participation of dietitians needs to be integrated into primary and specialty care teams and in vocation, education, and residential programs that serve this population throughout the life cycle. Rehabilitative services (e.g., prisons, group homes) should incorporate healthy eating/food policies so that residents and staff are encouraged to choose culturally diverse and appropriate meals, snacks, and drinks that promote mental and physical well-being.

Dietitians need to collaborate with other care providers to promote family-centred, interdisciplinary, coordinated care. Suggestions to facilitate this include having more community internships in

collaborative practice settings for dietitians-in-training and including dietitians in multidisciplinary mental health teams. Dietitians can network with other dietitians working in the mental health system (e.g., joining DC networks such as the Addiction, Mental Health and Eating Disorder Network). To enhance the accessibility of nutrition services, initiatives that include training of paraprofessionals and peer workers, availability of dietitian services in different sites such as drop-in centres, shelters, and transitional houses, and use of technology and telehealth need to be considered. Mental health service staff (e.g., mental health workers, psychiatric nurses) should have readily available access to Registered Dietitians for liaison and consultation.

4. Screening and Standards in Nutrition and Mental Health

Food and nutrition standards for mental health facilities and programs (e.g., community psychiatric homes, shelters, transitional houses, facilities for substance abuse recovery, food relief programs) and organizations that commission mental health services (e.g., non-profit associations) need to be established. Such standards need to define menu requirements and when referrals are needed for services of a Registered Dietitian. These standards should be incorporated into current performance assessment mechanisms to ensure their implementation.

Nutrition screening initiatives should be implemented for community based programs and services targeted to mental health consumers. Specialized health services need valid and reliable nutrition screening tools for mental health consumers, including for medical and psychosocial factors, anthropometric measures, lifestyle components, and biochemical data.

5. Mental Health and Nutrition Research

More investigative work that examines the role of nutrition in mental health promotion, disease prevention, and mental health condition–based interventions is needed. Adequate data is required to strengthen evidence for the benefits of mental health promotion strategies with a diet component are required. Results from epidemiological and intervention research can better define diets that will prevent or delay the development of mental health conditions. Research that characterizes dietitians working in mental health (e.g., number of full-time equivalents per client base) would help determine and advocate for appropriate service levels. Cost-effectiveness studies that quantify how specific nutritional interventions in mental health practice are economically beneficial are also informative. Investigations using large population databases that can examine new research questions about the role of nutrition and mental health, particularly within the context of the health determinants, can help inform dietetics practice. Finally, the effectiveness of nutritional interventions for mental health consumers needs to be examined (e.g., lifestyle interventions that help manage weight for individuals taking atypical antipsychotics). In order for these investigations to move forward, adequate funds for nutrition and mental health research need to be provided to support investigation of the relationship between diet and mental health and facilitate ongoing, meaningful citizen and civil society involvement in planning nutrition and mental health research.

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Appendix A: Search Strategy

Search Strategy for Peer-Reviewed Literature for Section Two: Mental Health Promotion and Prevention

<i>Mental Health Terms</i>		<i>Promotion/Prevention Terms</i>		<i>Nutrition Terms</i>		<i>Databases</i>		<i>Search Limits</i>
Mental health Mental disorder Mental illness Mental wellness Mental well-being Behaviour Emotional intelligence Stress Depression Coping Mental crisis Anxiety Resilience Cognition Mood Sleep	+	Mental health promotion Mental illness prevention Mental health intervention Healthy public policy Population health Social marketing Body image Self esteem Food environments Perinatal	+	Nutrition Food Vitamins Minerals Antioxidants Beverages Food security	in	Medline Embase PsychInfo CINAHL Pubmed Science Citation Index HealthSTAR EBM Reviews Biological Abstracts	with	English Human Time: 1980 to present

Manual Searches

American Journal of Health Promotion, Journal of Public Mental Health, Journal of Mental Health Promotion, International Journal of Mental Health Promotion

Search Strategy for Grey Literature

Psychological associations, Canadian Mental Health Association, Canadian Institutes of Health Research, Centre for the Study of Living Standards, Centre for Applied Research in Mental Health and Addiction (CARMHA), Centre for Addiction and Mental Health, World Health Organization, Brain and Mind Research Institute (University of Sydney), corporate wellness companies, Web of Science

Search Strategy for Peer-Reviewed Literature for Section Three: Nutrition and Mental Disorders and Section Five: Nutrition Care for Mental Health

<i>Mental Health Terms</i>		<i>Nutrition Terms</i>		<i>Therapeutic/ Intervention Terms</i>		<i>Databases and Search Limits</i>
Neurodevelopmental disorders Intellectual developmental disorders Communication disorder Autism spectrum Attention deficit/hyperactivity Learning disorders Motor disorders Schizophrenia spectrum Psychotic disorders Bipolar disorders Depressive disorders Anxiety Disorders Obsessive-compulsive disorders Trauma- and stressor-related disorders Post-traumatic stress disorder Dissociative disorders Somatic symptom disorders Feeding disorders (Pica, Rumination) Eating disorders (Avoidant/Restrictive Food, Intake Disorder, Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Night Eating Syndrome) Elimination disorders Sleep-wake disorders Sexual dysfunctions Gender dysphoria Disruptive, impulse control, and conduct disorders Substance use (addictive) disorders Neurocognitive disorders (Dementia and Alzheimer disease) Personality disorders Paraphilias Concurrent disorders Dual diagnosis	+	Vitamin Mineral Protein Fat Carbohydrates Alcohol Food Diet Healthy eating Food security Healthy living Lifestyle Nutrition risk Nutrients	+	Mindfulness Motivational Interviewing Cognitive Behaviour Therapy Dialectical Behaviour Therapy Educational Behaviour Therapy Solution Focused Therapy Trauma-Informed Care Harm-Reduction	in	Databases: Medline Embase PsychInfo CINAHL Pubmed Science Citation Index HealthSTAR EBM Reviews Biological Abstracts Search Limits: English Human Time: 1980 to present (to capture DSM-III and ICD-9 as cut-offs) Controlled trials first priority; in their absence observational studies were obtained and reviewed

Search Strategy for Grey Literature

Psychiatric associations, Canadian Mental Health Association, Centre for Applied Research in Mental Health and Addiction (CARMHA), Centre for Addiction and Mental Health, Web of Science

Search Strategy for Peer-Reviewed Literature for Section Four: Diversity in Practice

<i>Terms for Special Considerations and Populations</i>		<i>Mental Health Terms</i>		<i>Nutrition Terms</i>		<i>Databases and Search Limits</i>
Aboriginal peoples Children Adolescents Ethnocultural (ethnoracial) Rural (remote, isolated) Seniors Marginalized Populations Lesbian, Gay, Bisexual, and Transgender Gender (men, women) Violence (trauma) Food insecurity Natural health products Complementary and alternative therapies Comorbidities (diabetes, heart disease, hypertension, AIDS, HIV) Suicide Food addictions Homelessness Transitional housing Marginally housed Trauma	+	Mental health Mental disorder Mental illness Mental wellness Mental well-being Behaviour Stress Depression Coping Mental crisis Anxiety Resilience Cognition Mood Sleep	+	Diet Food Vitamins Minerals Eating	in	Databases: Medline Embase PsychInfo CINAHL Pubmed Science Citation Index HealthSTAR EBM Reviews Biological Abstracts Search Limits: English Human Time: 1980 to present (to capture DSM-III and ICD-9 as cut-offs)

Search Strategy for Grey Literature

Psychiatric associations, First Nations associations, Canadian Mental Health Association, Centre for Applied Research in Mental Health and Addiction (CARMHA), Centre for Addiction and Mental Health, Web of Science

Search Strategy Results

<i>Section of Paper for Searches</i>	<i>Total Resources Retrieved</i>	<i>Duplicated* or Non-Relevant Resources</i>	<i>Total Resources Used</i>
Section 2: Mental Health Promotion and Prevention	313	205	108
Section 3: Mental Health Conditions	676	398	278
Section 4: Diversity in Practice	391	230	161
Section 5: Nutrition Care for Mental Health	143	92	51

*Includes resources that were the same or had very similar content

Appendix B: Nutrition and Mental Health Resources

Aboriginal

Registered Dietitians in Aboriginal Communities: Feeding Mind, Body and Spirit. Role Paper of the Dietitians of Canada Aboriginal Nutrition Network, 2012. www.dietitians.ca/aboriginalnutrition

Healthy Food Guidelines For First Nations Communities. First Nations Health Council (2009). www.fnhc.ca

Indigenous Food Sovereignty. www.indigenousfoodsystems.org/food-sovereignty

Northwest Territories Food Guide. Government of the Northwest Territories.
www.hlthss.gov.nt.ca/pdf/brochures_and_fact_sheets/healthy_eating_and_active_living/2005/english/nwt_food_guide.pdf

Northwest Territories Healthy Foods in Facilities. Food and Beverage Guidelines for Health and Social Services.
<http://pubs.aina.ucalgary.ca/health/62202.pdf>

Food-based dietary guidelines in circumpolar regions. 2011. [http://ijch.fi/CHS/CHS_2011\(8\).pdf](http://ijch.fi/CHS/CHS_2011(8).pdf)

Addictions

Dekker T (2000). Nutrition and Recovery: A Professional Resource for Healthy Eating during Recovery from Substance Abuse by Trisha Dekker (200). Available through the Centre for Addiction and Mental Health (CAMH). www.camh.net

Hatcher AS (2008). Nutrition and Addictions - A Guide for Professionals. Includes information about the effects of each substance of abuse on nutritional health and nutritional needs during withdrawal and recovery, and patient education handouts. The resource can be ordered through the Behavioural Health Nutrition Dietetic Practice Group.
www.bhndpg.org/publications/index.asp

Yale Food Addiction Scale. www.yaleruddcenter.org/resources/upload/docs/what/addiction/FoodAddictionScale09.pdf

Alternative and Complementary Therapies

Canadian Complementary Medicine Association. www.ccmadoctors.ca

The Canadian Complementary Medicine Association is a network of physicians, residents and medical students who are dedicated to bringing together conventional and alternative medicine.

US version: www.nccam.nih.gov

Attention Deficit Hyperactivity Disorder

The Role of Nutrition in Mental Health: Attention Deficit Hyperactivity Disorder (ADHD).
www.mindingourbodies.ca/about_the_project/literature_reviews/adhd_and_nutrition

Behaviour and Food

Food and Behaviour Research. www.fabresearch.org

Provides updates on nutrition and its role in the prevention and management of many kinds of difficulties in behaviour, learning and mood.

Body Size Acceptance

Health At Every Size (HAES). www.haescommunity.org

Budgeting

Healthy eating CHEAP AND EASY. www.health.gov.bc.ca/cpa/publications/HealthyEatingdoc.pdf

A nutrition education tool by the BC Ministry of Health Planning.

Cognitive Behaviour Therapy

Cognitive Behavior Therapy and Eating Disorders by Christopher G Fairburn. New York (NY): Guilford Press; 2008. 324 p.

Concurrent Disorders

Concurrent Disorders Treatment: Models for Treating Varied Populations by Jennifer Puddicombe, Research Coordinator, Brian Rush, Senior Scientist, Christine Bois, Concurrent Disorders Knowledge Exchange Manager Program Models Project 2003–04. www.camh.net/about_addiction_mental_health/concurrent_disorders/cd_treatment_models04.pdf

Culturally Competent Care

Goody CM, Drago L. Cultural Food Practices. Includes a chapter on culturally competent nutrition counselling. Book can be ordered from the Academy of Nutrition and Dietetics. www.eatright.org

Depression

Canadian Mental Health Association. The Role of Nutrition in Mental Health: Depression.

www.mindingourbodies.ca/about_the_project/literature_reviews/depression_and_nutrition

Developmental Disability

Montana Disability and Health Program: Nutrition resources for individuals with disabilities.

mtdh.ruralinstitute.umt.edu/Directory/Nutrition.htm

National Center for Physical Activity and Disability: Information and guidelines on exercise and activity for individuals with all types of disabilities. www.ncpad.org

The Adult with Intellectual and Developmental Disabilities - A Resource Tool for Nutrition Professionals. Provides an overview of nutrition in individuals with intellectual and developmental disabilities. The resource guide is contained on a CD-ROM. To order go to: <https://www.bhndpg.org/publications/index.asp>

Diabetes

A Collaborative Approach to Diabetes and Mental Illness

A collaborative health care model was developed by diabetes, healthy heart, and mental health clinicians to treat clients with serious and persistent mental disorders and metabolic syndrome. The model is documented in a paper and two videos: a peer education video (Donah's story); and a second video for mental health and diabetes professionals. For information contact the Interior Health Authority, Mental Health, Penticton, BC at: Penticton Mental Health, 740 Carmi Avenue, Penticton, BC V2A-8P9, Phone: 250-770-3555.

Eating Disorders

Eating disorders in adolescents: Principles of diagnosis and treatment by the Canadian Paediatric Society.
www.cps.ca/english/statements/AM/am96-04.htm

Practice Paper of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders.
http://bhndpg.org/documents/Practice_Paper_Nutrition_Intervention.pdf

Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders.
http://bhndpg.org/documents/Position_Paper_Nutrition_Intervention.pdf

Ethnoracial Resources

Mian S, Brauer P and CDA Committee. South Asian Materials for Educators. Toronto: Canadian Diabetes Association, 2008. www.diabetes.ca/for-professionals/resources/nutrition/tools/

Food Security

BC Food Security Gateway. www.health.gov.bc.ca/healthyeating/foodsecurity.html

Food Secure Canada. <http://foodsecurecanada.org>

Food Services

Audits and More – A Nutrition and Food Service Audit Manual for Adults Residential Care Facilities with 25 or More Persons in Care.

Describes a nutrition and food service audit program for residential care facilities including homes for mental health and addictions. www.hls.gov.bc.ca/ccf/publications/index.html

Meals and More - A Foods and Nutrition Manual for Homes of Adults and Children with 24 Persons or Fewer in Care
A manual written for people who assist those living in specialized residential care. The services provided may include care of adults or children with mental health concerns, care of those with developmental disabilities or care of those in need of drug and alcohol rehabilitation. www.hls.gov.bc.ca/ccf/publications/index.html

Harm Reduction

British Columbia Harm Reduction Strategies and Services. Harm Reduction Training Manual.
www.bccdc.ca/NR/rdonlyres/C8829750-9DEC-4AE9-8D00-84DCD0DF0716/0/CompleteHRTRAININGMANUALJanuary282011.pdf

Healthy Eating and Living Resources

Gates LM. Making the Case for Integrating Healthy Eating into Mental Health Service. www.mindingourbodies.ca

Provincial Health Services Authority, BC Mental Health and Addiction Services, BC Children's Hospital. Healthy Living, Healthy Minds: A Toolkit for Health Professionals. Government of British Columbia. www.keltymentalhealth.ca

Learning Disability

Professional Consensus Statement: The Nutritional Care of Adults with a Learning Disability in Care Settings.
www.bda.uk.com/publications/statements/AdultsLearningDisabilityStatement0804.pdf

Mental Health Resources

Anxiety Disorder Association of Canada. www.anxietycanada.ca

Autism Canada Foundation. www.autismcanada.org

Autism Society Canada. www.autismsocietycanada.ca

Canadian Collaborative Mental Health Initiative. www.ccmhi.ca

Canadian Mental Health Association. www.cmha.ca (bilingual)

Centre for Addiction and Mental Health. www.camh.net

Offers numerous fact sheets on mental disorders and addiction – most have been translated into many languages. Has online catalogue of resources. Also have series of webinars, CAMH Mental Health and Addiction 101 Series

Mental Health Commission of Canada. www.mentalhealthcommission.ca
Provides quarterly newsletters; subscription free.

Mood Disorders Society of Canada. www.mooddorderscanada.ca

Schizophrenia Society of Canada. www.schizophrenia.ca (bilingual)

Seniors' Psychosocial Interest Group. www.seniorsmentalhealth.ca

The Alzheimer's Society of Canada. www.alzheimer.ca

Mental Health Promotion

Canadian Mental Health Association. Making the Case for Integrating Healthy Eating into Mental Health Service Provision. www.mindingourbodies.ca/sites/mindingourbodies.ca/files/Making_the_Case_for_Healthy_Eating.pdf

Canadian Mental Health Association. Eating Well for Mental Health - Final Evaluation Report. www.mindingourbodies.ca/about_the_project/evaluation/eating_well_for_mental_health_final_evaluation_report

Metabolic Monitoring

Monitoring Worksheet for Patients on Second-Generation Antipsychotics. [www.thenationalcouncil.org/galleries/business-practice-files/3\) Monitoring Sheets 10-18 \(active\).pdf](http://www.thenationalcouncil.org/galleries/business-practice-files/3)Monitoring_Sheets_10-18(active).pdf)

Changing Diets, Changing Minds: how food affects mental well being and behaviour. http://www.mentalhealth.org.uk/content/assets/PDF/publications/changing_diets.pdf?view=Standard

Mindful Eating

Altman D. Meal-by-Meal: 365 Daily Meditations for Finding Balance Through Mindful Eating. Inner Ocean Publishing (April, 2004)

David M. The Slow Down Diet: Eating for Pleasure, Energy, and Weight Loss Healing. Arts Press (2005)

Koenig K. The Rules of "Normal" Eating: A Commonsense Approach for Dieters, Overeaters, Undereaters, Emotional Eaters, and Everyone in Between! Gürze Books (2005)

Motivational Interviewing

Dr. Bill Miller's Motivational Interviewing Homepage. www.motivationalinterview.org

MI Training for New Trainers (TNT) Workbook. www.motivationalinterview.org/training/tnt2004.pdf

Molly Kellogg Resources. www.mollykellogg.com

Manual for the Motivational Interviewing Skills Code (MISC). <http://casaa.unm.edu/download/misc.pdf>

Brief coding form to assess motivational interviewing practice. www1.od.nih.gov/behaviorchange/measures/mi.htm

Behaviour Change Counselling Index (BECCI) – A tool for assessing MI Practice in Clinicians (Scale and coding). www.cardiff.ac.uk/medicine/general_practice/csu

Physical Activity

The Physical Activity Resource Centre

A website managed by the Ontario Physical and Health Education Association. Provides educators and healthcare promoters with an online networking space. Available at: www.ophea.net/parc

Primary Health Care

Davidson B, Schneider T, Northmore D, West D, West E, Brauer P, Dietrich L (2007). Tips and Tools for Registered Dietitians Working in Interdisciplinary Primary Care. Dietitians of Canada. Link: www.dietitians.ca

Professional Resources

Emerson M, Kerr P, Del Carmen Sole M, Anderson Girard T, Hoffinger R, Pritchett E, Otto M (2006). American Dietetic Association: Standards of Practice and Standards of Professional Performance for Registered Dietitians (Generalist, Specialty, and Advanced) in Behavioral Health Care. Journal of the American Dietetic Association, 109(8), pages 608-613.

American Dietetic Association: Standards of Practice and Standards of Professional Performance for Registered Dietitians (Competent, Proficient, and Expert) in Disordered Eating and Eating Disorders (DE and ED).

<http://bhndpg.org/documents/SOPSOPPED2011.pdf>

Sullivan WF, Berg JM, Bradley E, Cheetham T, Denton R, Heng J, Hennen B, Joyce D, Kelly M, Korossy M, Lunskey Y, McMillan S (2011). Primary care of adults with developmental disabilities: Canadian consensus guidelines by. Canadian Family Physician, 57, pages 541 to 553. <http://www.cfp.ca/content/57/5/541.abstract>

Kennedy S, Lam R, Parikh S, Patten S, Ravindran A. Canadian Network for Mood and Anxiety Treatments (CANMAT) Clinical guidelines for the management of major depressive disorder in adults.

www.canmat.org/resources/CANMAT%20Depression%20Guidelines%202009.pdf

Canadian Network for Mood and Anxiety Treatments (CANMAT) and International Society for Bipolar Disorders (ISBD) collaborative update of CANMAT guidelines for the management of patients with bipolar disorder: update 2009.

www.canmat.org/resources/CANMAT%20Bipolar%20Disorder%20Guidelines%20-2009%20Update.pdf

Clinical Practice Guidelines for the Treatment of Schizophrenia by Canadian Psychiatric Association Working Group Members.

www1.cpa-apc.org:8080/publications/clinical_guidelines/schizophrenia/november2005/cjp-cpg-suppl1-05_full_spread.pdf

Psycho-Education Programs

Craving Change© Psycho-Educational Program

For more information about resources and training workshops go to: www.cravingchange.ca

Seniors

The Canadian Coalition for Seniors Mental Health (CCSMH) National Guidelines. Full text guidelines are available at www.ccsmh.ca/en/natlGuidelines/natlGuidelinesInit.cfm.

Special Populations in Mental Health Care

Calgary Urban Project Society. Shared Mental Health Care Project for the Homeless: Final project team report. 2003. Calgary Urban Project Society, Calgary, Alberta.

Puddicombe J, Rush B and C Bois. Concurrent Disorders Treatment: Models for treating varied populations. 2004. Centre for Addiction and Mental Health, Toronto, ON.

Rainbow Health Ontario. www.rainbowhealthontario.ca/home.cfm
Website provides LGBT health information and resources for LGBT people and health care providers.

Addressing Health Inequities for Racialized Communities: A Resource Guide by Health Nexus, 2011.
www.healthnexus.ca/projects/building_capacity/Final_resource_guide_English.pdf

This resource guide provides information for those who are working with racialized groups in promoting health and reducing health inequities.

Recovery through the lens of cultural diversity by Nora Jacobson, Deqa Farah, and the Toronto Recovery and Cultural Diversity Community of Practice, 2010.
www.wellesleyinstitute.com/wp-content/uploads/2010/07/RTLCD-report-jul0410.pdf

Suicide

The Role of Nutrition in Mental Health: Suicide. Canadian Mental Health Association.
www.mindingourbodies.ca/about_the_project/literature_reviews/suicide_and_nutrition

Appendix C: Medications and Their Nutrition-Related Side Effects

Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects^{611;612}

Group		Actions	Nutrition-Related Side Effects
Alcohol Abuse Deterrents (also known as alcohol sensitizing agents,” or “antidipsotropic medications”)			
Generic	Brand	Disulfiram: Blocks oxidation of alcohol causing unpleasant symptoms Acamprosate calcium: restores glutamate tone	Garlic or metallic taste Caffeine can ↑ drug effects Transient elevated liver function tests Avoid all products containing alcohol May ↑ blood cholesterol (dose related) ⁶¹³
Disulfiram	Antabuse®		
Acamprosate calcium	Campral®		
Citrated calcium carbimide	Temposil®	Antagonist at opiate receptor sites; highest affinity for the μ opiod receptor – inhibits increased endorphins during alcohol use	Acamprosate calcium: vomiting, diarrhea (usually transient), peripheral edema, weight gain Naltrexone: Nausea, vomiting, abdominal pain, anorexia, weight loss (women more sensitive)
Naltrexone	ReVia®, Depade®, Nodict®, Trexan®		
Analgesics/ Substance Use Treatment Drugs			
Generic	Brand	Acts on μ opiate receptor; blocks euphoria effects of administered opiates	Grapefruit and related juices can slow metabolism of drug Anorexia, nausea, vomiting, constipation, decreased appetite, weight changes, menstrual irregularities (with long term use), sleep disturbances
Methadone hydrochloride	Diskets®, Dolophine®, Methadose®, Metadol®		
Buprenorphine	Subutex®, Suboxone®	Opiate agonist (specific receptors); at high doses an antagonist	Insomnia, abdominal pain, constipation Increase in liver enzymes; cases of hepatic failure
Anticonvulsants/Antiepileptic			
Generic	Brand	Anti-seizure; some have mood stabilizing effects. Enhance inhibitory (mainly GABA-mediated) processes, ↓ excitatory (especially glutamate-mediated) processes; and modulate membrane conductance	Nausea, vomiting, ↓ appetite, heart burn, abdominal pain, weight ↑ (except topiramate and lamotrigine) or ↓, menstrual disturbances Obesity may ↑ risk of hyperandrogenism in females (may be given metformin 500 mg tid) GI complaints common; may be given ranitidine or famotidine Suggested calcium and vitamin D supplementation with use ≥ six months ⁶¹⁴ as can cause vitamin D deficiency Irregular menses and secondary amenorrhea Grapefruit and related citrus can slow metabolism of drug ⁶¹⁵
First-Generation			
Phenytoin	Dilantin®		
Second-Generation			
Carbamazepine	Tegretol®, Epitol®, Teril® (liquid), Carbatrol®, Equetro®		
Divalproex sodium	Epival ECT®, Depakote®		
Valproic acid	Depakene®		
Valproate sodium	Depacon®		

continued...

Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Anticonvulsants/Antiepileptic /cont'd			
Generic	Brand		Can ↓ folate and ↑ homocysteine; ↑ metabolism of vitamins D and K, calcium, biotin, and can alter blood glucose and lipids ^{616;617} Trembling of hands can affect food intake For divalproex sodium and valproic acid minor elevations of transaminases [(e.g. AST(SGOT) and ALT(SGPT))] and LDH frequent, serum bilirubin, hyperammonemia, hyperglycinemia Those taking topiramate should drink plenty of fluids and avoid regular use of antacids to prevent renal stone formation
Third-Generation			
Gabapentin	Neurontin®		
Lamotrogine	Lamictal®		
Oxcarbazepine	Trileptal®		
Topiramate	Topamax®		
Antinarcology/Drugs for ADHD/Stimulants			
Generic	Brand	Blocks reuptake of norepinephrine and dopamine	Anorexia, weight ↓, ↓ growth, hypertension, anemia Avoid caffeine Monitor height and weight in children (may need to go on drug holidays)
Psychostimulant			
Dextroamphetamine	Dexedrine®, Dexrostat®		
Lisdexamfetamine	Vyvanse®		
Methamphetamine	Desoxyn®		
Mixed salts amphetamine	Adderall XR®		
Methylphenidate	Ritalin®, Biphentin® Concerta®, Methylin®		
Methylphenidate transdermal patch	Daytrana®		
Dexmethylphenidate	Focalin®	Selective norepinephrine reuptake inhibitor	Dose based on body weight Upper abdominal pain, nausea, vomiting, decreased appetite, weight loss, insomnia Dry mouth, constipation May ↑ bilirubin Monitor growth during treatment
Atomoxetine	Strattera		

continued...

Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group			Actions	Nutrition-Related Side Effects
Antipsychotics Typical (“First Generation”)				
Phenothiazines			Block dopamine, which serves to alleviate psychotic symptoms but can cause a parkinsonian-like side effect	Tardive dyskinesia, dry mouth, constipation, weight ↑, abdominal pain, water intoxication, mouth ulcerations (possibly from agranulocytosis) Extrapyramidal side effects such as acute dystonia, parkinsonism, or Rabbit Syndrome (fast rhythmic movement of the lips) can affect eating and swallowing Limit caffeine Can ↑ need for riboflavin ⁶¹⁸ , vitamins D and K, calcium, biotin, and folate, and can alter blood glucose and lipids ^{616;617} Hyperprolactinemia – can alter menstrual cycle, and bone mineral density loss With phenothiazines can develop folate (folic acid) deficiency, probably because hepatic microsomal drug-metabolizing enzymes are affected Initial work-up include family history of CVD, dyslipidemias, and glucose dysregulation Waist circumference, weighth and BMI; every three months thereafter Avoid grapefruit juice with pimozide
Class	Generic	Brand		
Aliphatics	Chlorpromazine	Largactil®		
	Methotrimeprazine	Nozinan®		
Piperidines	Mesosidazine	Serentil®		
	Pericyazine	Neuleptil®		
	Pipotiazine palmitate	Piportil L4®		
	Thioridazine	Mellaril®		
Piperazines	Fluphenazine	Moditen®		
	Perphenazine	Modecate®		
	Thiopropazine	Moditen Enanthate®, Majeptil®		
	Trifluoperazine	Stelazine®		
Other Typical Antipsychotics				
Butyrophenones	Haloperidol	Haldol®		
	Haloperidol–decanoate	Haldol–LA®		
Thioxanthenes	Flupenthixol	Fluanxol®		
	Flupenthixol–decanoate	Fluanxol–Depot®		
	Thiothixene	Navane®		
	Zuclopenthixol dihydrochloride	Clopixol®		
	Zuclopenthixol–acetate	Clopixol acuphase®		
	Zuclopenthixol–decanoate	Clopixol–Depot®		
Dibenzoxdiapine	Loxapine	Loxapac®		
Diphenylbutylpiperidines	Fluspirilene	Imap®		
	Fluspirilene-forte	Imap–Forte®		
	Pimozide	Orap®		

continued...

Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group			Actions	Nutrition-Related Side Effects
Antipsychotics Atypical/Novel ("Second-Generation")				
Class	Generic	Brand	Same actions as the typical antipsychotic agents but they also block serotonin 5-HT ₂ , a property which may account for less extrapyramidal side effects	There is variation of effects among the types Tardive dyskinesia (uncommon), dry mouth, constipation, diarrhea, sweating, weight ↑ (up to 50% of people and average is 20% of weight; primarily adipose tissue), ↑ salivation, dyspepsia (olanzapine), water intoxication (uncommon), mucous membrane ulcerations Dysphagia Clozapine: Reflux esophagitis (11% incidence), sialorrhea with difficulty swallowing Can ↑ metabolism of vitamins D and K, calcium, biotin, and folate, and can alter blood glucose and lipids^{616;617} Anemia reported with asenapine, clozapine, iloperidone, lurasidone, and ziprasidone Pancreatitis within six months of risperidone, olanzapine, quetiapine, and clozapine Case reports of exacerbation of bulimia nervosa with risperidone and clozapine Dose-related parkinsonism commonly reported with lurasidone and risperidone Thyroid hormone effects with quetiapine Paliperidone and asenapine not marketed in Canada but may be available through Health Canada special access program Initial work-up include family history of CVD, dyslipidemias, and glucose dysregulation Waist circumference, weight and BMI; every three months thereafter Lurasidone should be taken with food (at least 350 calories) With high-fat meals (about 800 to 1000 calories) quetiapine exposure may be increase Ziprasidone must be taken with food (at least 500 calories); increases bioavailability 2-fold Grapefruit juice may increase levels of clozapine, iloperidone, quetiapine, and ziprasidone
Benzisox-azole	Risperidone	Risperdal [®] , Risperdal Consta [®]		
	Iloperidone	Zomaril [®] , Fanapt [®]		
	Paliperidone	Invega [®] , Invega Sustenna [®]		
Benzoiso-thiazol	Lurasidone	Latuda [®]		
Benzothia-Zolypiper-azine	Ziprasidone	Geodon [®] , Zeldox [®]		
Dibenzo-diazepine	Clozapine	Clozaril [®]		
Dibenzo-oxepino pyrole	Asenapine	Saphris [®] , FazaClo ODT [®]		
Dibenzo-thiazepine	Quetiapine	Seroquel [®]		
Thienoben-zodiazepine	Olanzapine	Zyprexa [®] , Symbyax [®]		
Indolone	Molindone	Moban [®]		
--	Aripiprazole	Abilify [®]		
--	Paliperidone	Invega [®]		
--	Ziprasidone	Zeldox [®]		

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group			Actions	Nutrition-Related Side Effects
Antipsychotics (“Third Generation”)				
Class	Generic	Brand	Reported to facilitate dopamine transmission in prefrontal cortex and striatum	Appears to have less metabolic effect than SGAs Initial work-up include family history of CVD, dyslipidemias, glucose dysregulation, waist circumference, weight and BMI; every 3 months thereafter Avoid grapefruit juice Constipation, dysphagia, nausea and vomiting (usually dissipates in first week)
Dihydrocarbostyryl	Apipiprazole	Abilify®		
Antiparkinsonians				
Class	Generic	Brand	↑ dopamine activity or ↓ acetylcholine activity in the central nervous system	Extrapyramidal side effects such as acute dystonia or parkinsonism which can affect swallowing or cause Rabbit Syndrome (fast rhythmic movement of the lips) Some types cause anorexia, nausea and vomiting Recommended to limit caffeine to less than 400 mg per day ⁶¹⁹
Anticholinergics	Benztropine	Cogentin®		
	Biperiden	Akineton®		
	Procyclidine	Kemadrin®		
	Trihexphenidyl	Artane®		
	Orphenadrine	Disipal®		
Antihistaminergic	Diphenhydramine	Benadryl®		
Dopamine agonist	Amantadine	Symmetrel®		
β-Adrenergic	Propanolol	Inderal®		
α-Adrenergic antagonists	Clonidine	Catapres®		
Benzodiazepines	Clonazepam	Rivotril®		
	Lorazepam	Ativan®		

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Drugs for Treatment of Dementia			
Cholinesterase Inhibitors		Believed to increase acetylcholine levels Nicotinic cholinergic receptors may regulate cognitive functions, such as attention	Nausea, vomiting, diarrhea, constipation, anorexia (all occur early in treatment) Elevated liver transaminases in about 50% in first 12 weeks of treatment
Piperidine			
Donepezil	Aricept®		
Acridine			
Tacrine	Cognex®		
Carbamate			
Rivastigmine	Exelon®		
Phenanthrene Alkaloid			
Galantamine	Radadyne®, Reminyl®		
Aminoadamantane		N-methyl-D-aspartate (NMDA) inhibitory properties thought to help with abnormal glutamate transmission	Minimize use of antacids (magnesium based) as alkalinization of urine (pH > 8) will reduce elimination
Memantine	Namenda®, Ebixa®		
Mood Stabilizers/Antimanics			
Generic	Brand	Lithium clears the synaptic cleft of neurotransmitters, as well as by limits release from nerve endings	Contraindicated in conditions requiring ↓ sodium intake; need to maintain consistent fluid and sodium intake Gastrointestinal upset (initial), thirst, polyuria (may persist), dry mouth, metallic taste (composition of saliva altered), edema, weight changes (gain in 60%), hyperglycemia (diabetes insipidus), hyperammonemia, acute pancreatitis, hypothyroidism, ↑ blood/serum calcium, phosphorous and magnesium ⁶²⁰ Weight gain (usually > 4 kg) may be related to ↑ appetite, fluid retention, altered carbohydrate and fat metabolism, hypothyroidism Hyperparathyroidism with hypercalcemia reported in 10-40% on maintenance therapy – may decrease bone density Lithium can impair uptake or release of iodine by the thyroid Caffeine intake should not be dramatically altered while taking lithium Also see anticonvulsants section (carbamazepine, divalproex sodium, valproic acid, topamax) Topamax may be prescribed off label to counter appetite increase of other medications
Lithium			
Lithium carbonate	Lithane®, Carbolith®, Lithmax®		
Lithium carbonate sustained release	Duralith®		
		See anti-convulsants for actions	

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group			Actions	Nutrition-Related Side Effects
Antidepressants				
Nonselective Cycle Antidepressants			Appear to block the reuptake of norepinephrine and serotonin, and to block muscarinic, acetylcholine, and histamine receptors.	Dry mouth, constipation, hypertension, nausea, vomiting, anorexia, abdominal discomfort, diarrhea, ↑ appetite especially for and carbohydrates, blood glucose Weight changes; weight ↑ in about 30% with chronic use; average gain 7 kg Peculiar taste, “black tongue”, glossitis High fiber may reduce drug effect ⁶²¹ ; suggest avoid ingest high-fiber food concurrently with medication May ↑ need for riboflavin ⁶¹⁸ Limit caffeine as can ↑ anxiety Tardive dyskinesia (reported mainly with amoxapine, but also seen in other antidepressants) Dry mucous membranes may predispose person to dental caries
Tricyclic antidepressant (TCA)				
Generic	Brand			
Amitriptyline	Elavil®			
Clomipramine	Anafranil®			
Desipramine	Norpramin®			
Doxepin	Sinequan®, Adapin®, Silenor®, Zonalon®			
Imipramine	Tofranil®			
Imipramine pamoate	Tofranil PM®			
Nortriptyline	Aventyl®, Pamelor®			
Protriptyline	Vivactil®			
Trimipramine	Surmontil®			
Dibenzoxazepine				
Amoxapine	Ascendin®			
Tetracyclic				
Maprotiline	Ludiomil®			
Serotonin-2 Antagonists/Reuptake Inhibitors (SARI)				
Triazolopyridine	Trazodone	Desyrel®, Oleptro®	Inhibits reuptake of serotonin	Akathisia (rare – check serum iron for deficiency) Dry mouth, constipation, weight ↑, peculiar taste, “black tongue”, glossitis, upper GI bleeding Avoid grapefruit juice; excess caffeine can ↑ anxiety Nefazodone was withdrawn in Canada in 2003 due to risk of hepatotoxicity
Phenylpiperidine	Nefazodone	Serzone®		
Norepinephrine Dopamine Reuptake Inhibitor				
Monocyclic	Bupropion	Wellbutrin®, Zyban®, Aplenzin®	Inhibit reuptake of norepinephrine mainly and dopamine to a lesser extent	Nausea, anorexia, and weight loss with acute and long-term treatment Dry mouth Caution with grapefruit and related citrus ↑ weight changes, dry mouth, nausea, vomiting, constipation Rare, upper GI bleeding ⁶²² Contraindicated in individuals with history of anorexia or bulimia Cases of hypoglycemia reported

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Antidepressants /cont'd			
Selective Serotonin Reuptake Inhibitors (SSRI)		Block the reabsorption (reuptake) of serotonin which causes downregulation of post-synaptic receptors Some SSRIs can inhibit reuptake of norepinephrine (i.e., fluoxetine, paroxetine) or dopamine (i.e., sertraline)	Transient effect: Nausea, vomiting, diarrhea, abdominal discomfort Dry mouth, constipation, sweating, anorexia, dyspepsia, insomnia Interact with diabetes medications (hypoglycemics, insulin), tryptophan ⁶²¹ Meta-analysis found that weight loss occurred with acute treatment of most SSRIs but not sustained with chronic treatment; tends to be more pronounced in those with excess weight. Weight gain reported up to 18% of people gain more than 7% body weight with chronic use; more frequently in female and with paroxetine use ⁶²³ May ↓ absorption of leucine ⁶²⁵ Dystonia, dyskinesia, parkinsonism or tics; more likely in older people Paraesthesias; may be caused by pyridoxine deficiency (give 50-100 mg/ pyridoxine per day) ↑ LDL cholesterol reported with paroxetine and sertraline Low body weight can induce SIADH with hyponatremia Monitoring of serum sodium suggested in elderly Osteoporosis: rate of bone loss higher in SSRI users; increased risk of fractures in women and older adults ⁶²⁵ Excess ingestion of caffeine may increase anxiety Sertraline should be given with food (increase peak plasma level) Grapefruit and similar product while taking fluvoxamine and sertraline may increase plasma level of drugs
Generic	Brand		
Phthalane Derivative			
Citalopram	Celexa [®]		
Escitalopram	Lexapro [®] , Cipralex [®]		
Bicyclic			
Fluoxetine	Prozac [®] , Safafem [®] , Prozac Weekly [®]		
Fluoxetine/olanzapine	Symbyax [®]		
Monocyclic			
Fluvoxamine	Luvox [®] , Luvox CR [®]		
Phenylpiperidine			
Paroxetine hydrochloride	Paxil [®] , Paxil CR [®] ,		
Paroxetine mesylate	Pexeva [®]		
Tetrahydronaphthylmethylamine			
Sertraline	Zoloft [®]		
Paroxetine			
Serotonin and Norepinephrine Reuptake Inhibitor or SNRI		Inhibits neuronal serotonin and norepinephrine receptors and weak inhibition of dopamine receptors	Dry mouth (common), constipation, sweating, hypertension, nausea (transient), vomiting, anorexia, abdominal discomfort, diarrhea, increase blood cholesterol Reduce growth in children Sedation or insomnia Cases of elevated liver enzymes, hepatitis, bilirubinemia, and jaundice with venlafaxine Excess caffeine may increase anxiety
Generic	Brand		
Venlafaxine	Effexor [®]		
Duloxetine	Cymbalta [®]		
Desvenlafaxine	Pristiq [®]		

continued...

Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Antidepressants / cont'd			
Monoamine Oxidase Inhibitors or MAOIs			
Irreversible MAOIs			
Generic	Brand	Nonselectively inhibit MAO-A and B enzymes which are involved in oxidative deamination of serotonin, norepinephrine, and dopamine	Interacts with hypoglycemics, insulin, tryptophan, ginseng, and tyramine rich foods and drinks. Limit licorice, caffeine, and avoid tryptophan supplements ⁶¹⁴ Dry mouth, constipation, hypertension, nausea, vomiting, anorexia, abdominal discomfort, diarrhea Paresthesias or “electric-shock-like” sensations; carpal tunnel syndrome reported; may be due to vitamin B ₆ deficiency (manage by giving pyridoxine 50 to 150 mg/day) Educate person about foods to avoid
Phenelzine	Nardil®		
Tranlycypromine	Parnate®		
Reversible Inhibitor of the A type of MAOI (RIMA)			
Generic	Brand	Selectively and reversibly inhibit the “A” type of the enzyme monoamine oxidase	Dry mouth, constipation, sweating, nausea, vomiting, abdominal discomfort, diarrhea, insomnia, galactorrhea in females Moclobemide should be given after food to minimize side effects
Moclobemide	Manerix®		
Noradrenergic/Specific Sertonerger Antidepressants (NaSSA)			
Generic	Brand	Increases release of norepinephrine and serotonin	Insomnia, dry mouth (common), constipation, diarrhea, bitter taste, dyspepsia Carbohydrate craving, increased appetite and leptin concentrations, weight gain(> 4 kg) in >16% of individuals (first four weeks of treatment) Cases of pancreatitis and gallbladder disorder
Mirtazapine	Remeron®		
Vilazodone			
Indolalkylamine		Dual 5-HT _{1A} receptor partial agonist and 5-HT reuptake inhibitor	Nausea, vomiting, insomnia, gastroenteritis
Generic	Brand		
Vilazodone	Viibryd		
Adjunctive Psychotropics			
Generic	Brand	Clonazepam may potentiate serotonin.	Salivation (clonazepam), anorexia, vomiting, diarrhea, dry mouth, increased appetite, abdominal pain, anemia, weight changes Excess caffeine counters drugs effects Grapefruit and pomegranate juice with clonazepam can increase drug effects (including side effects)
Clonazepam	Rivotril®		

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Adjunctive Psychotropics /cont'd			
Generic	Brand	L-tryptophan is a precursor to serotonin. Serotonin can be converted to melatonin	May be given with antidepressant or lithium treatment. Protein-reduced diet can cause an amino acid imbalance with L-tryptophan. Caution in people with family history of diabetes as diabetogenic effect reported. Vitamin B6 deficiency can result in elevated tryptophan metabolites. Contraindicated in malabsorption in upper bowel and achlorhydria
L-tryptophan	Tryptan®		
Antianxiety (Anxiolytic)/Sedative Hypnotics			
Benzodiazepines used mainly as tranquilizers (anxiolytics) ^a			
Generic	Brand	May serve as blocking agent by ↑ concentration of GABA, an inhibitory neurotransmitter.	Constipation, sweating, nausea, vomiting, diarrhea, weight changes, edema Limit caffeine to less than 400 mg per day ⁶¹⁹ Hypoalbuminemia may increase drug effects Grapefruit and pomegranate juice with alprazolam, diazepam, estazolam, quazepam, triazolam) can increase drug effects (including side effects)
Alprazolam	Xanax® , Niravam®		
Bromazepam	Lectopam®		
Diazepam	Valium® , Diastat® , Diazemuls®		
Estazolam	ProSom		
Flurazepam	Dalmane		
Lorazepam	Ativan®		
Midazolam	Versed®		
Nitrazepam	Mogadon®		
Oxazepam	Serax®		
Quazepam	Doral		
Temazepam	Restoril		
Triazolam	Halcion		
Benzodiazepines used mainly as sedatives ^a			
Bromazepam	Lectopam®		
Clorazepate	Tranxene®		
Chlordiazepoxide	Librium®		
Flurazepam	Dalmane®		
Nitrazepam	Mogadon®		
Temazepam	Restoril®		
Triazolam	Halcion®		
Flunitrazepam	Rohypnol®		

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Antianxiety/Sedative Hypnotics /cont'd			
Non-sedating anti-anxiety		Belongs chemically to the azaspirodecanediones. Does not block transporters of monoamines	Dry mouth, constipation, hypotension, hypertension, nausea, vomiting, diarrhea, appetite change, burning tongue, galactorrhea, amenorrhea, thyroid abnormality, edema
Azaspirone			
Buspirone	Buspar [®]		
Miscellaneous Sedatives			
Generic	Brand	Serotonin 5-HT _{1A} receptor partial agonist	Avoid grapefruit or related citrus ⁶²¹ Low sodium, low calcium diet may be recommended with propranolol
Chloral hydrate	Noctec [®]		
Chlormezanone	Trancopal [®]		
Hydroxyzine	Atarax [®]		
Meprobamate	Miltown [®]		
Promethazine	Phenergan [®]		
Propranolol	Inderal [®]		
Zopiclone	Imovane [®]		
Hypnotics/Sedatives			
Generic	Brand		
Antihistamines		Sedating antihistamines antagonize histamine receptors in the brain	
Diphenhy-dramine	Nytol [®] , Simply Sleep [®] , Sominex [®] , Unisom [®]		
Doxylamine	Unisom-2 [®]		
Hydroxyzine	Atarax [®] , Vistaril [®]		
Promethazine	Phenergan [®]		
Barbiturate (not recommended; habit forming)			Weight ↓, anorexia ↑ metabolism of vitamin D; rickets and osteomalacia have been reported following prolonged usage
Pentobarbital	Nembutal [®]	May enhance and/or mimic the synaptic action of GABA	
Secobarbital	Seconal [®]		
Benzodiazepine ^a		Refer to benzodiazepine section	
Chloral Derivative		May enhance GABA-receptor complex	↓ appetite Can affect renal, cardiac, and hepatic systems.
Chloral hydrate	Noctec [®] , Aquachloral [®]		
Cyclopyrrolone			Altered appetite, dry mouth, constipation, bitter taste
Eszopiclone	Lunesta [®]	Zolpidem, zopiclone, eszopiclone and zaleplon bind to GABA receptor subtypes	
Zopiclone	Imovane [®]		

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Table 10: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects - continued

Group		Actions	Nutrition-Related Side Effects
Hypnotics/Sedatives /cont'd			
Generic	Brand		Food significantly delay peak plasma level of zolpidem
Imidazopyridine Derivative			
Zolpidem	Ambien [®] , Edular [®] , Solpimist [®]		
Pyrazolopyrimidine			
Zaleplon	Sonata [®]		
Selective Melatonin Agonist			
Ramelteon	Rozerem [®]	Has high binding affinity for specific melatonin receptors	Ramelteon can ↓ testosterone and ↑ prolactin. Persons on this medication should avoid taking the drug with or after a high-fat meal
Sex-Drive Depressants			
Antiandrogen/Progestogen			
Cyproterone	Androcur [®]	Steroid	Main long-term effect of LHRH is decreased bone density – treatment with biphosphonates, calcium, vitamin D can reverse side effect Androgen deprivation may result in weight gain with increased visceral adiposity, impaired glucose tolerance, dyslipidemia and emotional disturbances ⁶²⁶
Progestogen			
Medroxy-progesterone	Provera [®] , DepoProvera [®]	Inhibit secretion of pituitary gonadotropins	
Luteinizng hormone-releasing hormone (LHRH)/ gonado- tropin-releasing hormone (GnRH) agonist			
Leuprolide	Lupron [®]	Synthetic LNRH agonist	
Goserelin	Lupon Depot [®] , Eligard [®] , Zoladex [®]	Synthetic analog of GnRH	
LNRH Antagonist/GnRH Blocker			
Degarelix	Firmagon	GnRH agonist	
Anti-androgen; 5-α reductase inhibitor			
Finasteride	Proscar	Inhibits conversion of testosterone into 5-α-dihydrotestosterone	
Selected Drugs for Treatment of Smoking Cessation/Nicotine/Tobacco Use			
Generic	Brand	Blocks the pleasant effects of nicotine (from smoking) on the brain	Nausea, constipation, xerostomia
Varenicline	Champix [®]		

^aThe classifications of benzodiazepines (i.e., antianxiety and sedative hypnotic) are based on advertising claims rather than pharmacological properties of the drugs; the main difference between the benzodiazepines lies in the half-life (T_{1/2}) and whether or not the drug produces pharmacologically active metabolites.

Appendix D: Substances of Abuse and Their Effects

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Hallucinogens (Psychedelics, Dissociatives and Deliriants): “Hallucinogens” are used to produce distortion of reality		
PCP (phencyclidine): <i>Angel dust, crystal, CJ, boatelephant, hog, horse tranquilizer, love boat, ozone, peace pill, rocket fuel (killer week, Peace, pill, wack, supergrass: PCP mixed with marijuana)</i>	Synthetic; sold as tablets, capsules, liquid, crystals, pastes or white or colored powder. Snorted, smoked, or eaten. When smoked, PCP is often used with a leafy material such as mint, parsley, oregano, tobacco or marijuana. General anesthetic used in veterinary medicine	"Dissociative" drug, distorts perceptions of sight and sound and produce feelings of detachment. Symptoms can mimic schizophrenia (delusions, hallucinations, disordered thinking, extreme anxiety). Symptoms can persist for a year after cessation. Long term effects include depression and weight loss. Potential prolonged, profound depression may affect eating patterns.
Ketamine: <i>Cat valium, green, K, ket, kit-kat, jet, special K, vitamin K, Ketaset®, Ketalar®</i>	Used in human anesthesia and by veterinarians. Made as an injectable liquid, in illicit use is evaporated to form a powder. Snorted, swallowed, or injected.	
Dimenhydrinate: <i>Gravol®</i>	Used to prevent and treat nausea and vomiting. Sometimes used for sedation.	
LSD (lysergic acid diethylamide): <i>Acid, cid, blotter, boomers, cubes, LBJ, microdot, peace pill, yellow sunshine, blue heaven, purple haze, Raggedy Ann, window pane, tabs, trips, or named after the image on the blotter paper</i>	Made from ergot, a fungus that grows on grains. LSD is applied to “blotter” paper (paper perforated into small squares). Squares or “tabs” may be coloured or have image printed on them. Liquid LSD is clear. Can also be found in thin squares of gelatin or applied to sugar cubes. Gelatin and liquid can be put in the eyes. LSD is taken orally.	Changes perception of time and distance, dilated pupils, ↑ body temperature, heart rate or blood pressure, ↓ appetite, dry mouth, and tremors. Long-term effects of sudden flashbacks or Hallucinogen Persisting Perception Disorder. May manifest long-lasting psychoses such as schizophrenia or depression. Not considered addictive. Potential prolonged, profound depression may affect eating patterns and cause weight loss.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Hallucinogens (Psychedelics, Dissociatives and Deliriants): “Hallucinogens” are used to produce distortion of reality / cont’d</i>		
MDMA (3,4-methyl-ene-dioxy-N-methylamphet-amine or 3,4-methyl-enedi- oxymeth-amphetamine): <i>Ecstasy, X, Adam, hug, hug drug, CK, M&Ms, roll, XTC, E, beans, love drug</i>	Synthetic drug with amphetamine-like and hallucinogen properties. Tablets often branded (e.g., Playboy bunnies, Nike swoosh, CK). A “club drug.” Taken as a capsule or tablet. Tablets may contain ephedrine (stimulant); dextromethorphan (DXM, a cough suppressant); ketamine; caffeine; cocaine; and methamphetamine. Can be smoked. “Sextasy” refers to combining anti-impotence medication (e.g., Viagra) with ecstasy.	Mental stimulation, emotional warmth, enhanced sensory perception, and increased physical energy. Adverse effects include nausea, chills, sweating, teeth clenching, muscle cramping, and blurred vision. After-effects can include sleep problems, anxiety, and depression. Repeated use may damage the cells that produce serotonin (regulates mood, appetite, pain, learning, and memory).
Mescaline (3,4,5-trimethoxybenzene-ethanamine): <i>Mesc, buttons, cactus, peyote</i> or Peyote (lophophora) (3,4,5-trimethoxy-phenethylamine)	Peyote is a small cactus containing mescaline which can be extracted. Also can be produced synthetically. Ingested as powder, tablet, capsule, or liquid. Peyote “buttons” are usually chewed or ground up and smoked.	Appear slowly but last up to 18 hours and similar to LSD. Other effects include ↑ body temperature, heart rate, blood pressure; ↓ appetite; sweating; sleeplessness; numbness, dizziness, weakness, tremors; impulsive behaviour; rapid shifts in emotion. Long term effects include depression and weight loss. Potential prolonged, profound depression may affect eating patterns.
Morning Glory Seeds (LSD active ingredient): <i>Flying saucers, licorice drops, heavenly blue, pearly gates</i>	Seeds eaten whole or ground, mushed, soaked, and solution injected	See LSD Commercial seeds are treated with insecticides, fungicides, and other chemicals and can be poisonous
Psilocybin: <i>Caps, magic mushrooms, sacred mushrooms, shrooms, caps, psilocin, purple passion, little smoke</i>	Psilocybin and psilocin are in some mushrooms. Psilocybin is similar to serotonin, and disrupts functioning of the serotonin system. Mushrooms can be eaten, brewed and consumed as tea, sniffed, smoked, injected, or powder mixed with drink.	Same as other hallucinogens as well as nervousness, paranoia, panic.
STP or DOM (2,5-dimetnoxy-4-methyl-amphetamine) or MDA (3,4-ethylenedioxy-amphetamine), PMA (paramethoxyamphet-amine)	Chemical variations of amphetamines and mescaline; also classified as stimulants. DOM is nicknamed STP (“Serenity, Tranquility, and Peace”). Usually sold as white or off-white powder. Taken orally, sniffed or injected. MDA is similar to MDMA. Usually brown or white powder sold loose, in capsules, or as amber liquid. Usually taken orally.	STP or DOM may last 24 hours. High doses produce LSD like effects. Adverse reactions include intense anxiety, panic and sometimes psychosis. MDA effects occur within an hour and last up to eight hours. Produces sense of well-being and heightened emotions. High dose effects like LSD. Long term effects include depression and weight loss. Potential prolonged, profound depression may affect eating patterns.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Hallucinogens (Psychedelics, Dissociatives and Deliriants): “Hallucinogens” are used to produce distortion of reality cont’d</i>		
PMA (paramethoxyamphetamines): <i>Death, Mitsu-bishi double stack, chicken yellow</i>	Tablets or caplets containing beige, white or pink powder. Taken orally; PMA powder may be inhaled or injected	Similar to mescaline and MDA, but more toxic. One of the most dangerous hallucinogens. Long term effects are unknown. Potential prolonged, profound depression may affect eating patterns.
Tryptamines: DMT (N,N-dimethyltryptamine): <i>Businessman’s trip, lunch-hour drug, FOXY (=MeO-DIPT)</i>	Hallucinogenic tryptamine. Usually parsley is soaked in DMT, then dried and smoked. Can be injected.	Effects last for about 60 minutes so is called a “businessman’s trip.” Snorting hastens effect. Similar to LSD, DOM, and MDMA. Long-term effects unknown.
2C-B (4-Bromo-2,5-dimethoxyphenyl-thylamine) or DOB: <i>Nexus, bromo, toonies, herox, synergy</i>	Like mescaline. In pure form, is a powder; also available as purple/red or white pills and yellow capsules. Take orally or snorted.	Intense hallucinations, nausea or vomiting. 2C-B can cause cardiovascular disturbances, and dehydration. Long-term effects of 2C-B or DOB unknown.
DXM (dextrometh-orphan): <i>Dex, robo, robotripping, DM, velvet, skittles, triple C, tussin</i>	Found in cough and cold medications. Available as syrup, tablet or gel cap. Can be bought in powder form, often over the Internet. Usually swallowed.	High doses produces dissociative effects like PCP or Ketamine. Long-term and nutrition effects include liver damage due to consumption of large quantities of acetaminophen.
5-MeO-DIPT: <i>Foxy methoxy, foxy, yum yum, roxy, dip foxy, muffy, five</i>	Hallucinogenic tryptamine, like psilocybin. Usually as tablets with imprints (heart, spider, alien heads) or as capsules containing bright-coloured powder. Tablets are swallowed while capsule powders can be swallowed, snorted, or smoked.	Peaks at 60 to 90 minutes and lasts 3 to 6 hours. Hallucinations, euphoria, visual and auditory distortions, nausea, vomiting. Potential prolonged, profound depression may affect eating patterns.
Salvia Divinorum: <i>salvia, diviner’s sage, magic mint, sage of the seers,</i>	Hallucinogenic plant native to northeastern Mexico; part of the mint family. Dried leaves can be smoked/ vaporized then inhaled like marijuana, or chewed then swallowed.	When smoked can last up to 15 minutes; when chewed 1 to 2 hours. Hallucinations, dizziness, lack of coordination, decreased heart rate, and chills.
1-(3-trifluoromethylphenyl) piperazine (TFMPP): <i>Molly, legal E, legal X, A2</i>	Hallucinogenic piperazine used as an anti-parasitic (de-worming) agent. Usually found as tablets with imprints or in capsules containing an off-white powder.	Similar to MDMA, but taken in larger doses promotes hallucinogenic reactions.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Depressants: Opioid Pain Relievers: Depressants slow down the central nervous system		
Codeine: 222 [®] , 282 [®] , 292 [®] , Codeine Contin [®] , ratio- Codeine [®] , Atasol [®] , Fior-inal [®] , Tylenol [®] . Morphine: MS-Contin [®] , Oramorph [®] , M.O.S. [®] , MS-IR [®] , ratio-Morphine SR [®] , M-Eslon [®] , Kadian [®] , Meperidine or Pethidine: Demerol [®] , Hydromorphone: Hydro-morph Contin [®] , Dilaudid [®] , Hydrocodone: Vicodin [®] , Oxycodone: ratio-Oxycodan [®] , Oxycontin [®] , Percocet [®] , Pentazocine: Talwin [®]	Opioids are commonly prescribed as pain relievers. Sometimes referred to as narcotics, opioids effectively change the way a person experiences pain. When abused, prescription pain relievers in tablet form are crushed to remove the sustained-release coating; crushed tablets can be used orally, sniffed, or dissolved in water and injected.	With large doses, pupils constrict to pinpoints, skin is cold, moist, bluish, and breathing may slow. When injected, there is a surge of pleasure that surpasses hunger, pain, and sexual urges. Long-term effects include severe constipation, constricted pupils, moodiness, menstrual irregularities. Other nutrition effects include impaired gastrin release, hypercholesterolemia, altered glucose metabolism, altered pancreatic function and altered calcium status. Symptoms of use can include teeth grinding. Tolerance develops rapidly.
Opium (Laudanum, paregoric): Big O, block, gum, hop, black stuff, black	Made from the white liquid in the poppy plant. Appears as a fine brownish powder, black/ brown block of tar-like substance, or liquid. Usually eaten or smoked Contains a number of alkaloids including morphine and codeine	Opioids decrease gastrointestinal motility and increase blood glucose levels. Same effects as codeine. People who use opiates are often distracted by the cycle of getting high, crashing and looking for another high, that eating and self-care are severely neglected ³²⁶
Heroin (diacetylmorphine) (diamorphine): Big H, H, horse, junk, smack, black tar, brown sugar, dope, mud, skag, stuff, lady, shill, poppy, skunk, white horse, China white; cheese	From morphine. Usually a white to dark brown powder. Black tar heroin sold in one ounce chunks. Injected into muscle, vein ("mainlining"), or under the skin ("skin popping"), smoked in a water or standard pipe, mixed in a joint or cigarette, inhaled as smoke through a straw ("chasing the dragon"), or snorted as powder.	Same as above but riskier because the purity and contents of dose are not known. Infections, abscesses, or ulcers at injection sites. Blood borne virus infections such as Hepatitis B, C or HIV. Same effects as codeine. Cost of heroin addiction results in need for money; continued use typically results in unstable living conditions. Changes in nutritional status results of nausea, vomiting, constipation, decreased stomach acid secretion, decreased activity of small and large intestines, constriction of gall bladder ducts, and decreased urine flow.
Morphine: "M", dreamer, sweet Jesus, junk, morph, Miss Emma, monkey, stuff	Principal active component of opium poppy Taken as powder, capsule, tablet, liquid, injected	Effects as for heroin, but slower onset and longer-acting.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Depressants: Opioid Pain Relievers: Depressants slow down the central nervous system		
Methadone: <i>Dolophine</i> ®, <i>Roxan</i> ®, <i>Methadol</i> ®, <i>dollies</i> , <i>the kick pill</i> , <i>meth</i>	Can be legally prescribed in Canada. Orally: orange-flavoured solution, tablets. Used as tablet, liquid, injected	Lasts to 24 hours; good as once-a-day administration in heroin detox and maintenance programs. Prolonged use results in tolerance. Withdrawal develops more slowly and less severe but more prolonged than heroin. Same effects as codeine. Also menstrual irregularities. A pilot case-control study of pregnant women on methadone treatment indicated they had lower BMI, consumed more calories, had lower serum carotenoid concentrations, and higher plasma homocysteine concentrations than controls ⁶²⁷ .
Fentanyl: <i>Duragesic</i> ®, <i>ratio-Fentanyl</i> , <i>Actiq</i> ®, <i>lethal injection</i> , <i>drop dead</i> , <i>fat Albert</i> , <i>the bomb</i> , <i>incredible hulk</i>	Used for anaesthesia and analgesia. May be smoked or snorted.	See opioid pain relievers (same effects).
Depressants: Prescription Tranquilizers, Sleeping Pills, and Other Depressants		
Benzodiazepines used mainly as tranquilizers (anxiolytics) - Diazepam: <i>Valium</i> ®, Oxazepam: <i>Serax</i> ®, Lorazepam: <i>Ativan</i> ®, Alprazolam: <i>Xanax</i> ®	Prescription medications that slow down normal brain function. Tranquilizers produce calm without sleep. Benzodiazepines can also be used to aid sleep but may produce morning and daytime drowsiness. Usually prescribed to treat anxiety and nervousness, relax muscles and control certain types of muscle spasms. Rohypnol is not approved in	Constipation, sweating, nausea, vomiting, diarrhea, weight changes, edema. Same effects as codeine. Hypoalbuminemia may increase drug effects.
Benzodiazepines used mainly as sleeping pills or sedatives - Temazepam: <i>Restoril</i> ®, Flurazepam: <i>Dalmane</i> ®, Triazolam: <i>Halcion</i> ®, Flunitrazepam: <i>Rohypnol</i> ®, <i>roofies</i> , <i>rope</i> , <i>the forget pill</i>	Canada but is legally available in some countries and smuggled primarily from Mexico. Rohypnol is odourless, colour-less, and tasteless. Benzodiazepines are dangerous when consumed with other depressants such as alcohol.	

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Depressants: Prescription Tranquilizers, Sleeping Pills, and Other Depressants /cont'd</i>		
Barbiturates/Other Sleeping Pills – Secobar-bital: <i>Seconal</i> ®, <i>reds</i> , <i>red birds</i> , <i>red devils</i> , Pento-barbital: <i>Nembutal</i> ®, <i>yellow jackets</i> , Amobarbital: <i>Amytal</i> ®, <i>blue heavens</i> , Amobarbital-secobarbital: <i>Tuinal</i> ®, <i>Christmas trees</i> , <i>rainbows</i> , Zopiclone: <i>Imovane</i> ®	Barbiturates are barbituric acid derivatives used as sedatives and hypnotics. Tranquillizers and barbiturates have similar effects, but barbiturates are stronger	Barbiturates are “downers.” They work by reducing the amount of activity in the brain and central nervous system and lead to feelings of calm. People develop tolerance to barbiturates faster than on tranquillizers. Over time, regular use of barbiturates can cause liver damage and blood problems. Barbiturates can affect memory and judgment. They can also create depression, anger, mood swings and extreme tiredness. Barbiturates decrease blood glucose levels. Can increase metabolism of vitamin D; rickets and osteomalacia have been reported following prolonged usage.
GHB (Gamma-hydroxybutyrate): <i>easy lay</i> , <i>G</i> , <i>gamma G</i> , <i>G-riffick</i> , <i>Georgia home boy</i> , <i>ghost breath</i> , <i>growth hormone booster</i> , <i>love</i> , <i>grievous bodily harm</i> , <i>liquid ecstasy</i> , <i>nature's Quaalude</i> , <i>soap</i> , <i>soapy</i> , <i>scoop</i> , <i>salty walter</i> , <i>goop</i> , <i>liquid X</i> , <i>liquid E</i> , <i>GBH (grievous bodily harm)</i> , <i>riffick</i> , <i>cherry menth</i> , <i>organic quaalude</i> , <i>somatomax</i>	A natural substance in the body resulting from the metabolism of GABA. Can be produced in clear liquid, white powder, tablet, and capsule forms. Odourless and colourless. Often made in homes with recipes and kits found and purchased on the Internet.	Effects described as “pleasant alcohol-like, hangover-free high with aphrodisiac properties.” Low doses can relieve anxiety. Can produce withdrawal effects, insomnia, anxiety, tremors, sweating, hormonal problems (stimulates growth hormone).

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Depressants: Prescription Tranquilizers, Sleeping Pills, and Other Depressants /cont'd</i>		
Inhalants/Aerosols. Solvents (paint, paint thinners, gasoline, glues); gases (butane, propane, aerosol propellants, nitrous oxide); nitrites (isoamyl, isobutyl, cyclohexyl) <i>sniff, laughing gas, poppers, snappers, whippets, rush, moon gas, locker room, bolt, boppers, head cleaner, air blast, buzz bomb, climax, glading (using inhalant), gluey, hippie crack, kick, medusa, oz, poor man's pot, quick silver, shoot the breeze</i>	Uses: 1) inhaled directly from container ("sniffing" or "snorting"); 2) placed in a substance-soaked rag over nose and mouth and inhaled ("huffing"); 3) poured into a plastic bag where the fumes are inhaled ("bagging"); or 4) "Torching – inhaling fumes discharged from cigarette lighter, then igniting the exhaled air. Pressurized liquids may be inhaled directly from the container or out of a other containers such as a balloon filled with nitrous oxide. Products include model airplane glue, nail polish remover, cleaning fluids, hair spray, gasoline, the propellant in aerosol shipped cream, spray paint, fabric protector, air conditioner fluid (freon), cooking spray and correction fluid.	Intoxication experienced within seconds of inhalation. Effects include slurred speech, lack of coordination, dizziness, delirium, nausea, vomiting, hallucinations, and delusions. Physical consequences that may affect nutritional status include depression, weight loss, damage to liver, kidney, brain, and neurons, as well as impaired blood cell formation leading to anemia.
Alcohol (ethyl alcohol or ethanol): <i>beer, spirits, wine, coolers, hard liquor, brew, liqueurs, booze, moonshine, brewski, shooters, barley sandwich, hooch, 40 pounder</i>	From fermentation of fruits, vegetables or grains. One shot of distilled spirits (40% alcohol) has the same amount of alcohol (0.54 ounces) as one 5-ounce glass of wine (13% alcohol) or one 12-ounce serving of beer (5% alcohol). Alcohol is also found in many toiletries (mouth wash, after shave), cooking products (vanilla extract) and household cleaners (Lysol®)	Euphoria, drowsiness, dizziness, flushing, release of inhibitions and tensions. Long-term effects are liver damage, brain damage, heart disease, oral cavity and pharynx damage, ulcers, disorders of the pancreas, poor blood circulation, and impotence. Increased risk of mouth/larynx and possibly breast cancer. Vitamin and trace mineral depletion (e.g., folate, vitamins A, D, E, and K, thiamin, riboflavin, niacin, pantothenic acid, biotin, vitamin C, vitamin B ₆ , zinc, calcium, magnesium, potassium, and selenium) from primary (dietary nutrient displaced by alcohol) or secondary malnutrition (from maldigestion and/or malabsorption). Beverages that alcohol are mixed with (e.g., soft drinks) can further promote weight gain.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Stimulants		
Cocaine: <i>Big C, blow, coke, flake, freebase, lady, nose candy, rock, snow, snowbirds, crack, white crack</i>	From coca leaves. One of the most powerfully addictive drugs. Distributed as: 1) cocaine hydrochloride – a fine powder often diluted with sugar, cornstarch or talcum powder and snorted or dissolved in water and injected; 2) “Crack” – chunk or “rock” form that is smokable, freebase form made by adding baking soda to cocaine solution and mixture dries.	Affects dopamine, epinephrine, and norepinephrine. Smoking has the most immediate intense experience. Once the drug leaves the brain, the user experiences a “coke crash”; depression, irritability, and fatigue. Long-term effects include paranoia and ulceration of the mucous membrane of the nose. Nutritional effects include weight loss and malnutrition (decreased appetite with sporadic binge eating) as many people who use cocaine are often distracted by the cycle of getting high, crashing and looking for another high, that self-care is severely neglected ³²⁶ . Increased incidence of eating disorders. Risks include heart attack and stroke, as well as HIV infection and hepatitis with needle sharing and drug’s immunosuppressive effects.
Prescription: Amphetamine: <i>Adderall®</i> , Dextroamphet-amine: <i>Dexedrine®</i> , <i>dexies</i> <i>Ritalin®</i> , (<i>kibbles and bits, pineapple</i>), <i>Tenuate®</i> , <i>Ionamin®</i>	Enhance brain activity. Usually found in tablets and capsules.	Nervousness, insomnia, loss of appetite, nausea, vomiting, dizziness, palpitations, changes blood pressure, skin rashes, abdominal pain, weight loss, digestive problems, and psychotic episodes. Long-term effects can result in feelings of hostility, paranoia, hallucinations, excessive repetition of movements, formication (sensation of bugs and worms crawling under the skin), seizures, heart failure, malnutrition, emaciation (appetite loss), kidney damage, susceptibility to infection, and sleep disorders.
Methamphetamine: <i>Desoxyn®</i> , <i>chalk, croak, crypto, crystal meth, fire, glass, tweek, tina, white cross, speed, crystal, meth, ice, crank, shard</i>	Addictive stimulant. “Crystal meth” is a very pure, smokeable form of methamphetamine. Meth is a crystal-like powdered substance that sometimes comes in large rock-like chunks. When the powder flakes off the rock, the shards look like glass. Meth is usually white or slightly yellow.	Immediate effects: intense sensation followed by high agitation. Other effects include insomnia, decreased appetite, anxiety, convulsions and heart attack. Chronic use: paranoia, hallucinations, repetitive behaviour, delusions of parasites or insects crawling under the skin, or strokes. Long-term users forego food, sleep and hygiene often “binge” until they run out of the drug or become too disorganized to continue. Smoking methamphetamine can lead to “meth mouth” which is permanent damage to teeth and gums resulting from the inhalation of the ingredients used to make amphetamine (e.g., anhydrous ammonia, battery acid, drain cleaner, camp fuel). Multiple drug use is common as amphetamine may counteract effects of alcohol, marijuana or benzodiazepines (or the converse; sedatives may counteract amphetamine effects).

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Stimulants /cont'd</i>		
Methcathinone: <i>Cat</i>	Structural analogue of methamphetamine and cathi-none. A white or off-white crystalline powder. Usually snorted; can be taken orally by mixing it with a drink or diluting in water and injecting intravenously.	Amphetamine-like effects.
Khat (<i>Catha edulis</i>): <i>Qat, kat</i>	From leaves of the <i>Catha edulis</i> shrub. The leaves, twigs, and shoots are usually chewed, held in the cheek and chewed intermittently to release the active drug. Dried plant materials can be made into tea or chewable paste that is not as potent. Can also be smoked or sprinkled on food.	Compulsive use may result in aggressive behaviour with grandiose delusions. Long-term effects are unknown. Can cause sores in the mouth and on tongue.
Tobacco (<i>Nicotiana tabacum</i>): <i>smokes, butt, square, cigs, ciggies, stogs, stogies, stokes, snouts, tabs, loosey, backwards, bogeys, boges, gorts, ciggy wiggy dilly's, darts, refries, straights, dugans, hairy rags, jacks, joes, grits, grants, tailies, fags, coffin nails, cancer sticks, lung darts, Sweet cancer, gaspers, black lungs</i>	Found in cigarettes, cigars, bidis, and smokeless tobacco (snuff, spit tobacco, chew) and contain the addictive drug nicotine. Nicotine is readily absorbed into the bloodstream when a tobacco product is chewed, inhaled, or smoked. A typical smoker will take 10 puffs on a cigarette over a period of 5 minutes that the cigarette is lit. Thus, a person who smokes about 1½ packs (30 cigarettes) daily gets 300 "hits" of nicotine each day. Nicotine stimulates the release of many chemical messengers including acetylcholine, norepinephrine, epinephrine, vasopressin, arginine, dopamine, autocrine agents, and β -endorphin = enhanced alertness, memory, concentration	Nicotine stimulates the central nervous system and increases blood pressure, respiration, heart rate, and blood glucose. Nicotine increases levels of the neurotransmitter dopamine, which affects the brain pathways that control reward and pleasure. Nicotine suppresses appetite and compromises sense of taste and smell. Stimulates hypothalamus to release antidiuretic hormone resulting in fluid retention, increased heart rate and blood pressure, and increased LDL (reduced HDL) cholesterol. Increases stomach acid flow and decreases stomach contraction, and interferes with calcium absorption. Decreases absorption of vitamin C and causes higher turnover. The tar in cigarettes increases a smoker's risk of lung, larynx, mouth, bladder, pancreas, and possibly cervix cancer, emphysema, and bronchial disorders. The carbon monoxide in smoke increases the chance of cardiovascular diseases. Increased risk of miscarriage or low birthweight babies.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Stimulants /cont'd		
Caffeine	Stimulant group called xanthines includes caffeine, theobromine and theophylline. Occurs naturally in products such as coffee, tea, chocolate and cola drinks, and added to various prescription and over-the-counter medications (e.g., cough, cold and pain remedies, diet pills). Energy drinks may contain both naturally occurring and added caffeine. In Canada, naturally occurring caffeine sources are not required by law to be listed as an ingredient on the label. Only added caffeine must be listed. Caffeine in energy drinks may come from plants, such as yerba mate (<i>Ilex paraguariensis</i>) and guarana (<i>Paullinia cupana</i>).	Too much caffeine can cause headaches, upset stomach, nervousness, insomnia, flushed face, increased urination, and muscle twitching. Larger doses can cause rapid heartbeat, convulsions and delirium. Daily doses of caffeine higher than 600 mg may cause insomnia, anxiety, extreme agitation, tremors and a very rapid and irregular heartbeat. Regular use of caffeine can make you physically dependent on caffeine. Long-term use of large amounts of caffeine (e.g., four cups of coffee a day) may be associated with loss of bone density, increasing the risk of osteoporosis. Postmenopausal women are especially at risk. Caffeine use appears to be associated with irregular heartbeat and may raise cholesterol levels, but there is no firm evidence that caffeine causes heart disease. Caffeine use is high among individuals with eating disorders.
Anabolic Steroids		
Oxymetholone: <i>Andraol-50</i> ®, Stanazolol: <i>Winstrol</i> ® and <i>Winstrol V</i> ®, Nandro-lone: <i>Deca-Durabolin</i> ®, Methandrostenolone or Methandrie-none or Metandienone: <i>Dianabol</i> ®, Oxandrolone: <i>Anavar</i> ®, Bolde-none: <i>Equipoise</i> ®, Methe-nolone/Metenolone: <i>Primo-bolan</i> ®, Mesterolone: <i>Pro-viron</i> ®, Testosterone Cypio-nate: <i>Depo-testosterone</i> ®, Testosterone Enanthate: <i>Delatestryl</i> ®, Testosterone Propionate: <i>Testex</i> ®, Testosterone Undecanoate: <i>Andriol</i> ® Juice, gym candy, pumpers, stackers, roids	Most anabolic steroids are synthetic substances similar to the male sex hormone testosterone. They are taken orally or are injected. Users frequently combine several different types of steroids to maximize their effectiveness while minimizing negative effects, a process called “stacking.”	Major effects of steroid abuse can include liver damage; jaundice; fluid retention; high blood pressure; increases in “bad” cholesterol. Also, males risk shrinking of the testicles, baldness, breast development, and infertility. Females risk growth of facial hair, menstrual changes, male-pattern baldness, and deepened voice. Teens risk permanently stunted height, accelerated puberty changes, and severe acne. All users, but particularly those who inject the drug, risk infectious diseases such as HIV/AIDS and hepatitis. Users may suffer from paranoid jealousy, extreme irritability (“roid rage”), delusions, and impaired judgment.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: Common Names	Description	Short-Term, Long-Term, and Nutrition Effects
Cannabis		
Marijuana: ace, aunt mary, bhang, blunt, boom, chronic (marijuana alone or with crack), dope, joint, blunts, gangster, ganja, grass, gold, hash, herb, hemp Hydro (hydroponic marihuana), indian hay, J, kif, locoweed, Mary Jane, Mexican, pot, ragweed, reefer, shit, sinsemilla, skunk, sticks, weed, 420 Hashish or hash oil: Hash, oil, honey oil	Products of hemp plant Cannabis sativa. Smoked as a cigarette (joint), in a pipe, or in blunts, which are cigars that have been emptied of tobacco and refilled with a mixture of marijuana and tobacco. Can be mixed in food or brewed as a tea. Active ingredient is THC (delta-9-tetrahydrocannabinol). Hashish is a reddish-brown or black coloured THC-rich resinous material of the cannabis plant. Hashish is collected, dried, and then compressed into balls, cakes, or cookie-like sheets. Hash oil is the refined extract of the cannabis plant and varies in colour from amber to dark green or brown (more potent).	THC acts upon cannabinoid brain receptors and influences pleasure, memory, thinking, concentrating, sensory and time perception, and coordinated movement. Long-term abuse can lead to addiction; likelihood increases among those who start young. A number of studies have shown an association between chronic marijuana use and increased rates of anxiety, depression, and schizophrenia. However, at this time, it is not clear whether marijuana use causes mental problems, exacerbates them, or reflects an attempt to self-medicate symptoms already in existence. Regular, heavy use may increase risk of bronchitis, lung cancer, memory loss, and decreased immunity. May lead to decreased nutritional health as individuals crave and consume foods with poor nutrient to energy ratios. THC can reach high levels in breastmilk
Herbal Products: Active ingredients include alkaloids, steroids, tannins, volatile oils, glycosides, gums, resins, and lipids		
Kava (Kava Kava): Ava Pepper, Ava Root, Awa, Gea, Gi, Intoxicating Long Pepper, Intoxicating Pepper, Kao, Kavain, Kavapipar, Kawa, Kawa Kawa, Kawa Pepper, Kawapfeffer, Kew, Lawena, Long Pepper, Malohu, Maluk, Maori Kava, Meruk, Milik, Piper methysticum, Poivre des Cannibales, Poivre des Papous, Rauschpfeffer, Rhizome Di Kava-Kava, Sakau, Tonga, Waka, Wurzelstock, Yagona, Yangona, Yaqona, Yaquon, Yongona	Sold over-the-counter for mild insomnia and anxiety. Active ingredients are kavalactones. Found in tea bags, powder, capsules, and pills.	Enhanced vision and mental alertness. Long term effects include liver damage.

continued...

Table 11: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: <i>Common Names</i>	Description	Short-Term, Long-Term, and Nutrition Effects
<i>Herbal Products: Active ingredients include alkaloids, steroids, tannins, volatile oils, glycosides, gums, resins, and lipids /cont'd</i>		
Guarana: <i>Zoom, Paullinia cupana, paullinia, Brazilian cocoa, guarana bread, guarana paste or gum</i>	South American herb with stimulant and appetite suppressant effects. Sold as natural stimulant and in various diet products. Usually taken as a powder, mixed with water or another beverage.	Upset stomach, loss of appetite, constipation or diarrhea, nervousness, irritability, or anxiety, sleeplessness, irregular heartbeats, or headache.
Yerba Mate (<i>Ilex paraguayensis</i>)	South American herb with high caffeine content. Contains three xanthines: caffeine, theobromine and theophylline Herbal ecstasy is a mix of caffeine, ephedra and other stimulants.	Flushing, nausea, vomiting, irritability, nervousness, increased urination and headache.

Table adapted from: National Institute on Drug Abuse (NIDA), Commonly Abused Drugs Chart, 2011, Alberta Health Services, NIDA (2010). InfoFacts: MDMA (Ecstasy), Center for Substance Abuse Research, Health Canada (2000). Straight Facts About Drugs and Drug Abuse, American Dietetic Association (2000). Table 45.1: Potential Nutritionally Significant Consequences of Long-Term Use of Specific Drugs.

Appendix E: Nutrition Screening and Care

SCREEN FORM - "When to Refer to a Registered Dietitian"

NAME OF PERSON:		COMPLETED BY:		DATE:			
Review all information. Write score in "Total" column. See background information for details					Score	Total	
1. Medical Factors							
Feeding tube					10		
Special diet (e.g., kind/ amount food, therapeutic or texture modified diet, food allergy or intolerance)					10		
Has a condition that would directly benefit from diet therapy (check (✓) all that apply):					10		
☐ Eating disorder ☐ Diabetes ☐ Skin breakdown (e.g. open areas, sores) ☐ Dementia, stroke with paralysis or Parkinson's ☐ Other ▶ _____							
Chewing/swallowing concerns (see background)					10		
Ongoing poor food or fluid intake or avoids at least one food group					5		
Needs eating aids/help with meals					5		
Mouth pain affecting food intake					5		
Prolonged nausea, vomiting, constipation or diarrhea					5		
More than 1 abnormal lab result (see background)					4		
Takes more than 5 medications or takes medications that affect nutrition (see background)					4		
Prolonged infection (e.g. respiratory, urinary, skin, Clostridium difficile)					4		
Has a condition where diet therapy can help treatment (check (✓) all that apply):					3 for each ✓		
☐ Heart Disease ☐ High Blood Pressure ☐ Osteoporosis ☐ Breathing/lung problems ☐ Gastroesophageal reflux (GERD) ☐ Hiatus Hernia ☐ Substance use ☐ Mental health condition (e.g., depressive disorder) ☐ Other ▶ _____							
2. Resources (has inadequate finances, lack of access to food or cooking facilities, homeless)					4		
3. Behavioural eating problems (see background)					3		
If person is between 20-65 years of age, review the following (see background for details)		Score		If person is between 2-20 years of age, review the following (see background for details)		Score	Total
Significant weight change		10		Any weight loss		10	
Appears underweight (BMI < 18.5)		5		Appears underweight		5	
Appears overweight (BMI > 30)		3		Appears overweight		3	

TOTAL OVERALL SCORE (see below for how to interpret) ▶ ▶

Do I Refer To A Registered Dietitian?

If total score is between 0-9 No referral needed. Do this form in one year for adults, 6 months for a child or in response to changing needs. Review any concerns with the person's physician.	If total score is 10 or more Are all conditions indicated currently being well managed by a health care professional? (✓ check one) ☐ Yes ▶ No referral needed ☐ No ▶ Refer
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Adapted from "SCREENING FORM - When to Refer to a Registered Dietitian" (pp 30-32) in: *Meals and more manual - a foods and nutrition manual for homes of adults and children with 24 persons or fewer in care*, British Columbia, Ministry of Health, 2008. Adapted with permission from Lisa Forster-Coull, Director, Population and Public Health, Ministry of Health, British Columbia, received October 29, 2012.

SCREEN FORM – Background

This screening form was originally designed for use in community-based facilities for adults and children and has been assessed for face validity by Registered Dietitians and care providers. Depending on the context and target group, this form may need to be adapted.

Special Diet: Includes any changes (amount, types or texture) that are needed in food or fluid intake, including diets for weight loss.

Conditions: Check (✓) each one that applies. The “Other” box is checked if the person has conditions such as ulcers, crohn’s disease, ulcerative colitis, ostomy, celiac’s disease, cancer, prader willi, cerebral palsy or pancreatitis or any other conditions known to benefit from diet therapy. Check with a dietitian if unsure.

Swallowing and Chewing Problems: This applies if the person has been diagnosed with dysphagia or a swallowing disorder or has any of the following warning signs:

Coughing, choking, drooling, pocketing food, gurgly-sounding or slurred speech during/after eating or drinking.	Lung congestion or chronic respiratory infection.
Complains food “gets stuck”, “goes down the wrong way” or frequent throat clearing. Refuses or avoids certain food(s).	Drowsiness or fatigue at mealtimes or unable to keep upright for entire meal.
	Takes more than thirty minutes to eat meal.

Abnormal Lab Results: Score 4 if any of these are abnormal: blood sugars (random, fasting), albumin, cholesterol (total, HDL, LDL), hemoglobin, hematocrit, ferritin, serum creatinine, hemoglobin A1c, prealbumin, total lymphocyte count, liver enzymes, triglycerides, potassium, sodium, folate, vitamin B₁₂, homocysteine or microalbumin.

Medications: Consider all types including PRNs (e.g., laxatives, antacids, enemas), vitamin and mineral supplements, herbal remedies, etc. when counting the total number taken. Also consider if any of the following are taken: Isoniazid (INH), antipsychotics, antiseizure medications, lithium, statins or monoamine oxidase inhibitors (MAOI).

Behavioural Eating Problems: Score 3 if person has behaviours such as hearing internal voices that affect food intake, eating non-food or unsafe food items, regurgitating or self inducing, taking excess fluids, hoarding food, eating very quickly, eating a limit range of foods (picky eater), consumes foods mainly from outside sources (fast-food outlets, vending machines), practices unhealthy eating behaviours (e.g., chronic dieting, use of laxatives, diuretics, diet pills), hyperactive, involuntary movements, etc.

Condition Where Diet Therapy Benefits Treatment: Check (✓) each one that applies. Total the number of checks, multiply by the score and enter the amount in the last column. Breathing problems include chronic obstructive pulmonary disease, congestive heart failure or lung diseases. Mental health conditions include schizophrenia or psychotic, bipolar, major depressive, substance use, autism spectrum, attention deficit hyperactivity disorders, etc. “Other” box is checked if the person has a condition which is not indicated and where diet therapy can help treatment. Check with a dietitian if unsure.

Body Measures: If it is difficult to measure weight (e.g. in wheelchair), seek help from a health care professional. Significant weight changes are defined as 5% in one month, 7.5% in two months, or 10% in six months. Do not use the Body Mass Index (BMI) for those who are pregnant or breastfeeding, less than 2 years or over 64 years. If the BMI is between 25 to 29, this is the “caution zone”. Where feasible, review and adjust food intake or activity level to prevent further weight gain or facilitate healthy weight loss.

<i>Height</i>	<i>Weight Range for BMI Category</i>	
Metres (feet and inches)	BMI 18.5–24.9 kg (lbs)	BMI 25–29.9 kg (lbs)
1.42 (4'8")	37-50 (81-110)	50.1-60 (110-132)
1.45 (4'9")	39-52 (86-114)	52.1-62 (114-136)
1.47 (4'10")	40-54 (88-119)	54.1-64 (119-141)
1.50 (4'11")	42-56 (92-123)	56-67 (123-147)
1.52 (5'0")	43-57.5 (95-127)	57.6-69 (127-152)
1.55 (5'1")	44.5–59.5 (98-131)	59.6-71.5 (131-157)
1.58 (5'2")	46-62 (101-136)	62.1-74.5 (136-164)
1.60 (5'3")	47.5-63.5 (105-140)	63.6-76.5 (140-168)
1.63 (5'4")	49-66 (108-145)	66.1-79 (145-174)
1.65 (5'5")	50.5-67.5 (111-149)	67.6-81 (149-178)
1.68 (5'6")	52-70 (114-154)	70.1-84 (154-185)
1.70 (5'7")	53.5-72 (118-158)	72.1-86 (158-189)
1.73 (5'8")	55.5-74.5 (122-164)	74.6-89 (164-196)
1.75 (5'9")	56.5-76 (124-167)	76.1-91.5 (167-201)
1.78 (5'10")	58.5-79 (129-174)	79.1-94.5 (174-208)
1.80 (5'11")	60-80.5 (132-177)	80.6-97 (177-213)
1.83 (6'0")	62-83.5 (136-184)	83.6-100 (184-220)
1.85 (6'1")	63.5-85 (140-187)	85.1-102 (187-224)
1.88 (6'2")	65.5-88 (144-194)	88.1-105 (194-231)

<i>Significant Weight Change</i>			
<i>PREVIOUS WEIGHT</i>	<i>1 MONTH - 5% CHANGE</i>	<i>2 MONTH - 7.5% CHANGE</i>	<i>6 MONTH - 10% CHANGE</i>
lbs (kg)	lbs (kg)	lbs (kg)	lbs (kg)
88 (40)	4 (2)	6.5 (3)	8.5 (4)
110 (50)	5.5 (2.5)	8 (3.5)	11 (5)
132 (60)	6.5 (3)	10 (4.5)	13 (6)
154 (70)	7.5 (3.5)	11.5 (5.3)	15 (7)
176 (80)	8.5 (4)	13 (6)	17.5 (8)
198 (90)	10 (4.5)	15 (6.5)	20 (9)

For children, if BMI is less than 5th percentile or greater than 95th percentile based on growth charts (see <http://www.dietitians.ca/Dietitians-Views/Tracking-Childrens-Growth.aspx>), referral to a dietitian is needed. Other indicators of growth and development include use of growth charts and sexual maturation ratings for adolescent females (e.g., age at menarche, gynecological age, presence of heavy menstrual bleeding, and current or past pregnancy history). Nutrition assessment would be indicated if there is delayed sexual maturation.

Screening Tools for Disordered Eating

Eating Disorder Screen for Primary Care (ESP)

1. Are you satisfied with your eating patterns?
2. Do you ever eat in secret?
3. Does your weight affect the way you feel about yourself?
4. Have any members of your family suffered with an eating disorder?
5. Do you currently suffer with or have you ever suffered in the past with an eating disorder?

Any person answering "yes" to two or more of these five questions is quite likely to have an eating disorder and needs referral.

Brief Eating Disorder Screen – SCOFF

1. Do you make yourself **S**ick because you feel uncomfortably full?
2. Do you worry you have lost **C**ontrol over how much you eat?
3. Have you recently lost more than **O**ne stone (7.7 kg) in a 3 month period?
4. Do you believe yourself to be **F**at when others say you are thin?
5. Would you say that **F**ood dominates your life?

Any person answering "yes" to two or more of these five questions is quite likely to have an eating disorder and needs referral.

Figure 6: Flowchart of Nutrition Care Management for Mental Health Conditions

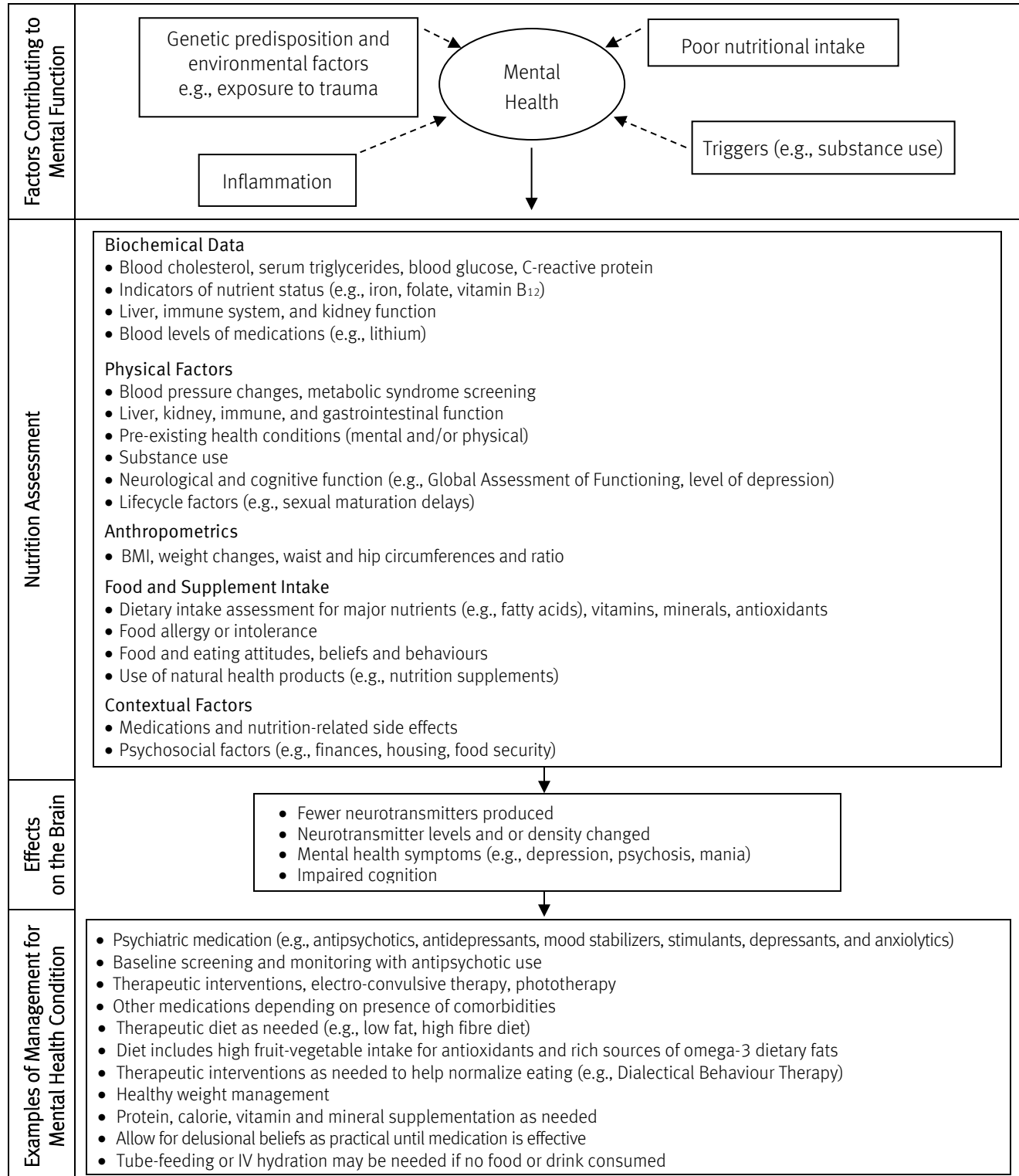


Figure derived from: Pharmacologic and nonpharmacologic strategies for weight gain and metabolic disturbance in patients treated with antipsychotic medications by Guy Faulkner and Tony A. Cohn, 2006. Adapted with permission from Dr. Tony Cohn, Centre for Addiction and Mental Health (CAMH) and University of Toronto, Toronto, ON, received November 6, 2012.

Appendix F: Case Examples

In Canada, there are examples of mental health initiatives that effectively implement nutrition components. The following outlines specific programs that are examples of collaboration in mental health and nutrition.

The Hamilton Health Services Organization Mental Health Nutrition Program

The program includes three components:

Mental health component: Each practice has a permanent counselor. A psychiatrist visits each practice for half a day every one to four weeks depending on practice size and need. Counselors and psychiatrists see patients referred by the family physicians and manage an array of pediatric and adult mental health problems. They also act as a resource to physicians.

Nutrition component: Each practice also has a Registered Dietitian (RD) who visits the practice for three hours to three days a week, depending on practice size. A RD can work in one to eight practices over the course of a week, although attempts are made to assign RDs to practices in the same geographic area to reduce traveling time.

The RDs assess consumers referred to them by the family physicians and initiate treatments or education programs according to need. The most common reasons for referral are dyslipidemias, Type II diabetes, and weight reduction related to medical problems. Weight management groups are run three to four times a year. Initial lipid classes are run in the majority of practices to reduce waiting times. Health promotion activities are currently focusing on pediatric, geriatric and prenatal populations. The RDs also serve as educational resources for the multidisciplinary team through case discussions, lunch and learns and presenting at grand rounds.

Central management team: Activities in individual practices are coordinated by a central management team. Some of their responsibilities include (re)allocating resources to practices, setting program standards, circulating educational materials, linking practices with local mental health and nutrition systems, and advocating on behalf of the program.

Specific benefits of the program have included increased access to timely and cost-effective services; distribution of up-to-date information on local mental health and nutrition services; guidelines, protocols, and standards for clinical activities; assisting practices in resolving problems; developing and organizing the program's evaluation; and representing and advocating for the program with other health service providers and the program's funding source.

The Cool Aid Community Health Centre, Victoria, BC

The Cool Aid Community Health Centre (CHC) was established as a clinic in 1970 and provides medical care and dental care for people who do not have health coverage, or who live in the downtown core, many of whom have psychiatric-related illnesses and/or other chronic health problems. In 2001, the CHC received provincial funding to develop the clinic into a comprehensive community health centre.

The centre endeavours to create an environment of trust and mutual respect between the staff and the clients it serves. Through an innovative team-based approach, the CHC provides primary health care, both acute and long term. Services at the CHC are designed to reduce the significant barriers facing the downtown population from accessing health services. Integral to the CHC is its location in the downtown core and the expanded hours of operations to include weekends.

A highlight of the unique service delivery at the CHC is the coordination of multiple entry points. For example, nurse practitioners, physicians, mental health and addictions counselors, dietitian, acupuncturist, pharmacist and pharmacist technician, dental clinic providing a full range of care, visiting specialists, such as psychiatrists, are all possible points of entry into accessing comprehensive health care.

Integrated with the primary health care function, the centre offers education to nursing and medical students, as well as family practice residents and physicians interested in inner-city medicine. The centre also has an outreach component that effectively integrates a holistic approach; the CHC takes its services to where the people are located, whether on the streets, in the drop-in centres, food banks, shelters or their homes. The outreach services also provide a full range of assessment, counselling and referral services for those with mental disorders, chemical dependence, as well as the homeless and those at risk of becoming homeless. This contact outside the CHC builds the necessary trust for consumers to then utilize the centre and the services offered. A Registered Dietitian is available for 2.5 days per week to provide nutrition education and counselling to a variety of people including those with mental health conditions.

Food is Mood Program

Northern Initiative for Social Action (NISA), Sudbury, Ontario

Run by and for consumers of mental health services, NISA is a consumer/survivor initiative in Sudbury Ontario. NISA's mission is to "develop occupational skills, nurture self-confidence and provide resources for recovery, by creating opportunities for participants to contribute to their own well-being and that of their community (NISA, 2009)."

Food is Mood Program was funded by Minding Our Bodies project through the Healthy Community Fund from the Ontario Ministry of Health Promotion and Sport. This three-month pilot program aimed to increase healthy eating amongst mental health consumers. Program components include food safety, cooking classes, and shopping on a budget, cookbook development through sharing of recipes.

The program partnered with Registered Dietitians and Community Food Advisors from the Sudbury and District Health Unit and Sudbury Regional Hospital. Dietitians delivered education sessions and supported development of a cookbook. The program also worked with The N'Swakamok Native Friendship Centre to establish new relationships and learn Aboriginal recipes (CMHA ON, 2012).

The program was able to increase social inclusion among participants and create partnerships with local agencies that are involved in nutrition promotion. Participants showed increased self-confidence in cooking and food safety practices and they indicated the need for this type of program (CMHA ON, 2011).

References

Northern Initiative for Social Action. (n.d.). *About NISA*. Retrieved March 16, 2012 from <http://nisa.on.ca/>
Canadian Mental Health Association, Ontario. (2012). *Food is Mood*. Retrieved March 16, 2012 from http://www.mindingourbodies.ca/program_directory/food_is_mood

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Healthy Buddies Program

The Healthy Buddies program was developed around the prescribed learning outcomes from the British Columbia Ministry of Education. The program's content is based on 3 main components of healthy living: being physically active, eating healthy foods, and having a healthy body image. The program's slogan ("Go Move!", "Go Fuel!", and "Go Feel Good!") emphasizes these 3 themes. Twenty-one healthy-living lessons have been designed and taught over the course of the school year.

The program involves pairing older students with younger students. At the beginning of the school year, students in 4th through 7th grade are paired with kindergarten through 3rd-grade buddies. Each week, students in 4th through 7th grade receive a 45-minute healthy-living lesson through direct instruction from the teacher. Students in 4th through 7th grade act as peer educators, teaching a 30-minute lesson to their kindergarten through 3rd grade buddy. Buddy lessons are delivered using a variety of techniques (e.g., presentations, games, art activities, etc). In the first half of the year, the buddy pairs learn how to be positive buddies and learned about the 3 components of a healthy life. In the second half of the year, they learn about the challenges to living a healthy life (e.g., the media) and how to overcome these obstacles. Each buddy pair also spend two 30-minute structured physical activity sessions per week in the gymnasium, which allows both classes (paired buddies) to participate simultaneously. Several steps are taken to decrease the potential variability in the performance between buddy pairs and to ensure that all younger buddies receive a similar experience. For instance, buddy pairs are changed once during the year, buddies away because of illness would be replaced by other buddies, and older buddies still developing in their leadership abilities would be paired with a more capable older buddy.

A brief description of the 3 themes of the Healthy Buddies program is provided below:

Regular Physical Activity: "Go Move!"

The buddy pairs spend two sessions per week doing 30-minute structured aerobic fitness sessions, called fitness loops. Each fitness loop incorporates a circuit, with a series of stations, designed around a theme (e.g., transportation fitness loop). Students are encouraged during the fitness loops to exercise vigorously, using self measured parameters of physical exertion (e.g., sweating, red in the face, etc). The school also participate in a school-wide healthy-living theme day, midway through the year. Each classroom prepares an activity and buddy pairs rotate through the different activities.

Healthy Eating: “Go Fuel!”

Students learn about nutritious and nonnutritious foods and beverages and were exposed to numerous examples of healthy foods throughout the program. Students’ learning are reinforced through exercises such as memory card games and visual art projects. Students learn about why we eat, about how the body uses fuel and about energy balance.

Healthy Body Image, Self-esteem, and Social Responsibility: “Go Feel Good!”

Students first learn about valuing themselves and others based on who they and others are on the inside. The Healthy Buddies program also addresses body-image and disordered eating issues by teaching kids about healthy growth and development and media literacy. Fitness loops are designed for every level of fitness so that the physical activity component aids in healthy body-image development. The peer-led structure are designed to facilitate social skills development as well as self-esteem and social responsibility through role modeling.

A more comprehensive description of the Healthy Buddies program can be obtained from their website:

www.healthybuddies.ca.



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