Dietitians of Canada
Les diététistes du Canada

The Role of Nutrition in Mental Health Promotion and Prevention (1)

The Role of Nutrition Care for Mental Health Conditions (2)

Nutrition and Mental Health: Therapeutic Approaches (3)

DECEMBER 2012

www.dietitians.ca | www.dietetistes.ca

The Role of Nutrition Care for Mental Health Conditions (2)

DECEMBER 2012

Advisory Team:

Jadine Cairns, M.Sc., R.D., Nutritionist, Day Treatment Program, Provincial Specialized Eating Disorders Program, Vancouver, British Columbia

Karen Davison, Ph.D., R.D., Intersections in Mental Health and Perspectives in Addiction Research Training Program, BC Centre for Excellence in Women's Health, Vancouver, British Columbia (Project Consultant)

Jennifer Grant-Moore, B.Sc., P.Dt., Clinical Dietitian, Eating Disorder Clinic, Capital Health, Halifax, Nova Scotia

Melanie Jaques, B.H.Ec., R.D., Revive Wellness Incorporated, Edmonton, Alberta

Linda Mailhot-Hall, B.Sc., R.D., Grey Bruce Health Services, Owen Sound, Ontario

Eric Ng, M.P.H., R.D., Knowledge Exchange Associate, Minding Our Bodies Project, Canadian Mental Health Association, Ontario, Toronto, Ontario

Jan Palmer, B.Sc., P.Dt., Clinical Dietitian, Food and Nutrition Services, Capital Health, Halifax, Nova Scotia

Christina Seely, B.Sc., R.D., Clinical Inpatient Dietitian, Regional Mental Health Care, London, Ontario

Elke Sengmueller, B.A.Sc., R.D., Registered Dietitian/Nutrition Therapist, Family Nutrition Counselling, Toronto/York Region and Mount Pleasant Therapy Centre, Toronto, Ontario

This paper, **The Role of Nutrition Care for Mental Health Conditions (2),** is the second of three papers derived from the Dietitians of Canada comprehensive role paper on nutrition and mental health, ***Promoting Mental Health through Healthy Eating and Nutritional Care.***

Contributing Authors – The Role of Nutrition Care for Mental Health Conditions (2):

Karen Davison
Jadine Cairns
Christina Seely
Eric Ng
Uppala Chandrasekera
Elke Sengmueller
Melanie Jaques
Jan Palmer

Suggested Citation – The Role of Nutrition Care for Mental Health Conditions (2):

Davison KM, Cairns J, Selly C, Ng E, Chandrasekera U, Sengmueller E, Jaques M, Palmer J for Dietitians of Canada. The Role of Nutrition Care for Mental Health Conditions. Toronto: Dietitians of Canada, 2012. Access at: www.dietitians.ca/mentalhealth.

The Advisory Team would also like to thank the following reviewers for their insight and comments:

Reviewers:

Carol Ayers, Law and Mental Health Program, Centre for Addiction and Mental Health

Uppala Chandrasekera, Planning and Policy Analyst, Canadian Mental Health Association

Dianne Drummond, Prevention & Health Promotion, Addiction and Mental Health, Alberta Health Services - Edmonton Zone

Michelle Gold, Senior Director, Policy and Programs, Canadian Mental Health Association, Ontario

Clifford Holloway, Owner, Daystar Counselling

Leanne Johnson, Soulfull Nutrition Counselling

Bonnie Kaplan, Professor, Department of Community Health, University of Calgary

Elisa Levi, Dietitians of Canada Aboriginal Network Chair

Nicole MacLellan, Registered Dietitian, Sherbourne Health Centre

Kelly Matheson, Registered Dietitian, Sherbourne Health Centre

Scott Mitchell, Director, Knowledge Transfer, Canadian Mental Health Association, Ontario

Victoria Smye, Assistant Professor, School of Nursing, University of British Columbia

Pat Vanderkooy, Manager, Public Affairs, Dietitians of Canada

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 Nº 220. http://www.who.int/mediacentre/factsheets/fs220/en/

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]. Dietitians of Canada (DC), the national professional association for dietitians, recognizes that there are many intersections between nutrition and mental health and for this reason they commissioned the development of a comprehensive document titled "Promoting Mental Health Through Healthy Eating and Nutritional Care". This paper derived from the larger document provides policy makers, practitioners, and other interested groups and individuals, with an evidence-based summary of the current literature about nutrition as a component of treatment for people with mental health conditions.

This document is the second in the series which includes:

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

Process

A structured literature search was conducted followed by extensive review of more than 280 resources to identify key themes. An integrative literature synthesis was then employed to outline the various intersections between nutrition and treatment for mental health conditions. The literature was organized into three main themes that included mental health conditions, their nutritional implications, and suggested interventions; nutrition screening and assessment for mental health conditions nutrition; and intersections between nutrition and mental health conditions as defined by the fifth edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). Based on the analyses in these three areas, suggestions to guide the future of nutrition care for mental health conditions are presented.

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 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, enhanced food security, 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. Currently, the evidence base linking nutrition as a component of treatment for mental health conditions appears strongest for neurodevelopmental disorders, schizophrenia spectrum and other psychotic disorders, bipolar and related disorders, depressive disorders, anxiety disorders, obsessive-compulsive and related disorders, trauma- and stressor-related disorders, somatic symptom disorders, feeding and eating disorders, sleep-wake disorders, substance use and addictive disorders, and neurocognitive disorders. Nutritional care is also of relevance for individuals with co-occurring conditions that have specialized needs.

Recommendations

The recommendations relevant to nutrition care for mental health conditions are summarized here. To review all recommendations of the full role paper on nutrition and mental health, readers should refer to the executive summary of the complete role paper. To better integrate nutritional and mental health services, the following recommendations are made:

1. Advocate for Nutrition and Mental Health Practice

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., how to manage nutritional side effects of psychiatric medications, nutrition guidelines for specific conditions). 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.

There is a need to develop and implement mental health content and/or field experience in nutrition training programs in the identification of and treatment 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.

2. 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. Participation of dietitians should be integrated into primary and specialty care teams and in vocation, education, and residential programs serving this population.

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.

3. 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.

4. Mental Health and Nutrition Research

More investigative work that examines the role of nutrition in mental health condition–based interventions is needed. 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

Tables

Figures

This paper is the second in a series of three papers derived from the Dietitians of Canada comprehensive role paper on nutrition and mental health, Promoting Mental Health through Healthy Eating and Nutritional Care. The three papers in the series are titled:

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

The Role of Nutrition Care for 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

1. Introduction

Mental health conditions are associated with long-lasting disability and with mortality through suicide, medical illness, and accidental death. The annual economic cost of mental health conditions in Canada has been estimated to be $51 billion[1]. By 2030, if trends continue unabated, mental health conditions will be the leading cause of disability in Canada. As current treatments offer only partial benefit[2], other options such as nutritional interventions that can augment standard care[3] need to be integrated.

Dietitians of Canada (DC), the national professional association for dietitians, recognizes that there are many intersections between nutrition and mental health and for this reason they commissioned the development of a comprehensive document titled "Promoting Mental Health Through Healthy Eating and Nutritional Care". This paper derived from the larger document provides policy makers, practitioners, and other interested groups and individuals, with an evidence-based summary of the current literature about nutrition care for mental health conditions.

2. Process

A structured literature search was conducted followed by extensive review of more than 280 resources to identify key themes. An integrative literature synthesis was then employed to outline the various intersections between nutrition and treatment for mental health conditions. The literature was organized three key themes that included: 1) Mental health conditions, their nutritional implications, and suggested interventions; 2) Nutrition screening and assessment for mental health conditions nutrition; and 3) The intersections between nutrition and mental health conditions as defined by the fifth edition of *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). Based on the analyses in these three areas, suggestions to guide the future of nutrition care for mental health conditions are presented.

3. Defining Mental Health Conditions

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). 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 1). 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 1: 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)	

4. 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 2). 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)[4]. Undernutrition is a well-documented occurrence in care settings. For example, one study[5] 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 malnutrition[5]. 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 reasons[6], 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 model[7] 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[8;9] also help in understanding differences in mental health needs and outcomes[10]. 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 difficult[11-14]. Stress is most often related to intersecting factors, such as poverty, unemployment, housing issues, and discrimination[14]; 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 use[15].

*Table 2: 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 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 2: 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
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 2: 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 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 2: 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
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 2: 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 4) 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 Hacket 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

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 action[16]: 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; combating 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.

In this document, 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 of the comprehensive role paper as well as the third paper in this series. 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 changes[17].

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 behaviour[18]. 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 eating[18]. 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 important[19]. 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 illness[20], such as disturbance of appetite. This implies that there are common biochemical pathways underlying mood, appetite, and disordered eating behaviour.

5. 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 endorphins[21].

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 supplementation[22] (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 radicals[23]. 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 mediations available in Canada are detailed in Table 4 (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 medication[24]; clinical observations have suggested that many people with mental health conditions are prescribed five or more psychiatric medications (including pain medications)[25]. 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" functions[26]. 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 youth[27], 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 low[27].

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[28;29].

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[30;31]. This practice issue identifies the importance of dietary interventions that lower blood cholesterol and present no risks.

6. Nutrition Screening and Assessment for Mental Health Conditions

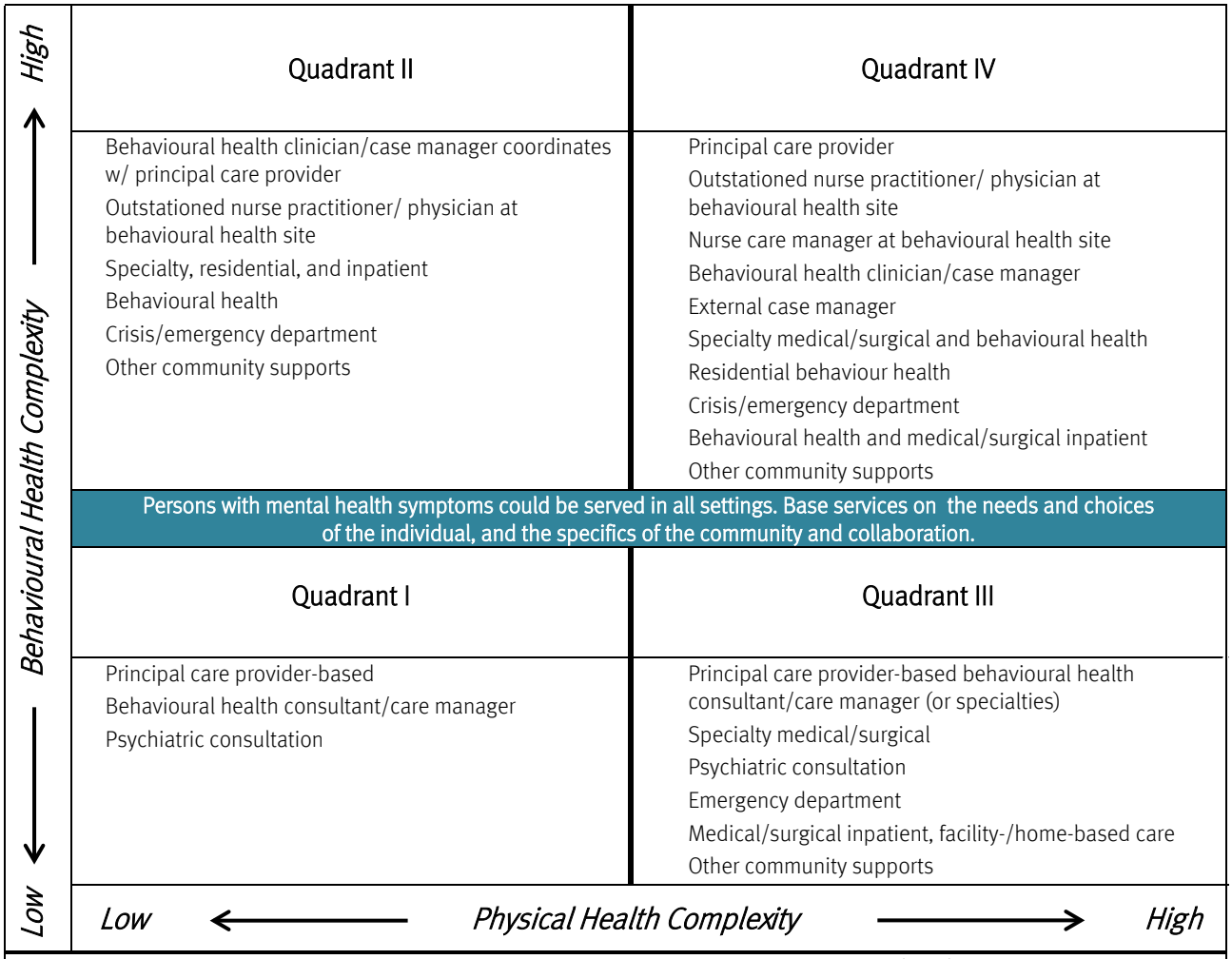
All individuals with mental health conditions should be screened for nutrition issues and be referred as needed for a more systematic assessment by a Registered Dietitian. Appendix E contains examples of screening tools. The purposes of nutritional care management in mental health conditions[32] are 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 3), 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 1) 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 1: The Four Quadrant Clinical Integration Model[33]



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).

7. Mental Health Conditions and Nutrition Practice

Mental health conditions as defined by the DSM-5[34] 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 docment 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 related[35].

7.1 Neurodevelopmental Disorders

7.1.1 Intellectual Developmental Disorder

Intellectual developmental disorder (IDD) includes both a current intellectual and adaptive functioning deficit with onset during the developmental period[35]. 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 problems[36]. Working with a Registered Dietitian can enhance quality of life by minimizing the effects of secondary conditions and prevent others from developing[37]. 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 community[38]; some may have multiple eating disorders[39;40]. 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 hospital[41].

7.1.2 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 impairment[42]. Dysphagia (swallowing problems) has been reported to positively correlate with communication disorders[43;44]. 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.

7.1.3 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 functioning[45]. 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 children[46] and the prevalence of ASD is increasing worldwide[47;48]. 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 E[49]. 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 limited[50]. 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 popular[50], 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 (for a detailed description, see Section 5 of the comprehensive role paper or the third paper of the series). 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 expense[51]. 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.

7.1.4 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 adults[52]. 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[53;54]. If the child is food sensitive, an additive-free diet (no food colours or preservatives) may improve symptoms[55] 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 behaviour[56]. 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

severity[57]. Some studies show lower levels of docosahexaenoic acid (DHA) and arachidonic acid (ARA) in children with hyperactivity[17]. 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 4). 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 growth[58].

7.1.5 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 abilities[35]. 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 nutrition[59]. Many people with learning disorders are unable to understand the written educational tools; targeted, individualized nutrition interventions are therefore needed[60]. Best practices guidelines for nutritional care of adults with a learning disability in care settings are available to provide further guidance[60].

7.1.6 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 disorders[59]; these are commonly associated with attention deficit hyperactivity and obsessive-compulsive disorder[61]. 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 sports[62].

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 life[63] and most find food to be highly motivating[64]. Eating skills can be improved through

use of a prompting and reinforcement strategy[65] and guided eating[66].

7.2 Schizophrenia Spectrum and Other Psychotic Disorders

One in 100 Canadians has some form of schizophrenia spectrum or other psychotic disorder[67]. The different types are described here.

7.2.1 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 schizophrenia[35]. 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 women[68]. 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 common[69].

7.2.2 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 symptoms[35]. Schizoaffective disorder is described as a mood disorder (e.g., major depressive or manic episode) combined with psychotic symptoms characteristic of schizophrenia[35]. 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 consequences[70]. 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 disease[71-73], anxiety, depression, post-traumatic stress disorder, obsessive-compulsive disorder[74], and substance use[75;76]. Some studies also

suggest an elevated risk of lung and esophageal carcinomas related to smoking and alcohol consumption[74]. 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[77;78] 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 screening[79]. 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 diabetes[80]. Up to 70% of individuals 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 individiuals with schizophrenia was indicated to be 44%[81].

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 therapists[82]. Some studies have suggested that an a priori increased risk of obesity[83], impaired fasting glucose (while not taking drugs) and insulin resistance[84;85] seems to be associated with the diagnosis of schizophrenia. This would suggest that people with schizophrenia would lifely 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 food[86]. 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 readiness[87].

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 started[88]. Results of studies of omega-3 fatty acid supplementation in this population are not conclusive[89].

7.3 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 symptoms[35]. 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 condition[90]. Up to 65% of people with bipolar disorder meet the criteria for at least one comorbid mental health condition[91;92]; 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)[92]. Suicidal behaviour in bipolar disorder is among the highest of any mental health condition[93].

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[94;95], 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[96;97]. 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 food[98]. Antipsychotic medications are often prescribed as treatment for this condition, which contributes to weight gain and metabolic disturbance[80] 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 for[99]. 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 episodes[100]. If folate supplementation is warranted, it may mask a deficiency of vitamin B_{12}; therefore, supplementation with vitamin B_{12} should also occur.

7.4 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)[101]. Canadian estimates of lifetime prevalence of major depression are 12.2%[102]. 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 depression[103]. Folate (with vitamin B_{12}) and omega-3 fatty acids (eicosapentaenoic and docosahexaenoic acid) supplementation may be beneficial as an adjunct treatment[100;104]. 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 B_6, vitamin B_{12}, and folate status[105;106]. 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 products[107]. While these programs appear to have reduced the prevalence of neural tube defects[108], 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 concern[109], including studies that suggest that some people with depression have a specific genotype that reduces blood levels of this nutrient[110].

7.5 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 impairment[111]. 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)[112]. 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)[113]. 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 condition[114] 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 day[17].

7.6 Obsessive-Compulsive and Related Disorders

Obsessive-compulsive disorder (OCD) includes recurrent obsessions or compulsions that interfere significantly with personal or social functioning[17]. 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 issues[115].

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%[116]. TTM has also been linked with mood, anxiety, and substance use disorders[117]. Individuals with a skin picking disorder pick their skin repeatedly, which can cause sores severe enough to require surgery[117]. 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%[118;119] 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 trichobezoars[120], that lodge in the gastrointestinal tract[121] and lead to gastrointestinal obstruction, gut perforation, acute pancreatic necrosis, obstructive jaundice, hypochromic anemia, vitamin B_{12} deficiency, and weight loss[122], 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[122]:

1. calories equal to 30 to 35 kilocalories per kilogram of body weight;
2. 1.25–1.5 grams of protein per kilogram of body weight for positive nitrogen balance;
3. 30 ml of fluid per kilogram of body weight to prevent dehydration; and
4. a balanced diet that meets the Recommended Dietary Allowances for all nutrients.

Supplemental nutrition may be needed to meet these dietary requirements[122]. 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, lycine, 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 OCD[123].

7.7 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 team[124].

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 extensively[125].

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 vomiting[126]. The Registered Dietitian may incorporate a variety of therapeutic interventions, 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.

7.8 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 disorder[35]. 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 misuse[127]. 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 disorders[128]. 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.

7.9 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)[35]. 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 men[129]. 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 water[129]. 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 dysfunction[130]. 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.

7.10 Feeding and Eating Disorders

7.10.1 Eating Disorders

This group of conditions includes anorexia nervosa, bulimia nervosa, and binge eating disorder and is diagnosed based on psychological, behavioural, and physiologic characteristics[131]. Eating disorders have morbidity and mortality rates that are among the highest of any mental health condition[132]. 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 disorder[131]. 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 in 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 criterion[133]. 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 subtype[134]. Many of those with the restricting subtype will eventually develop binge eating, with at least one-third of people with AN restricing subtype crossing over into bulimia nervosa (BN)[135]. Crossover to binge eating and BN typically occurs within the first five years of the condition[253]. Women with AN who develop BN are likely to relapse back into AN[253].

The outcomes associated with AN are poor as only 35% to 85% recover and recovery times range from 57 to 79 months[136]. AN is one of the most medically serious mental health conditions[137] 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 AN[138]. Depression, a consequence of poor caloric intake and low weight, is frequently comorbid with AN and often resolves with refeeding[139]. Anxiety symptoms are common and often precede the development of the condition[140].

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 death[141]. 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 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 treatment[142]. 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 diets[134]. As with AN, people with BN may place undue emphasis on their body shape and live in fear of gaining weight[134]. 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 AN[135].

Many more women than men have BN. The affected person is usually aware that their 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 the eyes (from the strain of vomiting), pouch-like look to the corners of the mouth due to swollen salivary glands, rashes and pimples, small cuts and calluses across the tops of the 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, it is proposed that 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 control[134]. Additional symptoms include feeling uncomfortably full, eating rapidly, eating alone, eating when not hungry, and feeling disgusted afterward[143]. 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%[142] but is much higher in weight-management settings (30%) and among those who are severely obese (50%)[144]. BED occurs in both men and women and affects many diverse populations and a broad age range (those aged 25–50 years)[142]. 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 weight[142]. 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 itself 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 the challenges of having BED and the need for lifestyle changes pre- and post-surgery will be required[131].

7.10.2 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 of comprehensive role paper or the third paper in the series) 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[131;145]. Eating disorders are often found with conditions such as depression, anxiety, body dysmorphic disorder, chemical dependency, or personality disorders which require additional counselling skills[146].

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, stress management, and spirituality may lead to alternative thoughts and behaviours to reduce food preoccupation, mealtime anxiety, and disorders related to food[147;148]. Telemedicine and Internet-based delivery offer potential sources for help for individuals with bulimia nervosa and binge eating disorders[131].

7.10.3 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 disorders[149]. 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 food[134]. 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 BN[149].

Night eating syndrome (NES) was initially described by Stunkard et al.[150] 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[151;152]. Typically viewed as a long-term circadian shift in eating behaviours, NES may be exacerbated by stress[153]. 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 awakenings[154]. 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)[155]. 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 population[151].

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 NES[152]. 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.

7.10.4 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 age[155]. 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 perspectives[156] 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 satiety[156]. 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 tension[157].

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 disabilities[158]. It has been noted in 8.1% of pregnant African-American women in the United States[159] and 8.8% of pregnant women in Saudi Arabia[156;160]. Katsoufis et al.[161] 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 lead[162] 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 infestations[156]. The formation of bezoars has been associated with pica[162]. Bezoars (also described in Section 7.6.2) 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 intestine[164], cholestasis, malnutrition, and protein-losing gastroenteropathy[165]. richobezoars 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 contacted[158]. Behavioural approaches that combine reinforcement and response reduction are effective in reducing pica for those with intellectual disabilities[158]. 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 out[35]. 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 pneumonia[166]. 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 juice[167]. In a case study of habit reversal to treat rumination by a child[168], 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.

AFRID 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 ARFID[35]. 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.

7.11 Elimination Disorders

The elimination disorders include encopresis and enuresis[35]. 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.

7.12 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 normally[168]. 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).

7.12.1 Insomnia Disorder

The main complaint of a person with insomnia disorder is dissatisfaction 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[169]. The sample included 43 participants with primary insomnia (22 in the supplemented group, 21 in the placebo group) aged 78.3 ± 3.9 years. Participants took a food supplement (5 mg melatonin, 225 mg magnesium, and 11.25 mg zinc, mixed with 100 g of pear pulp) or placebo (100 g pear pulp) every day for eight weeks, one hour before bedtime. Measures of sleep quality were taken and total sleep time was evaluated using an armband-shaped sensor. The food supplement resulted in considerably better overall sleep quality. However, more research is needed to determine the generalizability of the findings.

7.12.2 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 hypersexuality[170]. 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[170;171]. Management for KLS is mainly supportive with attention to skin, bowels, bladder, and nutrition during phases of impaired consciousness and withdrawal[172]. Some may take stimulants for sleepiness[173] 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.

7.12.3 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 appetite[174]. 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[175-178]. Some studies suggest both lower basal metabolism and subtle changes in eating behaviour lead to positive energy balance and weight gain[179]. 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 disorder[179]. Other research has also suggested that binge eating occurs in people with narcolepsy[180].

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 Questionnaire[181]. 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.

7.12.4 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.

Because obesity is common in OSAHS, it is thought that nutrition might play an independent role in the modulation and development of the condition. Currently the 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 limited[182]. Specific nutritional supplements have been proposed for the modulation of oxidative and inflammatory aspects of OSAHS, mostly with inconclusive results[183]. Among experimental evidence, a diet rich in pro-oxidants and limited in antioxidants can exacerbate the tissue injury typical of OSAHS, thus contributing to cognitive decline[184]. One study on military veterans with OSAHS demonstrated a significantly lower intake of vitamin E and other antioxidants (e.g., folate, vitamin C) compared with that of veterans without the condition[185]. Nutritional supplements might prove beneficial as an adjuvant treatment for OSAHS, but current management remains centred on weight reduction and CPAP.

7.12.5 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 present[35]. Circadian rhythm sleep disorder is a persistent or recurring pattern of sleep disruption resulting in alterations in a person's 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 of 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)[186].

7.12.6 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 impairment[35]. 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 disease[187]. Restless legs syndrome is a night-time neurological disorder, with throbbing, pulling, creeping, unpleasant sensations in the legs and an uncontrollable urge to move them[188].

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 sleep[189].

7.13 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 difficulty[190]. 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 exercise[191]. 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 score[192]. 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.

7.14 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 consequences[35]. 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 problems[193-195].

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 disorder[196]. 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 kleptomania[197] and intermittent explosive disorder[198]. A randomized, placebo-controlled trial of a multinutrient supplement in a prison setting showed significantly lowered antisocial and violent behaviour[199]. 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 aggression[200]. In these observational studies, confounding is a concern and roles of natural vs synthetic dTFA were not separated.

7.15 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.

7.15.1 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 adolescents[201]. 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.

7.15.2 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 5), 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 5). 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 death[202]. Substance use is frequently concurrent with a mental health condition[203]; 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 alterations[204]. 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 tobacco[205].

The abuse of substances is associated with deficiencies of many nutrients, including thiamin; niacin; folate; pantothenic acid; biotin; vitamins B_6, B_{12}, C, A, D, E, and K; zinc; calcium; magnesium; iron; potassium; and selenium; and imbalances in amino acid storage and protein synthesis[32]. 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 cancer[32].

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.

7.15.3 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 counselling[206]: 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 and careful monitoring is needed. 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 seizures[32]. 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 days[206]. Sometimes a multivitamin/mineral supplement will also be provided. When the gastrointestinal tract has been severely damaged, short-term intravenous nutritional therapy may be required to bypass the gut[207].

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-being[209]. Some research suggests use of amino acid supplementation to restore serotonin, dopamine, enkephalins, taurine, and gamma-aminobutyric acid[210]. Supplementation with phenylalanine, a precursor of tyrosine, has been shown to increase mood and motivation, and to indirectly decrease drug cravings[211]. Tryptophan supplementation during the early stages of alcohol detoxification may reduce the number and intensity of withdrawal symptoms and may possibly improve cognitive functions[212].

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, work with clients to discover why they allow themselves to get hungry, and work on methods to help clients avoid becoming too hungry. 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 foods[213]. High-dose vitamin and mineral supplementation for the water-soluble vitamins (e.g., one to three times the recommended standards) and provision of fat-soluble vitamins at the recommended standard levels may be indicated for nutritional repletion in the early stages[214]. During withdrawal and recovery some individuals may try to substitute other substances which can trigger relapses; for example, anticholinergic hallucinogens, which naturally occur in plants, foods, and herbs. Mescaline from the peyote cactus[215], s*alvia divinorum*, nutmeg, and mace contain small amounts of the psychoactive ingredient myristica oil[333]. Others may consume excess sugar or sweet foods, caffeine, food (compulsive overeating), or nicotine. These substance substitutions, can compromise nutritional health, perpetuate the

behavioural aspects of addiction, and cause weight gain[216]. Those taking protection drugs such as Antabuse will need to be educated about foods that contain alcohol and that should be avoided (e.g., flavour extracts, cooking wines, some medications, ciders, vinegars)[216].

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 but not reduce abstinence. One study showed a very low-calorie diet increased abstinence but did not prevent weight gain in the longer term[217].

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

In summary, whatever the type of substance used, nutrition is a powerful ally in the process of recovery, particularly during the initial stages of detoxification. A varied diet rich in healthy carbohydrates, good quality proteins (lean meat, fish, and vegetable proteins), fruit and vegetables, essential fats (oily fish, nuts), and drinking lots of water[218] helps the recovery process.

7.15.3 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 gamblers[218]. 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.

7.16 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.

7.16.1 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 conditions[219] 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 months[220]. 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 age[219].

The prevalence of delirium among seniors admitted to hospital has been estimated at 10%–70%, depending on the population studied and the method used[219-222]. 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 detected[219]. 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 delirium[223].

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 lithium[219]. Polypharmacy is common among seniors and this contributes to the risk of delirium[224].

Figure 2 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 B_{12})[225], 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 deficits[226]. Alterned 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 potential[227]. 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 requirements[228].

The treatment of delirium includes ensuring quality care such as receiving proper food, water, and sleep[229]. Guidelines for the treatment of delirium from Canada[229] and the United Kingdom[230] 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).

Because of the serious health risks 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.

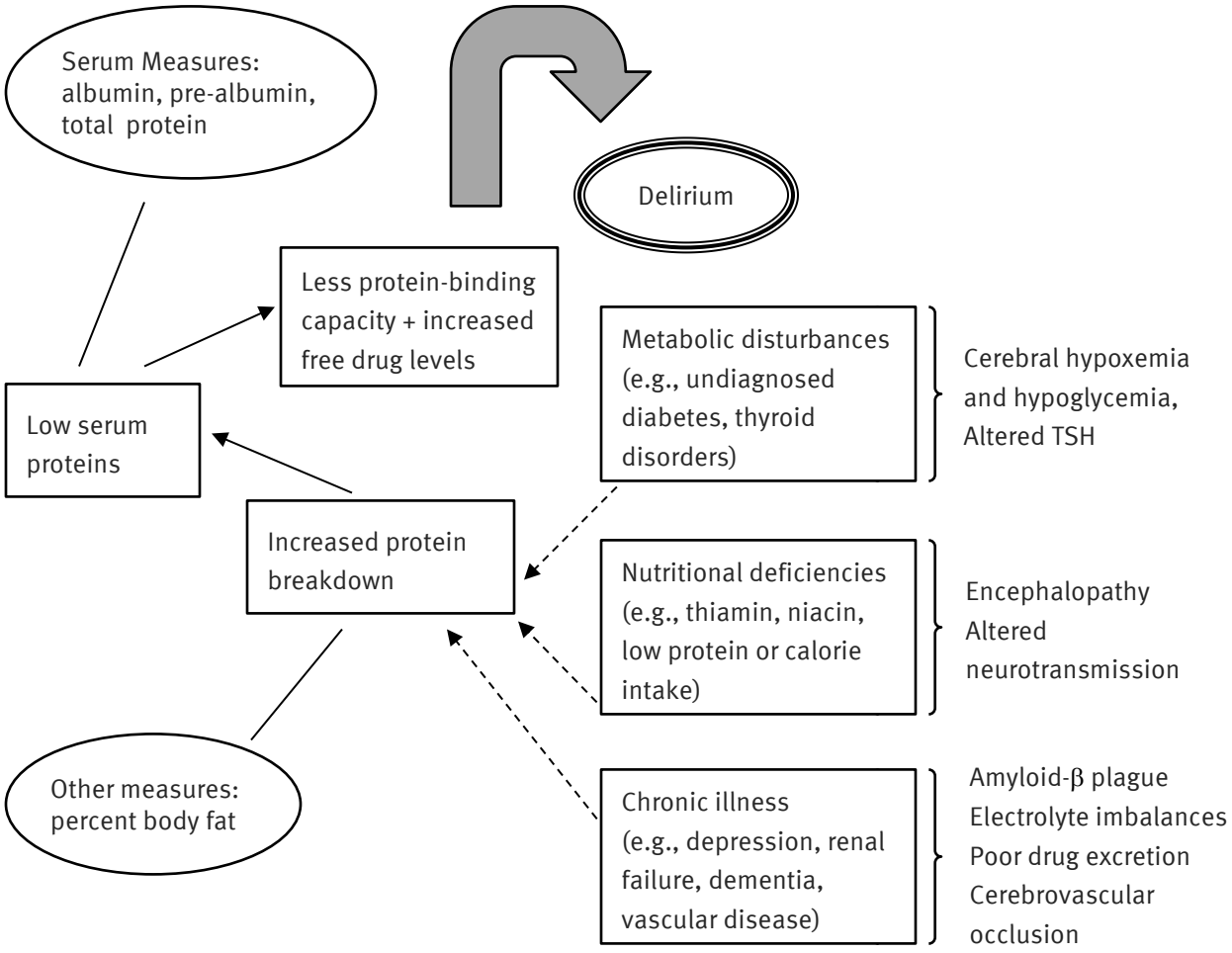
7.16.2 Mild and Major Neurocognitive Disorders

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 language[231]. 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 years[232]. 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 processes[233]. 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 items[234]. Appetite increase tends to be more common with frontotemporal dementia[235]. 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 illnesses[236-238] can hasten or complicate dementia-associated processes[239].

Unintentional weight loss is one of the main hallmarks of AD[239] and can continue as the condition progresses[239;240]. When weight loss occurs, the first priority is to identify and treat the underlying causes by using a multidisciplinary team approach[241]. 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[242;243]. However, the long-term benefits of ONS use are yet to be consistently

Figure 2: Role of Nutrition in Delirium



Adapted from: Kennith 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.

demonstrated[244;245]. 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 dementia[243]. 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 B_{12}, B_6, E, folate, thiamin, or niacin supplements in improving the cognitive function of people with dementia is inconclusive[246;247;248]. Low serum folate and vitamin B_{12} 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 considered[249]. DHA supplements may improve dementia, but more research is needed to confirm this[250].

About half of people with dementia live in a care facility[251]. 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 care[236].

One study of long-term care facilities found inadequacy in 70% or more of residents for folate, magnesium, zinc, vitamin E, and vitamin B_6; inadequacy prevalence was below 50% for protein, vitamin C, and thiamin[252]. 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[241;253;254]. 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 needed[255].

7.17 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 population[256]. 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 Frankenburg[257] 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 when working with individuals with different personality characteristics to optimize their nutrition status.

7.18 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 persons[258]. 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 cases[259]. 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 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 it[258]. Treatment for paraphilias includes psychotherapy, self-help groups, and pharmacotherapy. Antidepressants have been used in 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.

7.19 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 nicotine[260]. 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" disorders[261]. The topic of dual diagnosis is covered in Section 4 of the comprehensive role paper or the third paper in this series.

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%[262]. In Canada, rates of CD have been reported to be 56% among people with bipolar disorder and 47% of people with schizophrenia[263]. 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 behaviours[264]. 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 system[264]. 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%)[265].

Many people with mental health conditions may have more than one diagnosis; throughout this document 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 interviews[266], 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.

8. 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, as shown in examples outlined in Table 3, including 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 multidisplinary 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 interventions
- ability to apply clinical knowledge in the
- nutrition assessment and treatment of the various mental health conditions, 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.

Table 3: 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

9. Recommendations for Nutritional Care and Mental Health Conditions

At the beginning of this document, reference was made to primary health care and the Four Quadrant Model. Nutrition services can be offered throughout the spectrum of mental health services. 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.

This paper is derived from the comprehensive role paper on nutrition and mental health, Promoting Mental Health through Healthy Eating and Nutritional Care, which outlines a complete set of recommendations related to nutrition and the continuum of mental health care. The recommendations relevant to nutrition care for mental health conditions are summarized here.

1. Advocate for Nutrition and Mental Health Practice

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., how to manage nutritional side effects of psychiatric medications, nutrition guidelines for specific conditions). Diet therapy should be recognized as a cornerstone of mental health interventions in clinical practice guidelines and standards of care. Adequate funding will ensure appropriate nutrition services in mental health care are provided including mechanisms for monitoring and evaluation for effectiveness and efficiency. The development and implementation of mental health content and/or field experience in nutrition training programs would enhance mental health care in areas such as the identification of and treatment of nutrition-related side effects of psychiatric medications. Interdisciplinary care that addresses the unique needs of those with a mental health condition and concurrent chronic disease, such as depression and diabetes will ensure equity in care.

2. 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. Participation of dietitians should be integrated into primary and specialty care teams and in vocation, education, and residential programs serving this population. 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.

3. 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. Nutrition screening initiatives for community based programs and services targeted to mental health consumers will help identify early needs and optimize mental health care. 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.

4. Mental Health and Nutrition Research

More investigative work that examines the role of nutrition in mental health condition–based interventions is needed. 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 can help 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.

References

1. Canadian Mental Health Association. Fast Facts: Mental Health/Mental Illness. Retrieved from: www.cmha.ca/bins/content_page.asp?cid=6-20-23-43. 2012. Canadian Mental Health Association.
2. Muench J, Hamer AM. Adverse effects of antipsychotic medications. Am Fam Physician 2010;81:617-22.
3. Kennedy DO, Veasey R, Watson A, Dodd F, Jones E, Maggini S et al. Effects of high-dose B vitamin complex with vitamin C and minerals on subjective mood and performance in healthy males. Psychopharmacology (Berl) 2010;211:55-68.
4. Green SM, Watson R. Nutritional screening and assessment tools for use by nurses: literature review. J Adv Nurs 2005;50:69-83.
5. Abayomi J, Hackett A. Assessment of malnutrition in mental health clients: nurses' judgement vs a nutrition risk tool. J Adv Nurs 2004;45:430-7.
6. Osborn DP. The poor physical health of people with mental illness. West J Med 2001;175:329-32.
7. Suls J, Luger T, Martin R. The biopsychosocial model and the use of theory in health psychology. Handbook of health psychology and behavioral medicine. New York: Guilford Press, 2010.
8. Hankivsky O, Cormier R, and DeMerich D. Intersectionality: Moving women's health research and policy forward. 2009. Vancouver: Women's Health Research Network.
9. Cole E. Intersectionality and research in psychology. American Psychologist 2009;64:170-80.
10. Rossiter K, Morrow M. Health Inequities in Canada: Intersectional Frameworks and Practices. In: Hankivsky O, ed. Intersectional frameworks in mental health: Moving from theory to practice, pp 312-30. Toronto: UBC Press, 2011.
11. Registered Nurses' Association of Ontario (RNAO). Supporting Clients on Methadone Maintenance Treatment: Clinical Best Practice Guidelines. Toronto. 2009. Toronto, Registered Nurses' Association of Ontario.
12. Reist D. Methadone Maintenance Treatment in British Columbia, 1996-2008: Analysis and Recommendations. 2010. Victoria, Ministry of Healthy Living and Sport and the Centre for Addictions Research in BC, University of Victoria.
13. Lloyd C. Sinning and sinned against: The Stigmatisation of Problem Drug Users. 2010. London, The UK Drug Policy Commission (UKDPC).
14. Gardner CB, Gronfein WP. Reflections on varieties of shame induction, shame management, and shame avoidance in some works of Erving Goffman. Symbolic Interaction 2005;28:175-82.
15. Curtis S, Copeland A, Fagg J, Congdon P, Almog M, Fitzpatrick J. The ecological relationship between deprivation, social isolation and rates of hospital admission for acute psychiatric care: a comparison of London and New York City. Health Place 2006;12:19-37.
16. Pape B, Galipeault JP. Mental Health Promotion for People with Mental Illness: A Discussion Paper. 2002. Ottawa, Mental Health Promotion Unit of Health Canada.
17. Mahan KL, Escott-Stump S. Krause's Food and Nutrition Therapy. Philadelphia: Elsevier/Saunders Publishing Company, 2007.
18. Raine KD. Determinants of healthy eating in Canada: an overview and synthesis. Can J Public Health 2005;96:S8-S14.
19. Polivy J, Herman CP. Mental health and eating behaviours: A bi-directional relation. Can J Public Health 2005;96:S43-S46.
20. Brewerton T. Psychiatric aspects of the relationship between eating and mood. Nutr Rev 1986;44:78-88.

21. Virani AS, Bezchlibnyk-Butler KZ, Jeffries JJ, Procyshyn RM. Clinical Handbook of Psychotropic Drugs 19th Revised Edition. Toronto: Hogrefe Publishing, 2012.
22. Michael N, Sourgens H, Arolt V, Erfurth A. Severe tardive dyskinesia in affective disorders: treatment with vitamin E and C. Neuropsychobiology 2002;46 2002;46:28-30.
23. Zhang XY, Zhou DF, Cao LY, Chen DC, Zhu FY, Wu GY. Blood superoxide dismutase level in schizophrenic patients with tardive dyskinesia: association with dyskinetic movements. Schizophr Res 2003;62:245-50.
24. Davison KM. Determinants of Food Intake in Individuals with Mood Disorders. January 2010. University of Calgary.
25. Zorumski C, Rubin E. Demystifying psychiatry: A resource for patients and families. New York: Oxford University Press, 2010.
26. McCann JC, Ames BN. Vitamin K, an example of triage theory: is micronutrient inadequacy linked to diseases of aging? Am J Clin Nutr 2009.
27. Maayan L, Correll CU. Weight gain and metabolic risks associated with antipsychotic medications in children and adolescents. J Child Adolesc Psychopharmacol 2011;21:517-35.
28. Faulkner G, Cohn TA. Pharmacologic and nonpharmacologic strategies for weight gain and metabolic disturbance in patients treated with antipsychotic medications. Can J Psychiatry 2006;51:502-11.
29. Galletly CL, Murray LE. Managing weight in persons living with severe mental illness in community settings: a review of strategies used in community interventions. Issues Ment Health Nurs 2009;30:660-8.
30. Weidner G, Connor SL, Hollis JF, Connor WE. Improvement in hostility and depression in relation to dietary change and cholesterol lowering. Ann Int Med 1992;117:820-3.
31. Procyshyn RM, Chau A, Tse G. Clozapine's effects on body weight and resting metabolic rate: a case series. Schizophr Res 2004;66:159-62.
32. American Dietetic Association, Dietitians of Canada. Manual of Clinical Dietetics. Chicago: American Dietetics Association, 2000.
33. Mauer BJ. Behavioral Health / Primary Care Integration and the Person-Centered Healthcare Home. 2009. Washington, National Council for Community Behavioral Healthcare.
34. Stein DJ, Phillips KA, Bolton D, Fulford KW, Sadler JD, Kendler KS. What is a mental/psychiatric disorder? From DSM-IV to DSM-V. Psychol Med 2010;40:1759-65.
35. American Psychiatric Association. DSM-5: The Future of Psychiatric Diagnosis. Retrieved from: www.dsm5.org. 2012. American Psychiatric Association.
36. American Dietetics Association. Position of the American Dietetic Association: Providing Nutrition Services for Infants, Children, and Adults with Development Disabilities and Special Health Care Needs. J Am Diet Assoc 2004;104:97-107.
37. Humphries K. Nutrition for Individuals with Intellectual or Developmental Disabilities. http://mtdh.ruralinstitute.umt.edu/Publications/StandardsStaff.htm. 2005. Research and Training Center on Disability in Rural Communities, The University of Montana Rural Institute: A Center of Excellence in Disability.
38. Gravestock S. Eating disorders in adults with intellectual disability. J Intellect Disabil Res. 2000; 44(Pt 6):625-37..
39. Tewari S, Krishnan VHR, Valsalan V, Roy A. Pica in a learning disability hospital: a clinical survey. Br J Dev Dis 1995;41:13-22.
40. Turner S, Sloper P. Behaviour problems among children with Down's syndrome: prevalence, persistence and parental appraisal. J Appl Res Intellect Disabil 1996;9:129-44.
41. Kennedy M, McCombie L, Dawes P, McConnell KN, Dunnigan MG. Nutritional support for patients with intellectual disability and nutrition/dysphagia disorders in community care. J Intellect Disabil Res 1997;41:430-6.

42. Ontario Association for Families of Children with Communication Disorders. Did you know. Retrieved from: www.oafccd.com. 2012.
43. Clark LW. Communication disorders: what to look for, and when to refer. Geriatrics 1994;49:51-5.
44. Martin BJ, Corlew MM. The incidence of communication disorders in dysphagic patients. J Speech Hear Disord 1990;55:28-32.
45. Autism Society of Canada. What is Autism Spectrum Disorder? 2007. Ottawa, Autism Society of Canada.
46. Fombonne E. Modern Views of Autism. Can J Psychiatry 2003;48:503-5.
47. Fombonne E. Epidemiology of autism and other pervasive developmental disorders: an update. J Autism Dev Disord 2003;33:365-81.
48. Fombonne E, Zakarian R, Bennett A, Meng L, McLean-Heywood D. Pervasive developmental disorders in Montreal, Quebec, Canada: prevalence and links with immunizations. Pediatrics 2006;118:e139-e150.
49. Herndon AC, DiGuiseppi C, Johnson SL, Leiferman J, Reynolds A. Does nutritional intake differ btween children with autism spectrum disorders and children with typical development? J Autism Dev Disord 2009;39:212-22.
50. Millward C, Ferriter M, Calver SJ, Connell-Jones GG. Gluten- and casein-free diets for autistic spectrum disorder. Cochrane Database of Systematic Reviews 2008;2.
51. BC Ministry of Children and Family Development. A Parent's Handbook: Your Guide to Autism Programs. 2009. Victoria, BC Ministry of Children and Family Development.
52. Young GS, Maharaj NJ, Conquer JA. Blood phospholipid fatty acid analysis of adults with and without attention deficit/hyperactivity disorder. Lipids 2004;39:117-23.
53. Konofal E, Lecendreux M, Deron J, Marchand M, Cortese S, Zaim M. Iron deficiency in children with attention-deficit/hyperactivity disorder. Pediatr Neurol 2008;38:20-6.
54. Kiddie JY, Weiss MD, Kitts DD, Ley-Milne R, Wasdell MB. Nutritional status of children with attention deficit hyperactivity disorder: A pilot study. Int J Pediatrics 2010;ID 767318:7 pages.
55. Schab DW, Trinh NH. Do artificial colors promote hyperactivity in children with hyperactive syndromes? A meta-analysis of double-blind placebo-controlled trials. J Dev Beh Ped 2004;25:423-34.
56. Niederhofer H, Pittschieler K. A preliminary investigation of ADHD symptoms in persons with celiac disease. J Atten Disord 2006;10:200-4.
57. Zukier Z, Solomon JA, and Hamadeh MJ. The Role of Nutrition in Mental Health: Attention Deficit Hyperactivity Disorder (ADHD). 2011. Toronto, Canadian Mental Health Association.
58. Meijer WM, Faber A, van den Ban E, Tobi H. Current issues around the pharmacotherapy of ADHD in children and adults. Pharmacy World and Science 2009;31:509-16.
59. Scahill L, Williams S, Schwab-Stone M, Applegate J, Leckman JF. Disruptive behavior problems in a community sample of children with tic disorders. Adv Neurol 99 2006;99:184-90.
60. DiMascio F, Hamilton K, and Smith L. Professional Consensus Statement: The Nutritional Care of Adults with a Learning Disability in Care Settings. 2011. Birmingham, The British Dietetic Association Specialist Mental Health Group .
61. Swain JE, Scahill L, Lombroso PJ. Tourette syndrome and tic disorders: a decade of progress. J Am Acad Child Adolesc Psychiatry 2007;46:947-68.
62. Nass R, Ross G. Developmental disabilities. In: Bradley WG, Daroff RB, Fenichel GM, Jankovic J, eds. Neurology in Clinical Practice, Philadelphia: Butterworth-Heinemann, 2008.
63. Qvarfordti I, Engerstrom IW, Eliasson AC. Guided eating or feeding: three girls with Rett syndrome. Scand J Occup Ther 2009;16:33-9.

64. Kerr AM, Burford B. Towards a full life with Rett disorder. Pediatr Rehabil 2001;4:157-68.

65. Luiselli JK. Training self-feeding skills in children who are deaf and blind. Behav Modif 1993;17:457-73.

66. Gentile AM. Implicit and explicit processes during acquisition of functional skills. Scand J Occup Ther 1998;5:16.

67. Public Health Agency of Canada. A Report on Mental Illnesses in Canada. 2002. Ottawa, Public Health Agency of Canada.

68. Bhalla RN. Schizophreniform Disorder. Medscape Reference. 2011.

69. Blais MA, Smallwood P, Groves JE, Rivas-Vazquez RA. Personality and personality disorders. In: Stern TA, Rosenbaum JF, Fava M, Biederman J, Rauch SL, eds. Massachusetts General Hospital Comprehensive Clinical Psychiatry, 1st ed., Philadelphia, PA: Mosby Elsevier, 2008.

70. Carpenter WT, van Os J. Should Attenuated Psychosis Syndrome Be a DSM-5 Diagnosis? Am J Psychiatry 2011;168:460-3.

71. Casey DA, Rodriguez M, Northcott C, Vickar G, Shihabuddin L. Schizophrenia: medical illness, mortality, and aging. Int J Psychiatry Med 2011;41:245-51.

72. Cournos F, McKinnon K, Sullivan G. Schizophrenia and comorbid human immunodeficiency virus or hepatitis C virus. J Clin Psychiatry 2005;66:27-33.

73. Friedlander AH, Marder SR. The psychopathology, medical management, and dental implications of schizophrenia. J Am Dental Assoc 2002;133:603-10.

74. Buckley PF, Miller BJ, Lehrer DS, Castle DJ. Psychiatric comorbidities and schizophrenia. Schizophr Bull 2009;35:383-402.

75. Hermle L, Szlak-Rubin R, Täschner KL, Peukert P, Batra A. Substance use associated disorders: Frequency in patients with schizophrenic and affective psychoses. Nervenarzt 2012 Apr 6 2012;epub ahead of print.

76. Kessler RC, Nelson CB, McGonagle KA, Edmund MJ, Frank RG, Leaf PJ. The epidemiology of co-occurring addictive and mental disorders: Implication for prevention and service utilization. Am J Orthopsychiatry 1996;66:17-31.

77. McCreadie R, Scottish Schizophrenia Lifestyle Group. Diet, smoking, and cardiovascular risk in people with schizophrenia: Descriptive study. Br J Psychiatry 2003;183:534-9.

78. Brown S, Birtwistle J, Roe L, Thompson C. The unhealthy lifestyle of people with schizophrenia. Psychol Med 1999;29:697-701.

79. Gupta A, Craig TK. Diet, smoking and cardiovascular risk in schizophrenia in high and low care supported housing. Epidemiol Psichiatr Soc 2009;18:200-7.

80. Newcomer JW. Second-generation (atypical) antipsychotics and metabolic effects: a comprehensive literature review. CNS Drugs 2005;19:1-93.

81. McEvoy JP, Meyer JM, Goff DC, Nasrallah HA, Davis SM, Sullivan L. Prevalence of the metabolic syndrome in patients with schizophrenia: baseline results from the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) schizophrenia trial and comparison with national estimates from NHANES III. Schizophr Res 2005;80:19-32.

82. Cohn TA, Serriyak MJ. Metabolic monitoring for patients treated with antipsychotic medications. Can J Psychiatry 2006;51:492-6.

83. Strassing M, Singh J, Ganguli R. Dietary intake of patients with schizophrenia. Psychiatry 2005;February:31-5.

84. Spelman LM, Walsh PI, Sharifi N, Collins PB, Thakore JH. Impaired glucose tolerance in first-episode drug-naive patients with schizophrenia. Diabetic Medicine 2007;24:481-5.

85. van Nimwegen LJM, Storosum JG, Blumer RME, Allick G, Venema HW, de Haan L. Hepatic insulin resistance in antipsychotic naive schizophrenic patients: stable isotope studies of glucose metabolism. J Clin Endocrin Metab 2008;93:575-7.

86. Gaines AD. Anosmia and hyposmia. Allergy Asthma Proc 2010;31:185-9.

87. Green TL, McGregor LD, King KM. Smell and taste dysfunction following minor stroke: a case report. Can J Neurosci Nurs 2008;30:10-3.

88. Cascella NG, Kryszak D, Bhatti B, Gregory P, Kelly DL, McEvoy JP. Prevalence of celiac disease and gluten sensitivity in the United States clinical antipsychotic trials of intervention effectiveness study population. Schizophrenia Bulletin 2011;37:94-100.

89. Irving CB, Mumby-Croft R, Joy LA. Polyunsaturated fatty acid supplementation for schizophrenia. Cochrane Database of Systematic Reviews 2006;3.

90. Schaffer A, Cairney J, Cheung A, Veldhuizen S, Levitt A. Community survey of bipolar disorder in Canada: lifetime prevalence and illness characteristics. Can J Psychiatry 2006;51:9-16.

91. McElroy SL, Altshuler LL, Suppes T, Keck PE Jr, Frye MA, Denicoff KD. Axis I psychiatric comorbidity and its relationship to historical illness variables in 288 patients with bipolar disorder. Am J Psychiatry 2001;158:420-6.

92. Sagman D, Tohen M. Comorbidity in bipolar disorder. Psychiatr Times 2009;26:1-9.

93. Valtonen H, Suominen K, Mantere O, Leppämäki S, Arvilommi P, Isometsä ET. Suicidal ideation and attempts in bipolar I and II disorders. J Clin Psychiatry 2005;66:1456-62.

94. Baldessarini RJ. Treatment research in bipolar disorder: issues and recommendations. CNS Drugs 2002;16:721-9.

95. Keck P, McElroy S, Strakowski S. Compliance with maintenance treatment in bipolar disorder. Psychopharmacol Bull 1997;33:91.

96. Katon WJ. Clinical and health services relationships between major depression, depressive symptoms and general medical illness. Biol Psychiatry 2003;54:216-26.

97. McElroy SL, Kotwal R, Malhotra S, Nelson EB, Keck PE, Nemeroff CB. Are mood disorders and obesity related? A review for the mental health professional. J Clin Psychiatry 2004;65:634-51.

98. Kilbourne AM, Rofey DL, McCarthy JF, Post EP, Welsh D, Blow FC. Nutrition and exercise behavior among patients with bipolar disorder. Bipolar Disord 2007;9:443-52.

99. Pynnonen PA, Isometsa EG, Aronen ET, Verkasalo MA, Savilahti E, Aalberg V. Mental disorders in adolescents with celiac disease. Psychosomatics 2004;45:325-35.

100. Montgomery P, Richardson AJ. Omega-3 fatty acids for bipolar disorder. Cochrane Database of Systematic Reviews 2008;2.

101. National Institute of Mental Health. What are the different forms of depression? 2011. Bethesda, National Institute of Mental Health.

102. Statistics Canada. Canadian Estimates from the Canadian Community Health Survey 1.2 Mental Health and Well-being. 2002. Ottawa, Statistics Canada.

103. Solomon JA, Zukier A, and Hamadeh MJ. The Role of Nutrition in Mental Health: Depression. 2011. Toronto, Canadian Mental Health Association.

104. Young SN. Folate and depression - a neglected problem. J Psych Neurosci 2007;32:80-2.

105. Gilbody S, Lightfoot T, Sheldon T. Is low folate a risk factor for depression? A meta-analysis and exploration of heterogeneity. J Epidemiol Community Health.2007 2007;61:631-7.

106. Taylor MJ, Carney SM, Goodwin GM, Geddes JR. Folate for depressive disorders: systematic review and meta-analysis of randomized controlled trials. J Psychopharmacol 2004;18:251-6.

107. Health Canada. Preconception Health and Folic Acid: Primary Prevention of Neural Tube Defects with Folic Acid. 1998. Ottawa: Health Canada.

108. Ray JG, Meier C, Vermeulen MJ, Boss S, Wyatt PR, Cole DE. Association of neural tube defects and folic acid food fortification in Canada. Lancet 2002;360:2047-8.

109. Davison KM, Kaplan BJ. Is it time to screen for folate status for individuals with mood disorders? 2012. Unpublished Work

110. Gardner A, Boles RG. Is "mitochondrial psychiatry" in the future? A review. Curr Psychiatry Rev 2005;1:255-71.

111. Canadian Collaborative Mental Health Initiative (CCMHI). People with Serious Mental Illness Special Population Toolkit. 2006. Mississauga, CCMHI.

112. Anxiety BC. Separation Anxiety Disorder. Retrieved from: www.anxietybc.com/parent/separation.php. 2012.

113. Anxiety Association of Canada. Panic Disorder. Anxiety Association of Canada. 2007.

114. Anxiety Disorders Association of Canada. Treatment Guidelines for Social Anxiety Disorder. 2003. Scarborough, Anxiety Disorders Association of Canada.

115. Mataix-Cols D, Frost RO, Pertusa A, Clark LA, Saxena S, Leckman JF et al. Hoarding disorder: a new diagnosis for DSM-V. Depression and Anxiety 2010;27:556-72.

116. Duke DC, Keeley ML, Geffken GR, Storch EA. Trichotillomania: A current review. Clin Psych Rev 2010;30:181-93.

117. Famma JM. Skin picking disorder fact sheet. 2010. Boston, International OCD Foundation.

118. Christenson GA, Mackenzie TB, Mitchell JE, Callies AL. A placebo-controlled double-blind crossover study of fluoxetine in trichotillomania. Am J Psychiatry 1991;148:1566-71.

119. Christenson GA, Pyle RL, Mitchell JE. Estimated lifetime prevalence of trichotillomania in college students. J Clin Psychiatry 1991;52:415-7.

120. Bouwer C, Stein DJ. Trichobezoars on trichotillomania: Case report and literature overview. Psychosom Med 1998;60:658-60.

121. Phillips MR, Zaheer S, Drugas GT. Gastric trichobezoar: case report and literature review. Mayo Clin Proc 1998;73:653-6.

122. Grieger L. Nutrition and wound dare. Today's Dietitian 2009;11:12.

123. Camfield DA, Sarris J, Berk M. Nutraceuticals in the treatment of obsessive compulsive disorder (OCD): a review of mechanistic and clinical evidence. Prog Neuropsychopharmacol Biol Psychiatry 2011;35:887-95.

124. The American Academy of Child and Adolescent Psychiatry. Reactive Attachment Disorder. 2011. Washington, The American Academy of Child and Adolescent Psychiatry.

125. Whitney D. Post Traumatic Stress Disorder: Discussion paper prepared for The Workplace Safety and Insurance Appeals Tribunal. 2012. Toronto, Workplace Safety and Insurance Appeals Tribunal.

126. Herman J. Trauma and Recovery. New York: New York, 1997.

127. Sierra M. Depersonalization: A new look at a neglected syndrome. Cambridge: Cambridge University Press, 2009.

128. La Mela C, Maglietta M, Castellini G, Amoroso L, Lucarelli S. Dissociation in eating disorders: relationship between dissociative experiences and binge-eating episodes. Compr Psychiatry 2010;51:393-400.

129. Dubravko H. Pseudocyesis in peri- and postmenopausal women. Central European Journal of Medicine 2010;5:372-4.

130. Khanam M, Abul M, Azad K, Ullah A, Bari W, Nazrul S. Serum immunoglobulin concentration of conversion disorder patients. German Journal of Psychiatry (GJPsy) 2008;11:141-145.

131. American Dietetic Association. Position of the American Dietetic Association: Nutrition intervention in the treatment of eating disorders. J Am Diet Assoc 2011;111:1236-41.

132. Herpertz-Dahlmann B, Holtkamp K, Konrad K. Eating disorders: anorexia and bulimia nervosa. Handb Clin Neurol 2012;106:447-62.

133. Attia E, Roberto C. Should amenorrhea be a criterion for AN. Int J Eat Disord 2009;42:581-9.

134. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR). Washington: American Psychiatric Association, 2000.

135. Eddy KT, Dorer DJ, Franko DL, Tahilani K, Thompson-Brenner H, Herzog DB. Diagnostic crossover in anorexia nervosa and bulimia nervosa: implications for DSM-V. Am J Psychiatry 2008;165:245-50.

136. Strober M, Freeman R, Morrell W. The long-term course of severe anorexia nervosa in adolescents: survival analysis of recovery, relapse, and outcome predictors over 10-15 years in a prospective study. Int J Eat Disord 1997;22:339-60.

137. Katzman DK. Medical complications in adolescents with anorexia nervosa: a review of the literature. Int J Eat Disord 2005;37(suppl):S52-S59.

138. Sullivan PF. Mortality in anorexia nervosa. Am J Psychiatry 1995;152:1073-4.

139. Fairburn CG, Harrison PJ. Eating disorders. Lancet 2003;361:407-16.

140. Godart N, Berthoz S, Rein Z, Perdereau F, Lang F, Venisse JL. Does the frequency of anxiety and depressive disorders differ between diagnostic subtypes of anorexia nervosa and bulimia? Int J Eat Disord 2006;39:772-8.

141. Mehanna HM, Moledina J, Travis J. Refeeding syndrome: what it is, and how to prevent and treat it. BMJ 2008;336:1495-8.

142. Hudson JI, Hiripi E, Pope HG, Kessler RC. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol Psychiatry 2007;61:348-58.

143. Cremonini F, Camilleri M, Clark MM, Beebe TJ, Locke GR, Zinsmeister AR. Associations among binge-eating behavior patterns and gastrointestinal symptoms: a population based study. Int J Obes 2009;33:342-53.

144. Walsh BT, Wilfley DE, Hudson JI. Binge Eating Disorder: Progress in Understanding and Treatment (educational monograph). Wayne: Health Learning Systems, 2003.

145. Wanden-Berghe RG, Sanz-Valero J, Wanden-Berghe C. The application of mindfulness to eating disorders treatment: a systematic review. Eat Disord 2011;19:34-48.

146. Wilson GT, Syako R. Frequency of binge eating episodes in bulimia nervosa and binge ED: Diagnostic considerations. Int J Eat Disord 2009;42:603-10.

147. Scribner Reiter C, Graves L. Nutrition therapy for eating disorders. Nutr Clin Pract 2010;25:122-36.

148. Williams KD, Dobney T, Geller J. Setting the eating disorder aside: An alternative model of care. Eur Eat Disord Rev 2010;18:90-6.

149. Fairburn CG, Cooper Z, Bohn K, O'Connor ME, Doll HA, Palmer RL. The severity and status of eating disorder NOS: implications for DSM-V. Behav Res Ther 2007;45:1705-15.

150. Stunkard AJ, Grace WJ, Wolff HG. The night eating syndrome: a pattern of food intake among certain obese patients. Am J Med 1955;19:78-86.

151. Colles L, Dixon JB, O'Brien PE. Night eating syndrome and nocturnal snacking: association with obesity, binge eating and psychological distress. Int J Obes (Lond) 2007;31:1722-30.

152. Allison KC, Engel SG, Crosby RD, Crosby RD, O'Reardon JP, Wonderlich SA. Evaluation of diagnostic criteria for night eating syndrome and binge eating disorder among persons seeking bariatric surgery: prevalence and related features. Eat Behav 2008;9:398-407.

153. Allison KC, Ahima RS, O'Reardon JP, Dinges DF, Sharma V, Cummings DE. Neuroendocrine profiles associated with energy intake, sleep, and stress in the night eating syndrome. J Clin Endocrinol Metab 2005;90:6214-7.

154. Birketvedt GS, Florholmen J, Sundsfjord J, Osterud B, Dinges D, Bilker W et al. Behavioral and neuroendocrine characteristics of the night-eating syndrome. JAMA 1999;282:657-63.

155. Bryant-Waugh R, Markham L, Kreipe RE, Walsh BT. Feeding and eating disorders in childhood. Int J Eat Disord 2010;43:98-111.

156. Rose EA, Porcerelli JH, Neale AV. Pica: common but commonly missed. J Am Board Fam Pract 2000;13:353-8.

157. Stein DJ, Bouwer C, van Heerden B. Pica and the obsessive-compulsive spectrum disorder. S Afr Med J. 1996;86:1586-8, 1591-2.

158. Hagopian LP, Rooker GW, Rolider NU. Identifying empirically supported treatments for pica in individuals with intellectual disabilities. Res Dev Disabil 2011;32:2114-29.

159. Edwards CH, Johnson AA, Knight EM. Pica in an urban environment. J Nutr 1994;124:954S-62S.

160. Al-Kanhal MA, Bani IA. Food habits during pregnancy among Saudi women. Int J Vitam Nutr Res 1995;65:206-10.

161. Katsoufis CP, Kertis M, McCoullough J, Pereira T, Seeherunvong W, Chandar J et al. Pica: An important and unrecognized problem in pediatric dialysis patients. J Ren Nutr 2012;Jan 31 Epub ahead of print.

162. Brna P, Gordon K, Dooley JM, Price V. Manganese toxicity in a child with iron deficiency and polycythemia. J Child Neurol 2011;26:891-4.

163. O'Sullivan MJ, McGreal G, Walsh JG, Redmond HP. Trichobezoar. J Roy Soc Med 2001;94:68-70.

164. Rees M. Intussusception caused by multiple trichobezoars: a surgical rap for the unwary. Br J Surg 1984;71:721.

165. Hossenbocus A, Colin-Jones DG. Trichobezoar, gastric polyposis, protein-losing gastroenteropathy and steatorrhoea. Gut 1973;14:730-2.

166. Parry-Jones B. Merycism or rumination disorder: a historical investigation and current assessment. Br J Psychiatry 1994;160:303-14.

167. Wagaman JR, Williams DE, Camilleri M. Behavioral Intervention for the treatment of rumination. Journal of Pediatric Gastroenterology & Nutrition 1998;27:596-8.

168. American Academy of Sleep Medicine. The International Classification of Sleep Disorders-Revised. Diagnostic and Coding Manual. In: Hauri P, ed. p 297. Chicago: American Academy of Sleep Medicine, 2005.

169. Rondanelli M, Opizzi A, Monteferrario F, Antoniello N, Manni R, Klersy C. The effect of melatonin, magnesium, and zinc on primary insomnia in long-term care facility residents in Italy: a double-blind, placebo-controlled clinical trial. J Am Geriatr Soc 2011;59:82-90.

170. Ramdurg S. Kleine-Levin syndrome: Etiology, diagnosis, and treatment. Annals of Indian Academy of Neurology 2010;13:241-146.

171. Shukla G, Bajpai H, Mishra D. Kleine-Levin syndrome: A case-report from India. Br J Psychiatry 1982;141:97-104.

172. Pearce N. Analytical Implications of Epidemiological Concepts of Interaction. Int J Epid 1989;18:976-80.

173. Oliveira MM, Conti C, Saconato H, Fernandes do Prado G. Pharmacological treatment for Kleine-Levin Syndrome. Cochrane Database Syst Rev 2009;2.

174. Peyron C, Tighe DK, van den Pol AN. Neurons containing hypocretin (orexin) project to multiple neuronal systems. J Neurosci 1998;18:9996-10015.

175. Bell IR. Diet histories in narcolepsy. In Guilleminault C, Dement WC, Passouant P, eds. Narcolepsy, pp 221-7. New York: Spectrum publications, Inc., 1976.

176. Bruck D, Armstrong S, and Coleman G. Dietary factors in narcolepsy. Abstracts 9th European Congress in Sleep Research. 1988.

177. Bruck D. Food consumption patterns in narcolepsy. Sleep 2003;26 (Suppl):A272-A273.

178. Lammers GJ, Lestra J, Languis JAE, Buunk G. Spontaneous food choice in narcolepsy. Sleep 1996;19:75-6.

179. Chabas D, Foulon C, Gonzalez J, Nasr M, Lyon-Caen O, Willer JC. Eating disorders and metabolism in narcoleptic patients. Sleep 2007;30:1267-73.

180. Kotagal S, Krahn LE, Slocumb N. A putative link between childhood narcolepsy and obesity. Sleep Med 2004;5:147-50.

181. Husain AM, Yancy Jr WS, Carwile ST, Miller PP, Westman EC. Diet therapy for narcolepsy. Neurology 2004;62:2300-2.

182. Fritscher LG, Mottin CC, Canani S, Chatkin JM. Obesity and obstructive sleep apnea-hypopnea syndrome: the impact of bariatric surgery. Obes Surg 2007;17:95-9.

183. Baldwin CM, Bootzin RR, Schwenke DC, Quan SF. Antioxidant nutrient intake and supplements as potential moderators of cognitive decline and cardiovascular disease in obstructive sleep apnea. Sleep Med Rev 2005;9:459-76.

184. Solfrizzi V, Panza F, Capurso A. The role of diet in cognitive decline. J Neural Transm 2003;110:95-110.

185. Baldwin CM, Bell IR, Kroesen K, Quan SF. Differences in antioxidant intake in veterans with and without obstructive sleep apnea. Sleep 2003;26:A212.

186. American Academy of Sleep Medicine. Circadian Rhythm Sleep Disorders. 2008. Darien, American Academy of Sleep Medicine.

187. Boot BP, Boeve BF, Roberts RO, Ferman TJ, Geda YE, Pankratz VS. Probable rapid eye movement sleep behavior disorder increases risk for mild cognitive impairment and Parkinson disease: A population-based study. Annals of Neurology 2012;71:49-56.

188. National Institute of Neurological Disorders and Stroke. Restless Legs Syndrome Fact Sheet. 2011. Washington, Natinal Institutes of Health.

189. Sleep Disorders Center. Sleep Hygiene: Helpful Hints to Help You Sleep. 2010. Baltimore, University of Maryland Medical Center.

190. Balon R, Taylor Segraves R, Clayton A. Issues for DSM-V: Sexual Dysfunction, Disorder, or Variation Along Normal Distribution: Toward Rethinking DSM Criteria of Sexual Dysfunctions. Am J Psychiatry 2007;164:198-200.

191. Esposito K, Giugliano F, Maiorino MI, Giugliano D. Dietary factors, Mediterranean diet and erectile dysfunction. J Sex Med 2010;7:2338-45.

192. Esposito K, Ciotola M, Maiorino MI, Giugliano F, Autorino R, De Sio M et al. Hyperlipidemia and sexual function in premenopausal women. J Sex Med 2009;6:1696-703.

193. Durst R, Katz A, Teitelbaum A, Zislin J, Dannon PN. Kleptomania: Diagnosis and treatment options. CNS Drugs 2001;15:185-95.

194. Galovski T, Blanchard EB, Veazey C. Intermittent explosive disorder and other psychiatric comorbidity among court-referred and self-referred aggressive drivers. Behaviour Research and Therapy 2002;40:641-51.

195. Petry NM, Stinson FS, Grant BF. Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 2005;66:564-74.

196. Campbell D. Notes on the Major Psychiatric Disorders among Children and Youth and a Guide to Internet Information. Retrieved from: www.ontario.cmha.ca/children_and_youth.asp?cID=6897. 2012. Canadian Mental Health Association.

197. Dannon PN. Kleptomania: An impulse control disorder? Int J Psychiatry Clin Pract 2002;6:3-7.

198. McElroy SL. Recognition and treatment of DSM-IV intermittent explosive disorder. J Clin Psychiatry 1999;60:12-6.

199. Gesch B, Hammond S, Hampson S. Influence of supplementary vitamins, minerals and essential fatty acids on the antisocial behaviour of young adult prisoners. Br J Psychiatry 2002;181:22-8.

200. Golomb BA, Evans MA, White HL, Dimsdale JE. Trans fat consumption and aggression. PLoS ONE 2012;7:e32175.

201. Seifert SM, Schaechter JL, Hershorin ER, Lipshultz SE. Health effects of energy drinks on children, adolescents, and young adults. Pediatrics 2011;127:511-28.

202. Health Canada and Canadian Executive Council on Addictions. Canadian Addiction Survey: A national survey of Canadians' use of alcohol and other drugs. 2005. Ottawa, Health Canada.

203. Kessler RC, Crum R, Warner LA, Nelson CB, Schulenberg J, Anthony JC. Lifetime co-occurrence of DSM-III-R alcohol abuse and dependence with other psychiatric disorders in the National Comorbidity Survey. Arch Gen Psychiatry 1997;54:313-21.

204. Insel P, Turner RE, Ross D. Nutrition. Boston: Jones and Bartlett Publishers, 2001.

205. Doweiko HE. Concepts of Chemical Dependency. Boston: Brooks/Cole, 1999.

206. Rogers C. On Becoming a Person: A Therapist's View of Psychotherapy. Boston: Houghton Mifflin Co, 1995.

207. Sullivan JT, Skykora K, Schneideman J. Assessment of alcohol withdrawal: the revised Clinical Institute Withdrawal Assessment for Alcohol Scale (CIWA-Ar). Br J Addict 1989;84:1353-7.

208. Grotzkyj-Giorgi M. Nutrition and addiction - can dietary changes assist with recovery? Drugs and Alcohol Today 2009;9:24-8.

209. Banderet LE,.Lieberman HR. Treatment with tyrosine, a neurotransmitter precursor, reduces environmental stress in humans. US Army Research Institute of Environmental Medicine Brain Research Bulletin 1989;22:759-62.

210. Bonner AB, Thomson AD, Cook CCH. Alcohol, Nutrition, and Recovery of Brain Function. Oxford, 2004.

211. Ehrenpreis S. Degradation of endogenous opioids: its relevance in human pathology and therapy. New York: Raven Press, 1983.

212. Grotzkyj-Giorgi M. Nutrition and addiction — can dietary changes assist with recovery?", Drugs and Alcohol Today 2009; 9(2):24 – 28.

213. Buydens-Branchey L, Branchey M, McMakin DL, Hibbeln JR. Polyunsaturated fatty acid status and relapse vulnerability in cocaine addicts. Psychiatry Research 2003;120:29-35.

214. Hatcher SA. Nutrition supplementation in alcohol and drug abuse treatment. Diet Dev Psychiatr Disord 1993;Summer 1993:1.

215. Hanson G, Venturelli PJ, Fleckenstein AF. Drugs and Society. Boston: Jones and Bartlett Publishers, 2006.

216. Dekker T. Nutrition and Recovery: A Professional Resource for Healthy Eating During Recovery from Substance Abuse. Toronto, ON: Centre for Addiction and Mental Health, 2000.

217. Farley AC, Hajek P, Lycett D, Aveyard P. Interventions for preventing weight gain after smoking cessation. Cochrane Database Syst Rev 2012;1.

218. Canadian Partnership for Responsible Gambling. Canadian Gambling Digest 2009-2010. 2012. Toronto, Canadian Partnership for Responsible Gambling.

219. Rudolph JL, Marcantonio ER. Diagnosis and prevention of delirium. Geriatr Aging 2003;6:14-9.

220. McCusker J. The long-term prognosis of delirium. Geriatr Aging 2003;6:22-7.

221. Inouye SK, Schlesinger MJ, Lydon TJ. Delirium: a symptom of how hospital care is failing older persons and a window to improve quality of hospital care. Am J Med 1999;106:565-73.

222. Siddiqi N, Stockdale R, Britton AM, Holmes J. Interventions for preventing delirium in hospitalised patients. Cochrane Database Syst Rev 2007;18:CD005563.

223. Bull MJ. Delirium in older adults attending adult day care and family caregiver distress. Int J Older People Nurs 2011;6:85-92.

224. Saad M, Harisingani R, Katinas L. Impact of geriatric consultation on the number of medications in hospitalized older patients. Consult Pharm 2012;27:42-8.

225. Ledikwe JH, Smiciklas-Wright H, Mitchell DC, Miller CK, Jensen GL. Dietary patterns of rural older adults are associated with weight and nutritional status. J Am Ger Soc 2004;52:589-95.

226. Caplan JP. Too much too soon? refeeding syndrome as an iatrogenic cause of delirium. Psychosomatics 2008;49:249-51.

227. Caplan JP, Chang G. Refeeding syndrome as an iatrogenic cause of delirium: A retrospective pilot study. Psychosomatics 2010;51:419-24.

228. Meguid MM, Crook M, Boateng AA, Sriram K. Refeeding syndrome: Treatment considerations based on collective analysis of literature case reports. Nutrition 2010;26:156-67.

229. Canadian Coalition for Seniors Mental Health. The Assessment & Treatment of Delirium in Older Adults. Retrieved from: www.ccsmh.ca. 2006.

230. Murthy L, Akunne A, O'Mahony R, Young J. Synopsis of the National Institute for Health and Clinical Excellence Guideline for Prevention of Delirium. Ann Intern Med 2011;154:746-51.

231. Franczak MB, Maganti R. Neurodegenerative disorders; dementias. Neurology 2004;8:2.

232. Ferri CP, Prince M, Brayne C. Global prevalence of dementia: a Delphi consensus study. Lancet 2005;366:2112-7.

233. Morris CH, Hope RA, Fairburn CG. Eating habits in dementia. A descriptive study. The Br J Psychiatry 1989;154:801-6.

234. Kergoat H, Kergoat M-J, Justino L, Chertkow H, Robillard A, Bergman H. Visual retinocortical function in dementia of the Alzheimer type. Gerontology 2002;48:197-203.

235. Ikeda M, Brown J, Holland AJ, fukuhara R, Hodges JR. Changes in appetite, food preference, and eating habits in frontotemporal dementia and Alzheimer's disease. Neurol Neurosurg Psychiatry 2002;73:371-6.

236. Salva A, Coll-Planas L, Bruce S, De Groot L, Andrieu S, Abellan G. Nutritional assessment of residents in long-term care facilities (LTCFs): recommendations of the task force on nutrition and ageing of the IAGG European region and the IANA . J Nutr Helath Aging 2012;13:475-83.

237. Li-Chan L, Watson R, Wu SC. What is associated with low food intake in older people with dementia? J Clin Nurs 2010;19:53-9.

238. Finley B. Nutritional needs of the person with Alzheimer's disease: practical approaches. J Am Diet Assoc 1997;97:S177-S180.

239. Gillette Guyonnet S, Abellan Van Kan G, Alix E, Andrieu S, Belmin J, Berrut G. International Academy on Nutrition and Aging Expert Group: weight loss and Alzheimer's disease. J Nutr Health Aging 2007;11:38-48.

240. Guérin O, Andrieu S, Schneider SM, Milano M, Boulahssass R, Brocker P. Different modes of weight loss in Alzheimer disease: a prospective study of 395 patients. Am J Clin Nutr 2005;82:435-41.

241. Alibhai SMH, Greenwood C, Payette H. An approach to the management of unintentional weight loss in elderly people. CMAJ 2005;172:773-80.

242. Stratton RJ, Elia M. Who benefits form nutritional support: what is the evidence? Eur J Gastroenterol Hepatol 2007;19:353-8.

243. Johnson S, Nasser R, Banow T, Cockburn T, Voegeli L, Wilson O. Use of oral nutrition supplements in long-term care facilities. Can J Diet Prac Res 2009;70:194-8.

244. Gray-Donald K, Payette H, Boutier V. Randomized clinical trial of nutritional supplementation shows little effect on functional status among free-living frail elderly. J Nutr 1995 1995;12:2965-71.

245. Volkert D, Hubsch S, Oster P, Schlierf G. Nutritional support and functional status in undernourished geriatric patients during hospitalization and 6- month follow-up. Aging (Milano) 1996;8:386-95.

246. McCarty MF. High-dose pyridoxine as an "anti-stress" strategy. Med Hypotheses 2000;54:803-7.

247. Cousens G. Depression-free for life. New York: William Morrow, 2000.

248. Selhub J, Bagley L, Miller J, Rosenberg I. B vitamins, homocysteine, and neurocognitive function in the elderly. Am J Clin Nutr 2000;71:614S-20S.

249. Robins Wahlin TB, Wahlin A, Winblad B, Backman L. The influence of serum vitamin B_{12} and folate status on cognitive functioning in very old age. Biol Psychol 2001;56:247-65.

250. MacLean CH, Issa AM, Newberry SJ, Mojica WA, Morton SC, Garland RH, Hilton LG, Traina SB, and Shekelle PG. Effects of Omega-3 Fatty Acids on Cognitive Function with Aging, Dementia, and Neurological Diseases. Evidence Report/Technology Assessment No. 114 (Prepared by Southern California/RAND Evidence-based Practice Center under Contract No. 290-02-0003). AHRQ Publication No. 05-E011-2. 2005. Rockville, MD: Agency for Healthcare Research and Quality.

251. Hébert R, Dubois MF, Wolfson C. Factors associated with long-term institutionalization of older people with dementia: data from the Canadian Study of Health and Aging. J Gerontol Med Sci 2001;56A:M693-M699.

252. Lengyel CO, Whiting SJ, Zello GA. Nutrient inadequacies among elderly residents of long-term care facilities. Can J Diet Prac Res 2008;69:87.

253. Altus DE, Engelman KK, Mathews RM. Using family-style meals to increase participation and communication in persons with dementia. J Gerontol Nurs 2002;28:47-53.

254. Nijs KA, de Graaf C, Siebelink E, Blauw YH, Vanneste V, Kok FJ. Effect of family-style meals on energy intake and risk of malnutrition in Dutch nursing home residents: a randomized controlled trial. J. Gerontol A Biol Sci Med Sci 2006;61:935-42.

255. Freeman C, Ricevuto A, DeLegge MH. Enteral nutrition in patients with dementia and stroke . Curr Opin Gastroenterol 2010;26:156-9.

256. Health Canada. A Report on Mental Illnesses in Canada. 1-108. 2002. Ottawa, Health Canada.

257. Zanarini MC, Frankenburg FR. Omega-3 fatty acid treatment of women with borderline personality disorder: a double-blind, placebo-controlled pilot study. Am J Psychiatry 2003;160:167-9.

258. Guay DR. Drug treatment of paraphilic and nonparaphilic sexual disorders. Clin Ther 2009;31:1-31.

259. Garcia FD, Thibaut F. Current concepts in the pharmacotherapy of paraphilias. Drugs 2011;71:771-90.

260. Schizophrenia Society of Canada. Concurrent Disorders and Schizophrenia: A National Awareness Strategy Discussion paper. 2006. Winnipeg, Schizophrenia Society of Canada.

261. Puddicombe J, Rush B, and Bois C. Concurrent Disorders Treatment: Models for Treating Varied Populations. 2004. Toronto, Centre for Addiction and Mental Health.

262. Skinner W, O'Grady CP, Bartha C, and Parker C. Concurrent Substance Use and Mental Health Disorders: An Information Guide. 2004. Toronto, Centre for Addiction and Mental Health.

263. Centre for Addiction and Mental Health. Concurrent Disorders: A Resource for Families. 2006. Toronto, Centre for Addiction and Mental Health.

264. BC Partners for Mental Health and Addictions Information. Here To Help: Concurrent Disorders. Retrieved from: www.heretohelp.bc.ca/publications/factsheets/concurrent. 2012.

265. Davison KM and Kaplan BJ. A Comparison of Vitamin and Mineral Intakes in Adults with Mood Disorders With and Without Drug-Related Problems. 2011. Toronto, Canadian Centre on Substance Abuse, Issues of Substance Conference.

266. Bankier B, Januzzi JL, Littman AB. The high prevalence of multiple psychiatric disorders in stable outpatients with coronary heart disease. Psychosom Med 2004;66:645-50.

267. Pronsky ZM. Food-Medication Interactions, 14th Edition. 2006. Birchrunville, Food-Medication Interactions.

268. United States Pharmacopeia. Drug Information for the Health Care Professional (USP DI: v.1 Drug Information for the Health Care Professional). Rockville: Thomson Healthcare, 2004.

269. Jellin JM, Gregory P, Batz F, Hitchens K, and Pheat N. Natural Medicines Comprehensive Database, 7th Ed. 2005. Stockton, Therapeutic Research Faculty.

270. Garg SK, Kumar N, Bhargava VK, Phrabhaker SK. Effect of grapefruit juice on carbamazepine bioavailability in patients with epilepsy. Clin Pharmacol Ther 1998;64:286-8.

271. Perry-Keene DA, Jenkins RG, Heyman P. The effect of long-term diphenylhydantoin therapy on glucose tolerance and insulin secretion: A controlled trial. Clin Endocrinol 1980;12:575-80.

272. Kruse K. On the pathogenesis of anti-convulsant-induced alterations of calcium metabolism. Eur J Pediatr 1952;138:202-8.

273. Pinto JT, Rivlin RS. Drugs that promote renal excretion of riboflavin. Drug Nutr Inter 1987;5:143-51.

274. Kim RB. The Medical Letter Handbook of Adverse Drug Interactions. New Rochelle: Medical Letter, 2005.

275. Teasley-Strausburg KM. Nutrition Support Handbook. Cincinnati: Harvey-Whitney, 1992.

276. Tatro DS. Drug Interaction Facts. St Louis: Facts and Comparison, 2005.

277. De Abajo FJ, Garcia-Rodriguez LA, Montero D. Association between selective serotonin reuptake inhibitors and upper gastrointestinal bleeding: population based case-control study. BMJ 1999;319:1106-9.

278. Serretti A, Mandelli L. Antidepressants and body weight: A comprehensive review and meta-analysis. J Clin Psychiatry 2010;71:1259-72.

279. Urdaneta E, Idoate I, Larralde J. Drug-nutrient interactions: inhibition of amino acid intestinal absorption of fluoxetine. Br J Nutr 1998;79:439-46.

280. Author Unknown. SSRIs and osteoporosis. Med Let Drugs Ther 2007;49:95-6.

281. Giltay EF, Gooren LJ. Potential side effects of androgen deprivation treatment in sex offenders. J Am Acad Psychiatry Law 2009;37:53-8.

282. Tomedi LE, Bogen DL, Hanusa BH, Wisner KL, Bodnar LM. A pilot study of the nutritional status of opiate-using pregnant women on methadone

Appendix A: Search Strategy

Mental Health Terms		*Nutrition Terms*		*Therapeutic/ Intervention Terms*		*Databases and Search Limits*
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

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

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

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 heath 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

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

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.mooddisorderscanada.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

Metabolic Monitoring

Monitoring Worksheet for Patients on Second-Generation Antipsychotics.
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)

Koening 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, Lunsky 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. ww1.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 4: Psychotropic Agents by Medication Group and Their Nutrition-Related Side Effects[267;268]

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)[269] Acamprosate calcium: vomiting, diarrhea (usually transient), peripheral edema, weight gain Naltrexone: Nausea, vomiting, abdominal pain, anorexia, weight loss (women more sensitive)
Disulfiram	Antabuse®		
Acamprosate calcium	Campral®		
Citrated calcium carbimide	Temposil®		
Naltrexone	ReVia®, Depade®, Nodict®, Trexan®	Antagonist at opiate receptor sites; highest affinity for the μ opiod receptor – inhibits increased endorphins during alcohol use	
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 hyperandogenism 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[270] as can cause vitamin D deficiency Irregular menses and secondary amenorrhea Grapefruit and related citrus can slow metabolism of drug[271]
First-Generation			
Phenytoin	Dilantin®		
Second-Generation			
Carbemazepine	Tegretol®, Epitol®, Teril® (liquid), Carbatrol®, Equetro®		
Divalproex sodium	Epival ECT®, Depakote®		
Valproic acid	Depakene®		
Valproate sodium	Depacon®		

continued...

Table 4: 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[272;273] 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®		
Antinarcolepsy/Drugs for ADHD/Stimulants			
Generic	Brand		
Psychostimulant		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)
Dextroamphetamine	Dexedrine®, Dexrostat®		
Lisdexamfetamine	Vyvanse®		
Methamphetamine	Desoxyn®		
Mixed salts amphetamine	Adderall XR®		
Methylphenidate	Ritalin®, Biphentin® Concerta®, Methylin®		
Methylphenidate transdermal patch	Daytrana®		
Dexmethylphenidate	Focalin®		
Atomoxetine	Strattera	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

continued...

Table 4: 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[274], vitamins D and K, calcium, biotin, and folate, and can alter blood glucose and lipids[272;273] 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, weigth 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®		
	Thioproperazine	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 4: 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-HT2, 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[272;273] 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®		

continued...

Table 4: 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)
Dihydrocarbostyril	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[275]
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®		

continued...

Table 4: 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			
Memantine	Namenda®, Ebixa®	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
Mood Stabilizers/Antimanics			
Generic	**Brand**	Lithium clears the synaptic cleft of neurotransmitters, as well as by limits release from nerve endings See anti-convulsants for actions	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[276] 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®		

continued...

Table 4: 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[277]; suggest avoid ingest high-fiber food concurrently with medication May ↑ need for riboflavin[274] 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[279] Contraindicated in individuals with history of anorexia or bulimia Cases of hypoglycemia reported

continued...

Table 4: 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), trytophan[277] 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[279] May ↓ absorption of leucine[280] Dystonia, dyskinesia, parkinsonism or tics; more likely in older people Paraesthsias; may be caused by pyridoxine deficiency (give 50-100 mg/ pyridoxine per day) ↑ LDL cholesterol reported wih 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[280] Excess ingestion of caffeine may increase anxiety Sertraline should be given with food (increase peak plasma level) Grapefruit and similar product while taking flvoxamine 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®		
Tetrahydrona-phthylmethylamine			
Sertraline	Zoloft®		
Paroxetine			
Serotonin and Norepinephrine Reuptake Inhibitor or SNRI			
Generic	Brand	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
Venlafaxine	Effexor®		
Duloxetine	Cymbalta®		
Desvenlafaxine	Pristiq®		

continued...

Table 4: 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[270] 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®		
Tranylcy-promine	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 Sertonergic 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
Mirtrazapine	Remeron®		
Vilazodone			
Indolakylamine		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®		

continued...

Table 4: 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 B_6 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[275] 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®		

continued...

Table 4: 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[277] 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	
Diphenhydramine	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
Pentobartital	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®		

continued...

Table 4: 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[281]
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®		

[a]The 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 (T1/2) and whether or not the drug produces pharmacologically active metabolites.

Appendix D: Substances of Abuse and Their Effects

*Table 5: 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): *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)*	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: *Cat valium, green, K, ket, kit-kat, jet, special K, vitamin K, Ketaset®, Ketalar®*	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: *Gravol®*	Used to prevent and treat nausea and vomiting. Sometimes used for sedation.	
LSD (lysergic acid diethylamide): *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*	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 5: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

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 / cont'd		
MDMA (3,4-methyl-ene-dioxy-N-methylamphet-amine or 3,4-methyl-enedi- oxymeth-amphetamine): *Ecstasy, X, Adam, hug, hug drug, CK, M&Ms, roll, XTC, E, beans, love drug*	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): *Mesc, buttons, cactus, peyote* 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 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): *Flying saucers, licorice drops, heavenly blue, pearly gates*	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: Caps, *magic mushrooms, sacred mushrooms, shrooms, caps, psilocin, purple passion, little smoke*	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 5: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

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 cont'd		
PMA (paramethoxyam-phetamine): *Death, Mitsu-bishi double stack, chicken yellow*	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-dimethyltrypamine): *Businessman's trip, lunch-hour drug, FOXY (=MeO-DIPT)*	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-dimethoxyphene-thylamine) or DOB: *Nexus, bromo, toonies, herox, synergy*	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): *Dex, robo, robotripping, DM, velvet, skittles, triple C, tussin*	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: *Foxy methoxy, foxy, yum yum, roxy, dip foxy, muffy, five*	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: *salvia, diviner's sage, magic mint, sage of the seers,*	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): *Molly, legal E, legal X, A2*	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 5: 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 pan. 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[208]
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 5: 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: *Dolophine®*, *Roxan®e*, *Methadol®*, *dollies*, *the kick pill*, *meth*	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[282].
Fentanyl: *Duragesic®*, *ratio-Fentanyl*, *Actiq®*, *lethal injection*, *drop dead*, *fat Albert*, *the bomb*, *incredible hulk*	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: *Valium®*, Oxazepam: *Serax®*, Lorazepam: *Ativan®*, Alprazolam: *Xanax®*	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: *Restoril®*, Flurazepam: *Dalmane®*, Triazolam: *Halcion®*, Flunitrazepam: *Rohypnol®*, *roofies*, *rope*, *the forget pill*	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 5: 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: Prescription Tranquilizers, Sleeping Pills, and Other Depressants /cont'd		
Barbiturates/Other Sleeping Pills – Secobar-bital: *Seconal®*, *reds*, *red birds*, *red devils*, Pento-barbital: *Nembutal®*, *yellow jackets*, Amobarbital: *Amytal®*, *blue heavens*, Amobarbital-secobarbital: *Tuinal®*, *Christmas trees*, *rainbows*, Zopiclone: Imovane®	Barbituarates 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): easy lay, *G*, *gamma G*, *G-riffick*, *Georgia home boy*, *ghost breath*, *growth hormone booster*, *love*, *grievous bodily harm*, *liquid ecstasy*, *nature's Quaalude*, *soap*, *soapy*, *scoop*, *salty walter*, *goop*, *liquid X*, *liquid E*, *GBH (grievous bodily harm)*, *riffick*, *cherry menth*, *organic quaalude*, *somatomax*	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 5: 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: Prescription Tranquilizers, Sleeping Pills, and Other Depressants /cont'd		
Inhalants/Aerosols. Solvents (paint, paint thinners, gasoline, glues); gases (butane, propane, aerosol propellants, nitrous oxide); nitrites (isoamyl, isobutyl, cyclohexyl) *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*	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): *beer, spirits, wine, coolers, hard liquor, brew, liqueurs, booze, moonshine, brewski, shooters, barley sandwich, hooch, 40 pounder*	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 5: 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: *Big C, blow, coke, flake, freebase, lady, nose candy, rock, snow, snowbirds, crack, white crack*	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: *Adderall®*, Dextroamphet-amine: *Dexedrine®, dexies Ritalin®, (kibbles and bits, pineapple), Tenuate®, Ionamin®*	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, formicaton (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: *Desoxyn®, chalk, croak, crypto, crystal meth, fire, glass, tweek, tina, white cross, speed, crystal, meth, ice, crank, shard*	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 5: 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		
Methcathinone: *Cat*	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 (Catha edulis): *Qat, kat*	From leaves of the Catha edulis 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 (Nicotiana tabacum): *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*	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 5: 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 (Ilex paraguariensis) and guarana (Paullinia cupana).	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: *Andraol-50®*, Stanozolol: *Winstrol® and Winstrol V®*, Nandro-lone: *Deca-Durabolin®*, Methandrostenolone or Methandrie-none or Metan-dienone: *Dianabol®*, Oxan-drolone: *Anavar®*, Bolde-none: *Equipoise®*, Methe-nolone/ Metenolone: *Primo-bolan®*, Mesterolone: *Pro-viron®*, Testosterone Cypio-nate: *Depo-testosterone®*, Testosterone Enanthate: *Delatestryl®*, Testosterone Propionate: *Testex®*, Testosterone Undecanoate: *Andriol® 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 jealously, extreme irritability ("rhoid rage"), delusions, and impaired judgment.

continued...

Table 5: 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, a*unt 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 5: Substances of Abuse: Description, Short-Term, Long-Term and Nutrition Effects - continued

Category, Names: *Common Names*	Description	Short-Term, Long-Term, and Nutrition Effects
Herbal Products: Active ingredients include alkaloids, steroids, tannins, volatile oils, glycosides, gums, resins, and lipids /cont'd		
Guarana: *Zoom, Paullinia cupana, paullinia, Brazilian cocoa, guarana bread, guarana paste or gum*	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 (Ilex paraguayensis)	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): ☐ Eating disorder ☐ Diabetes ☐ Skin breakdown (e.g. open areas, sores) ☐ Dementia, stroke with paralysis or Parkinson's ☐ Other ▸ _____	10	
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): ☐ Heart Disease ☐ High Blood Pressure ☐ Osteoporosis ☐ Breathing/lung problems ☐ Gastroesophageal reflux (GERD) ☐ Hiatus Hernia ☐ Substance use ☐ Mental health condition (e.g., depressive disorder) ☐ Other ▸ _____	3 for each √	
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
Significant weight change	10
Appears underweight (BMI < 18.5)	5
Appears overweight (BMI > 30)	3

If person is between 2-20 years of age, review the following (see background for details)	Score	Total
Any weight loss	10	
Appears underweight	5	
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	If total score is 10 or more
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.	Are all conditions indicated currently being well managed by a health care professional? (√ check one) ☐ Yes ▸ No referral needed ☐ No ▸ **Refer**

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 used 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.
Complains food "gets stuck", "goes down the wrong way" or frequent throat clearing. Refuses or avoids certain food(s).
Lung congestion or chronic respiratory infection.
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, hematrocrit, ferritin, serum creatinine, hemoglobin A1c, prealbumin, total lymphocyte count, liver enzymes, triglycerides, potassium, sodium, folate, vitamin B_{12}, 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: Isonazid (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.

Height	*Weight Range for BMI Category*	
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)

Significant Weight Change			
PREVIOUS WEIGHT	*1 MONTH - 5% CHANGE*	*2 MONTH - 7.5% CHANGE*	*6 MONTH - 10% CHANGE*
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 3: Flowchart of Nutrition Care Management for Mental Health Conditions

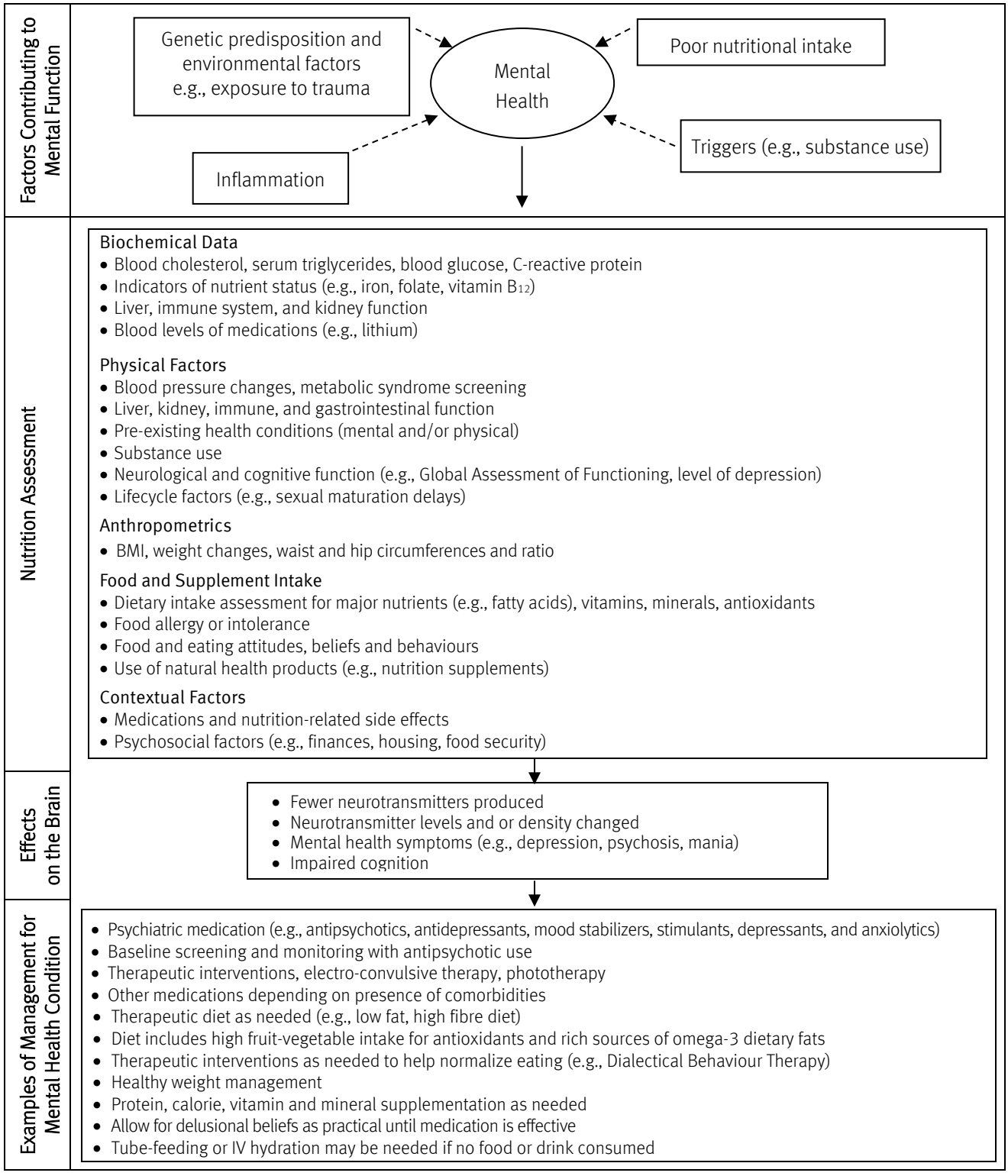


Figure derived from: Pharmacologic and nonpharmacologic strategies for weight gain and metabolic disturbance in patients treated with antipsychotic medications by Guy Faulkner and Tony A. Cohn, 2006. Adapted with permission from Dr. Tony Cohn, Centre for Addiction and Mental Health (CAMH) and University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

Canadian Mental Health Association, Ontario. (2011). Northern Initiative for Social Action: Food is Mood Case Study Report. Retrieved March 16, 2012 from http://www.mindingourbodies.ca/sites/default/files/MOB_Case_Study_NISA.pdf

Dietitians of Canada / Les diététistes du Canada
480 University Avenue, Suite 604
Toronto, Ontario, Canada M5G 1V2

TEL: 416.596.0857
FAX: 416.596.0603
EMAIL: centralinfo@dietitians.ca

www.dietitians.ca | www.dietetistes.ca