Proper Nutrition

The Science of Resilience

rrc@dal.ca

www.resilienceresearch.org

RRC - Evaluation
and Training Institute

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Definition

Simply put, proper nutrition can be defined as consuming the vitamins, minerals, and nutrients necessary for one's body and brain to function at their best. While eating healthy is an ubiquitous mandate that we all understand, there are many factors affecting how we acquire proper nutrition and how it is defined. Many studies operationalize proper nutrition into the number of fruit and vegetable servings one consumes daily (c.f. Blanchflower et al., 2013; Clark et al., 2005; Clark et al., 2019; Conner et al., 2017; McMartin et al., 2013; Mujcic & Oswald, 2016; Nguyen et al., 2017; Wattcik et al., 2018; Williams et al., 2011). The USDA recommends 5 to 9 servings of fruits and vegetables per day and many studies use 5 servings as a marker of proper fruit and vegetable intake. A smaller number of studies use a wider definition of nutrition and investigate individuals' consumption of important vitamins, minerals, and nutrients (c.f. Jyvakorpi et al., 2018; Lim et al., 2016), their knowledge of nutritional information (c.f. Grant et al., 2004; Smolak & Levine, 2001; Wattick et al., 2020), or look at sugar intake in addition to fruits and vegetable consumption (Lim et al., 2016; Wattick et al., 2018; Wattick et al., 2020). There is evidence in the literature that adherence to a traditional Mediterranean diet is associated with a healthy pattern of nutrient intake (Martinez-Gonzalez et al., 2012; Schröder et al., 2011), thus, some studies also include the Mediterranean diet as a component of nutrition (c.f. Jyvakorpi et al., 2018; Martinez-Gonzalez et al., 2012). While measuring fruit and vegetable intake is one of the simplest ways to conceptualize nutrition, other conditions such as obesity, eating disorders, and substance abuse also affect nutrition.

While an individual's preference for fruits and vegetables or for sugars and fatty foods will influence their nutrition, proper nutrition is a resourced quality in that a person's access to and knowledge about nutritional foods is a greater determinate than their personal preference. The importance of food security is reoccurring throughout the literature on proper nutrition. Food insecurity has been found to contribute to anxiety and depression in university students (Wattick et al., 2018). Yousafzai et al. (2013) notes that in low- and middle-income countries, nutritional deficiencies due to lack of access to proper nutritional foods for both mothers and children is a severe risk factor for infants. Furthermore, they find that nutritional interventions are only effective in the short-term and do not tend to have long-lasting effects because children continue to face nutritional deficiencies. Improving access to nutritional foods may thus be the best intervention option. Connor et al. (2017) found that their intervention to increase fruits and vegetable intake in young adults was only effective when the young adults were provided with fruits and vegetables weekly and not when they were send reminders to purchase fruits and vegetables. Nguyen et al. (2017) found that in a longitudinal study of fruit and vegetable consumption, those with favourable socioeconomic status were more likely to consume healthy amounts of fruits and vegetables, suggesting that proper nutrition is tied to an individuals' socioeconomic status and their ability to purchase and access healthy, nutritional foods. In addition to the personal resources (e.g. money) needed to access nutritional foods, other external resources include families and schools, which may be the main

source of knowledge concerning nutrition and access to nutritional food for children. Williams et al. (2011) found that parental rule-setting and teachings about nutrition were the biggest influence on children's eating habits, and that school canteens were an important source of healthy food options for children living in disadvantaged neighbourhoods in Victoria, Australia. Most interventions focusing on nutritional knowledge or eating disorder prevention are implemented in schools (Melnyk et al., 2009; Smolak & Levine, 2001). These environmental factors (e.g., money, access, family, and schools) shape an individual's nutrition.

Relationship to Resilience

The relationship between proper nutrition and resilience has not been directly explored much in the literature, however, the relationship between proper nutrition and various elements of resilience, such as development, mental well-being, and recovery, have been identified throughout the lifespan.

Proper nutrition is extremely important in the first two years of life. Lack of proper nutrition accounts for 35% of all under-five child deaths worldwide (Black et al., 2008) and contributes to growth deficiencies associated with poor cognitive development, lower educational attainment, and reduced adult income (Victora et al., 2008). Furthermore, nutritional deficiencies may have a dangerous feedback loop whereby an infant or young child who is malnourished becomes apathetic and, as a result, is less active, is harder to feed, and demands less food and attention from the caregiver, which, in turn, compromises the child's resilience. Finally, maternal undernutrition is a risk factor for the healthy development of the child, as well as a risk for the mother's health. Yousafzai et al. (2013) found that various supplemental and stimulation interventions for both mothers and young children increased the child's resilience, defined as proper development of cognitive, motor, social, and affective skills, even after nutritional deficiency.

In school-aged children, obesity is a risk factor for lower resilience and can be the result of poor nutrition. Obese youth are thought to underperform in school, be less engaged in school, be bullied by their classmates, form fewer meaningful relationships with other youth, and develop serious physical and mental health problems (Melnyk et al., 2009; Unger et al., 2014). In sum, obesity can interfere with school-based resilience. School can be an important part of youths' resilience, where youth at risk in other areas of their life can access meaningful resources and support (Ungar et al., 2014). School-based interventions that include nutrition education are a common pathway to target obesity, school engagement, and resilience. While these interventions demonstrate increased nutrition knowledge and self-esteem (Smolak & Levine, 2001) and lessened depression and anxiety (Melnyk et al., 2009), to actually reduce obesity in youth, interventions likely need to go outside of the school and provide youth with quality services and supports in all areas of their life (Ungar et al., 2014). As well, the risk for obesity does not end in adolescence, as 18 to 25-year-olds are at particular risk for weight gain

and being mildly or moderately overweight between the ages of 20 to 20 is linked with substantial incidence of obesity by 35 to 37 (Kattlemann et al., 2014).

In young adults, proper nutrition has been linked to both fewer symptoms of mental health disorders, such as depression and anxiety, and to mental well-being. In a sample of 1,956 graduate and undergraduate students from a large Appalachian university, Wattick et al. (2018) found that for men, lower fruit and vegetable intake and food insecurity were predictors of depression, while higher added sugar intake and food insecurity were predictors of anxiety. In women, food insecurity was a significant predictor of depression and anxiety and added sugar intake further predicted anxiety (Wattick et al., 2018). In Conner et al.'s (2017) study, even small increases fruit and vegetable intake rapidly translated into improved well-being, with participants self-reporting improved vitality and flourishing behaviours, such as curiosity, creativity, and motivation.

Proper nutrition is especially important for a subgroup of young adults, those recovering from substance abuse. Substance abuse can alter eating habits, thus, those in recovery often face malnutrition, metabolic disorders, altered body composition, and poor mental health. As well, evidence shows that those in recovery demonstrate cravings for calorically dense foods and sugar. Wattick et al. (2020) describes how recovering from substance abuse require "recovery capital," defined as, "the amount of internal and external resources that can be accessed to initiate and sustain recovery" (p. 326). Wattick et al. (2020) note the similarity between recovery capital and resilience. In their study of a nutritional component added to a collegiate recovery program for young adults attempting recovery while attending college, Wattick et al. (2020) found that higher participation in the nutrition program correlated with better ratings of health and the absence of depression symptoms. In a study of clinical nutrition programs included in substance abuse treatments, Grant et al. (2004) found that group nutrition/ substance abuse education had a positive, direct association to psychiatric, medical, and family/ social improvements.

In the general population, consumption of fruits and vegetables has been consistently associated with a lower prevalence of psychological distress and increased well-being in multiple countries. In a review of the available literature, Lim et al. (2016) found that dietary factors may aggravate or ameliorate symptoms and the progression of mental disorders. In a large sample of 60,404 Australian adults aged 45 years and older (mean = 62.2; SD = 10.6; 53.6% women), Nguyen et al. (2017) found that the consumption of fruits and vegetables was associated with a lower prevalence of psychological distress; the association remained significant when controlling for age, marital status, education, income, smoker status, BMI, physical activity levels, and self-reported history of chronic disease. This association was stronger in women (Nguyen et al., 2017). In another Australian sample of 12,00 people aged 15 years and older, Mujcic and Oswald (2016) found that fruit and vegetable consumption predicted increases in life satisfaction and well-being over time. Fruit and vegetable consumption in the current year predicted higher well-being in the next year even after

controlling for current well-being (Mujcic & Oswald, 2016). In a large scale Canadian study, using data from the Canadian Community Health Survey, which had five waves between 2000 and 2009 and which surveyed 296,121 individuals aged 12 and older, McMartin et al. (2013) found that fruit and vegetable intake was significantly associated with lower odds of depression and of suffering from distress. Using three data sets, the Welsh Health Survey of 2007-2010, the Scottish Health Survey of 2008, and the Health Survey of England in 2008, to study 80,000 individuals, Blanchflower et al. (2013) found that fruit and vegetable intake was associated with increases in happiness and mental health, as defined by measures of life satisfaction, mental well-being, mental disorders, self-reported health, happiness, nervousness, and feeling low. In high-income countries, fruit and vegetable consumption is significantly related to mental health and well-being, thus, it is likely it is also related to overcoming adversity.

In older adults, proper nutrition has a critical impact on functional ability and quality of life. In a sample of 1,277 older adults (mean age of 75.3; SD = 6.7), Clart et al. (2005; 2019) found that resilience in functioning was associated with fruit and vegetable intake. In a study of the oldest surviving men from the Helsinki Business Men (HBS) cohort, which included men from the highest socioeconomic class, 394 men, aged 82 to 97, Jyvakorpi et al. (2018) found that physical functioning in this cohort was significantly related to diet, specifically higher intake of vegetables, legumes, fibre, protein, folate, and vitamin E.

Interventions

Interventions for Mothers and New-borns

Yousafzai et al. (2013) reviewed nutrition supplement interventions for expecting mothers and new-borns in low- and middle-income (LAMI) countries. They found that interventions with balanced protein-energy supplementation can benefit child birthweight and reduce the risk of small-for-gestational-age births, and there is some evidence it can also benefit infant cognitive, behavioural, and motor development. Multiple micronutrient supplementation during pregnancy can reduce maternal anaemia and increase birthweight, improve child growth, and benefit infant motor and cognitive development. However, Yousafzai et al. (2013) note that these prenatal interventions are not likely to foster long-term resilience in children who grow up facing the continued risk of nutritional deficiencies. Rather than nutritional supplemental interventions alone, Yousafzai et al. (2013) advocate for combining nutrition supplementation with child simulation interventions; they advise that the first 2 to 3 years are the critical time to implement nutritional supplementation and stimulation interventions due to common pathways and mediators and the targeting of family caregiving skills. In studies in Colombia, Jamaica, Vietnam, and Bangladesh, children provided with food supplementation and stimulation interventions showed additional benefits of improved height and weight and reduced prevalence of stunting compared to the nutritional supplementation alone group and control group. Stimulation interventions can also target responsive feeding,

which is linked to children accepting and consuming more food. Yousafzai et al. (2013) claim that stimulation alone is likely not enough to promote growth, but it is a protective factor that increases children's interest in the world around them and cultivates their ability to communicate, thus fostering resilience in situation of nutritional deficiencies. However, Yousafzai et al. (2013) caution that when implementing nutritional interventions, it is important to understand the feeding styles in different cultural contexts in order to develop strategies that will support families.

School-aged Children

Williams et al. (2011) conducted qualitative interviews with 38 mother-child pairs who lived in disadvantaged neighbourhoods in Victoria, Australia. The authors claim the child in these pairs, aged 7 to 12, was resilient to nutritional deficiency as they were a healthy weight and consumed adequate intakes of fruits and vegetables despite the risk they faced for nutritional deficiency due to their environment. Williams et al. (2011) found that parents employing active strategies to promote healthy eating had the largest impact on children's nutrition. These strategies included limiting access to unhealthy food, emphasizing moderation, restricting unhealthy food options to special occasions, educating their children about nutrition, providing fruits and vegetable as snack options, and enforcing "food rules," such as prohibiting dessert until vegetables were consumed or mandating a minimum fruit and vegetable daily consumption quota. Parents also reported taking extra steps to secure quality fruits and vegetables, such as growing their own gardens or travelling further to access better quality produce. Peer influence, through verbal comments and modelling, did affect children's desire for unhealthy food, however peer influence and media influence were tempered by parental restrictions. Parents in this study reported a strong belief that they were responsible for their child's healthy eating. Interventions for this age should focus on the parents.

Eating Disorder Prevention

Adolescents are at high risk of eating disorders and the associated nutrition deficiency. Levine et al. (1995) designed an intervention for elementary school children to prevent the development of eating disorders in adolescence.

Eating Smart, Eating for Me (ESEM; Levine et al., 1995) is composed of 10, one-hour lesson designed to improve nutrition, encourage healthy exercise, enhance body esteem, foster awareness of the natural diversity of body shapes, discourage dieting and other unhealthy weight reduction techniques, and critique sociocultural influences, particularly peer teasing and media messages about nutrition and slenderness. The intervention was designed more for girls than boys due to the gendered nature of disordered eating. "The ESEM program aimed to increase certain forms of resilience, such as 1) knowledge and behaviour in regard to healthy nutrition and exercise, 2) positive body image, 3) knowledge and attitudes about fat, fat people, the natural diversity of weight and shape, and 4) critical evaluation of media messages glorifying a narrow standard of slender beauty" (Smolak & Levine, 2001, p. 323).

Among the initial sample of 388 boys and girls aged 9 to 11, the intervention increased knowledge concerning nutrition, the genetic and developmental aspects of body fat, and the negative effects of dieting.

At a two-year follow-up, Smolak and Levine (2001) assessed 289 participants of the original interventions, compared against 164 children who had been part of the original control group, and 104 children who comprised the new control group. The new control group did not attend the same elementary school at the time of the original intervention, so there was no possible spill-over effect as there was with the original control group. The two-year follow-up sample was comprised of 519 adolescents all together, aged 11 to 13 (248 boys, 252 girls, and 9 who did not indicate a gender, virtually all the participants were white, from working to middle class families). The two-year follow-up found a possible prevention effect from the ESEM intervention, where the intervention group was less likely to diet and had better body esteem than the new control group; they also had more knowledge of weight, weight control, and nutrition which significantly correlated with body esteem, weight control techniques, and attitudes towards appearance. The intervention was more effective for girls. The skills the ESEM intervention aimed to impart could increase school-aged children's resilience to the pressures they face to engage in unhealthy eating behaviours.

Obesity Intervention

Melnyk et al. (2009) designed an obesity intervention for Hispanic youth who are at a higher risk of obesity and less often the focus of such interventions. COPE (Creating Opportunities for Personal Empowerment) Healthy Lifestyles TEEN (Thinking, Emotions, Exercise, and Nutrition) is an intervention guided by cognitive-behavioural theory (CBT) and includes 15 manualized sessions that deliver educational information on leading a healthy lifestyle and cognitive-behavioural skills building (CBSE), which included practice and role playing. The content of the education sessions includes 1) creating a healthy lifestyle, 2) strategies to build self-esteem, 3) stress management, 4) goal setting, 5) effective communication, 6) nutrition, and 7) physical activity. Case-based examples were used to highlight concepts. Homework assignments, including a journal log that captured their goals and progress, were given out to be done between intervention sessions. Each session also included 15 to 20 minutes of physical activity.

The intervention was delivered 2 to 3 days a week during students' 9-week health class in an urban, predominantly Hispanic high school. Nineteen students agreed to participate in the follow-up survey, aged 14 to 16 (mean = 15.5, SD = 0.63; 58% female, 100% Hispanic; 58.3% had a BMI percental greater than or equal to 85).

Adolescents who participated in the COPE intervention were less depressed, less anxious, and more committed to making healthy choices following the intervention; those in the control group showed no change in depression or anxiety but did report a similar change in their commitment to making healthy choices, which makes sense as all students were enrolled

in a health class. The overweight subgroup of the intervention group also showed increases in nutrition knowledge, a decrease in depressive symptoms, and improved physical health; however, there was no change in weight or BMI percentile, likely due to the short time frame of the study. Melnyk et al. (2009) also note that this intervention preformed better than previous, after-school interventions as it was incorporated into the school curriculum and well-received by students.

Young Adults/ College and University Students

Conner et al. (2017) implemented an intervention to increase fruit and vegetable consumption in students attending a New Zealand university who reported fewer than 3 combined servings of fruits and vegetables a day. The sample included 171 young adults aged 18 to 25 (mean = 19.43, SD = 1.45; 56 men and 115 women; 64% identified as European, 18% as Asian, and 8% as Maori or Pacific Islander and 11% as mixed ethnicity).

The intervention was a 14-day, randomized control trial with three groups: 1) a diet-as-usual control, 2) an ecological momentary intervention condition (EMI), where participants were sent twice daily texts utilizing a variety of behavioural change techniques to help them increase their fruit and vegetable consumption plus a voucher to purchase the fruits and vegetables, 3) a fruit and vegetable intervention condition (FVI) where participants were given a bag of two weeks' worth of fruits and vegetables (kiwifruit or oranges depending on the season, apples and carrots) and were asked to consume at least 2 additional servings (1 fruit and 1 vegetable on top of their regular consumption). Participants took a nightly survey on their smartphones to measure their psychological well-being and decrease memory bias.

Participants in both experimental conditions reported small increases in fruit and vegetable daily consumption compared to the control group and to their own baselines; these reports were backed up by blood samples showing small gains in vitamin C levels and plasma carotenoids. However, only the FVI condition showed improvements in their self-reported vitality, flourishing, and flourishing behaviours, such as curiosity, creativity, and the largest gains in motivation. Conner et al. (2017) conclude that even small gains in fruit and vegetable consumption can rapidly translate into improved well-being, but only when young adults are given easy access to fruit and vegetables rather than just reminders to eat healthy.

Substance Abuse Recovery Population

Wattick et al. (2020) investigated a nutritional educational component of a collegiate recovery program (CRP) at West Virginia University. Young adults attending college and in recovery from substance abuse attended CRP programming to help their recovery process. Thirteen students who had attended the nutritional component of the CRP program throughout the fall semester agreed to take part in a follow-up survey, most were over 25 years old, 61.5% were women, and 76.9% were white. Wattick et al. (2020) found that higher participation in the nutrition program was associated with ratings of good health and the absence of depression

symptoms. Supporting this finding, Grant et al. (2004) found that group nutrition and substance abuse education programs had a positive, direct association with psychiatric, medical, and family/ social improvement on the Addiction Severity Index.

The intervention consisted of 3-4 session a semester. Each session was held by dietitians and nutritionists and consisted of a 30-minutes digital slide presentation and discussion of a nutrition topic followed by the group preparing a meal together related to the topic. Participants also received an educational handout that reinforced the lesson.

Session breakdown:

1. Foods to Aid Recovery – evidence on the relation between diet and mental health and how substance use affects appetite, mood, and vitamin and mineral absorption. Emphasized the B vitamins, omega-3 fatty acids, and vitamins A, C, D, and E because consumption of these were linked to less incidence of mental health disorders.
    a. Prepared a Mediterranean meal
    b. Handout focused on ways to add more vegetables to meals as evidence shows that educating college students on how to incorporate these foods can increase their fruit and veg intake
2. Metabolism and Portion Sizes – the importance of eating regular meals as evidence shows altered eating patterns in individuals in recovery, focused on the use of cooking and meal planning practices to improve diet quality, ways to ensure the meals were eaten regularly were provided, such as meal preparation for the week, planning ahead, and making snacks.
    a. Culinary component consisted of meals ideal for preparing for the week
    b. Educational handout focused on portion sizes and the importance of breakfast
3. Fad vs. Evidence-based Diets – navigate nutrition media to choose beneficial foods and stay away from fad diets, taught to identify evidence-based diets, taught about the meaning of food label claims and what to look for on a nutrition label
    a. This lesson occurred around Thanksgiving, so the culinary component included ways to add healthy dishes to the typical thanksgiving meal
    b. Handout focused on food label claims and what they meant
4. Dangers of Sugar in Recovery – the effects of excess sugar intake on mental and physical health, in particular how it affects recovery as evidence shows that individuals in recovery have severe sugar cravings; also discussed the recommended amount of sugar, identified ways in which sugar is hidden in foods, and tips to decrease consumption
    a. Culinary component focused on substituting homemade versions of food that are usually high in sugar such as salad dressing, barbecue sauce and premade desserts
    b. Handout focused on healthy snacks low in sugar

Older Adults

The Study of Exercise and Nutrition in Older Rhode Islanders (SENIOR) focused on the acquisition and maintenance of healthy eating and exercise in 12,74 older adults (mean age = 75.4; SD = 6.6; 69.6% were women, 76.4% Caucasian, and 93% were non-smokers). Clark et al. (2005) found that fruit and vegetable intake increased as a result of the 12-month, intensive intervention. The intervention is based on the theoretical foundation of the TTM, whereby people move through a series of stages in their attempt to change a behaviour. The intervention was tailored to the different stages of older adults trying to change their health behaviours.

The intervention was a 2x2 experimental design: 1) exercise intervention only, 2) nutrition intervention focusing on fruits and vegetables only, 3) combined exercise and nutrition intervention, and 4) a control group receiving fall prevention material. Each experimental condition included:

- Manuals: one for each target behaviour, they were organized by stage and strategy within each stage, contained a list of community resources and programs supportive of health behavioural change – distributed at the beginning of the intervention phase
- Newsletters: 82 separate newsletters were developed for exercise and diet containing stage-appropriate information about strategies, suggestions, activities, and resources. Were mailed on a monthly basis, except for the 3 months in which an expert system report was provided
- Expert system assessments and reports: participants were assessed approx. every 4 months by telephone interview to gather data on relevant TTM variables, the expert system report provided normative (compared to persons in the same stage who progressed the most, based on previous pilot research) and ipsative (compared to an individual's previous scores) feedback to encourage continued positive change
- Coaching calls: personal telephone calls to participants by trained behavioural change counsellor to integrate, enhance, and personalize the expert system reports – delivered three times during the 12-month period

Assessment

The National Institutes of Health All Day Fruit and Vegetable Screener (Thompsons et al. 2002; Appendix A)

- Validated with 242 randomly selected Americans, aged 20 to 70, from the NCI Eating at America's Table Study (EATS), about 90% were white, and 79% received more than a high school education
- The American Food Guide Pyramid was used to determine what foods counted as fruits and vegetables and to quantify a serving

- Useful for measuring median fruit and vegetable intakes
- 10-item measure
- Used in Clarke et al.'s, (2005; 2019) studies
- For more American-based dietary measures, see: https://epi.grants.cancer.gov/dietary-assessment/resources.html

The Mediterranean Diet Adherence Screener (MEDAS; Martinez-Gonzalez et al., 2012; Schröder et al., 2011; Appendix B)

- Based on the literature that a dietary pattern in line with the traditional Mediterranean diet was inversely associated with obesity risk or weight gain (Martinez-Gonzalez et al., 2012) and positively associated with favourable mental and physical health outcomes (Schröder et al., 2011). The Mediterranean diet is typically based on whole or minimally processed foods and incorporates most of the protective factors (fruits and vegetables, legumes, whole grains, dietary fibre, fish, vegetable protein and vegetable fat from olive oil) but few of the adverse dietary factors (fast food, sugar-sweetened beverages, refined grain products, energy density, and partially hydrogenated or trans-fat) for obesity.
- 14-item measure, scored from 0 – 14, with one point given for each condition of the Mediterranean diet met.
- Validated in the Spanish PREDIMED study, a large, 5-year, randomized control trial, with 7,447 asymptomatic participants at high risk for coronary heart disease, aged 55 to 80 years old, 4,282 women and 3,165 men
- The MEDAS is a short, valid measure for assessing adherence to the Mediterranean diet, which is associated with a healthy pattern of nutrient intake, a lower risk of obesity, and a favourable cardiometabolic risk profile (Martinez-Gonzalez et al., 2012; Schröder et al., 2011)
- Used in Jyvakorpi et al. (2018) with an elderly, Finish population

The Three-Factor Eating Questionnaire Revised 18-item version (TFEQ-R18; Karlsson et al., 2000; Appendix C)

- Originally piloted in an obese Swedish population, however identical factors were found in a student sample (Hyland et al., 1989) and further validated in a community sample of French adults (n = 520; 45.4% men and 54.6% women, aged 30 to 67) and their children (n = 334; 51.2% boys and 48.8% girls, aged 14 to 27) (de Lauzon et al., 2004).
- Translated into French and validated (de Lauzon et al., 2004)
- The 18-item revised version is based on an original 51-item TFEQ
- Measures three aspects of eating behaviour: retrained eating (conscious restriction of food intake in order to control body weight or to promote weight loss), uncontrolled eating (tendency to eat more than usual due to a loss of control over intake

accompanied by subjective feelings of hunger), and emotional eating (inability to resist emotional cues).

- The raw scores are transformed to a 0-100 scale [((raw score – lowest possible raw score)/possible raw score range) x 100]. Higher scores in the respective scales are indicative of greater cognitive restraint, uncontrolled, or emotional eating.
- In the cognitive restraint subscale, 5 of 6 items in each age group, 8 of 9 uncontrolled eating items in adults only, and 3 of 3 emotional eating items in each age group had acceptable convergent validity and discriminant validity. Cronbach's alpha for each of the three scales were above 0.70 (de Lauzon et al., 2004)
- The three different eating behaviours of the TFEQ-R18 were associated with different patterns of food intake; adults and adolescents displayed different patterns of association (de Lauzon et al., 2004).

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Appendix A: The National Institutes of Health All Day Fruit and Vegetable Screener

Thompsons et al. (2002)

Instructions: Think about what you usually ate last month. Please think about all the fruits and vegetables that you ate last month. Include those that were: raw and cooked, eaten as snacks and at meals, eaten at home and away from home (restaurants, friends, take-out), and eaten alone and mixed with other foods. Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had. If you mark "Never" for a question, follow the "Go to" instruction. Choose the best answer for each question. Mark only one response for each question.

1. Over the last month, how many times per month, week, or day did you drink 100% juice such as orange, apple, grape, or grapefruit juice? Do not count fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.
    a. Never (go to question 2)
    b. 1-3 times last **month**
    c. 1-2 times per **week**
    d. 3-4 times per **week**
    e. 5-6 times per **week**
    f. 1 time per **day**
    g. 2 times per **day**
    h. 3 times per **day**
    i. 4 times per **day**
    j. 5 or more times per **day**

1a. Each time you drank **100% juice**, how much did you usually drink?

    a. Less than ¾ cup (less than 6 ounces)
    b. ¾ to 1 ¼ cup (6 to 10 ounces)
    c. 1 ¼ to 2 cups (10 to 16 ounces)
    d. More than 2 cups (more than 16 ounces

2. Over the last month, how many times per month, week, or day did you eat fruit? Count any kind of fruit-fresh, canned, and frozen. Do not count juices. Include fruit you ate at all mealtimes and for snacks.
    a. Never (Go to Question 3)
    b. 1-3 times last **month**
    c. 1-2 times per **week**
    d. 3-4 times per **week**
    e. 5-6 times per **week**
    f. 1 time per **day**
    g. 2 times per **day**
    h. 3 times per **day**

i. 4 times per **day**
j. 5 or more times per **day**

2a. Each time you ate **fruit**, how much did you usually eat?

a. Less than 1 medium fruit */or/* less than ½ cup
b. 1 medium fruit */or/* about ½ cup
c. 2 medium fruits */or/* about 1 cup
d. More than 2 medium fruits */or/* more than 1 cup

3. Over the last month, how often did you eat lettuce salad (with or without other vegetables)?
    a. Never (Go to Question 4)
    b. 1-3 times last **month**
    c. 1-2 times per **week**
    d. 3-4 times per **week**
    e. 5-6 times per **week**
    f. 1 time per **day**
    g. 2 times per **day**
    h. 3 times per **day**
    i. 4 times per **day**
    j. 5 or more times per **day**

3a. Each time you ate **lettuce salad**, how much did you usually eat?

a. About ½ cup
b. About 1 cup
c. About 2 cups
d. More than 2 cups

4. Over the last month, how often did you eat French fries or fried potatoes?
    a. Never (Go to Question 5)
    b. 1-3 times last **month**
    c. 1-2 times per **week**
    d. 3-4 times per **week**
    e. 5-6 times per **week**
    f. 1 time per **day**
    g. 2 times per **day**
    h. 3 times per **day**
    i. 4 times per **day**
    j. 5 or more times per **day**

4a. Each time you ate French fries or fried potatoes, how much did you usually eat?

a. Small order or less (about 1 cup or less)
b. Medium order (about 1 ½ cups)
c. Large order (about 2 cups)
d. Super size order (about 3 cups)

5. Over the last month, how often did you eat other white potatoes? Count baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried.
    a. Never (Go to Question 6)
    b. 1-3 times last **month**

c. 1-2 times per **week**
d. 3-4 times per **week**
e. 5-6 times per **week**
f. 1 time per **day**
g. 2 times per **day**
h. 3 times per **day**
i. 4 times per **day**
j. 5 or more times per **day**

5a. Each time you ate these potatoes, how much did you usually eat?

a. 1 small potato or less (1/2 cup or less)
b. 1 medium potato (1/2 to 1 cup)
c. 1 large potato (1 to 1 ½ cups)
d. 2 medium potatoes or more (1 ½ cups or more)

6. Over the last month, how often did you eat cooked dried beans? Count baked beans, bean soup, refried beans, pork and beans and other bean dishes.
   a. Never (Go to Question 7)
   b. 1-3 times last **month**
   c. 1-2 times per **week**
   d. 3-4 times per **week**
   e. 5-6 times per **week**
   f. 1 time per **day**
   g. 2 times per **day**
   h. 3 times per **day**
   i. 4 times per **day**
   j. 5 or more times per **day**

6a. Each time you ate these beans, how much did you usually eat?

a. Less than ½ cup
b. ½ to 1 cup
c. 1 to 1 ½ cups
d. More than 1 ½ cups

7. Over the last month, how often did you eat other vegetables? DO NOT COUNT: Lettuce salads White potatoes Cooked dried beans Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc. Rice COUNT: All other vegetables-raw, cooked, canned, and frozen
   a. Never (Go to Question 8)
   b. 1-3 times last month
   c. 1-2 times per week
   d. 3-4 times per week
   e. 5-6 times per week
   f. 1 time per day
   g. 2 times per day
   h. 3 times per day

i. 4 times per day
j. 5 or more times per day

7a. Each of these times that you ate other vegetables, how much did you usually eat?

a. Less than ½ cup
b. ½ to 1 cup
c. 1 to 2 cups
d. More than 2 cups

8. Over the last month, how often did you eat tomato sauce? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.
    a. Never (Go to Question 9)
    b. 1-3 times last month
    c. 1-2 times per week
    d. 3-4 times per week
    e. 5-6 times per week
    f. 1 time per day
    g. 2 times per day
    h. 3 times per day
    i. 4 times per day
    j. 5 or more times per day

8a. Each time you ate tomato sauce, how much did you usually eat?

a. About ¼ cup
b. About ½ cup
c. About 1 cup
d. More than 1 cup

9. Over the last month, how often did you eat vegetable soups? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.
    a. Never (Go to Question 10)
    b. 1-3 times last month
    c. 1-2 times per week
    d. 3-4 times per week
    e. 5-6 times per week
    f. 1 time per day
    g. 2 times per day
    h. 3 times per day
    i. 4 times per day
    j. 5 or more times per day

9a. Each time you ate vegetable soup, how much did you usually eat?

k. Less than 1 cup
l. 1 to 2 cups
m. 2 to 3 cups
n. More than 3 cups

10. Over the last month, how often did you eat mixtures that included vegetables? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.
    a. Never
    b. 1-3 times last month
    c. 1-2 times per week
    d. 3-4 times per week
    e. 5-6 times per week
    f. 1 time per day
    g. 2 times per day
    h. 3 times per day
    i. 4 times per day
    j. 5 or more times per day

Appendix B: The Mediterranean Adherence Screener (MEDAS)

Schröder et al. (2011)

Scoring: one point is given for each criterion met, otherwise a score of 0 is given for that question, for a possible score of 0 to 14.

Questions	Criteria for 1 point
1. Do you use olive oil as the principal source of fat for cooking?	Yes
2. How much olive oil do you consume per day (including that used in frying, salads, meals eaten away from home, etc.)	≥4 Tbsp
3. How many servings of vegetables do you consumer per day? Count garnish and side servings as ½ point; a full serving is 200 g.	≥2
4. How many pieces of fruit (including fresh-squeezed juice) do you consume per day?	≥3
5. How many servings of red meat, hamburger, or sausage do you consumer per day? A full serving is 100-150 g.	Less than 1
6. How many servings (12 g) of butter, margarine, or cream do you consume per day?	Less than 1
7. How many carbonated and/or sugar-sweetened beverages do you consumer per day?	Less than 1
8. Do you drink wine? How much do you consume per week (1 cup = 100ml)	≥7 cups
9. How many servings (150 g) of legumes do you consumer per week?	≥3
10. How many servings of fish/ seafood do you consume per week? (100-150 g of fish, 4-5 pieces, or 200 g of seafood)	≥3
11. How many times do you consume commercial (not homemade) pastry, such as cookies or cake per week?	Less than 2

12. How many times do you consume nuts per week? (1 serving = 30 g)	≥3
13. Do you prefer to eat chicken, turkey, or rabbit instead of beef, pork, hamburgers, or sausage?	Yes
14. How many times per week do you consume boiled vegetables, past, rice, or other dishes with a sauce of tomato, garlic, onion, or leeks sautéed in olive oil?	≥2

Appendix C: The Three Factor Eating Questionnaire (TFEQ)

Karlsson et al. (2000)

Cognitive Restraint

1. I deliberately take small helpings as a means of controlling my weight
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false
2. I consciously hold back at meals in order not to gain weight
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false
3. I do not eat some foods because they make me fat
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false
4. How frequently do you avoid 'stocking up' on tempting foods?
    a. Almost never
    b. Seldom
    c. Usually
    d. Almost always
5. How likely are you to conscious eat less than you want?
    a. Unlikely
    b. Slightly likely
    c. Moderately likely
    d. Very likely
6. One a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never 'giving in'), what number would you give yourself?

Uncontrolled Eating

1. When I smell a sizzling steak or a juicy piece of meat, I find it very difficult to keep from eating, even if I have just finished a meal
    a. Definitely true
    b. Mostly true
    c. Mostly false

   d. Definitely false
2. Sometimes when I start eating, I just can't seem to stop
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
3. Being with someone who is eating often makes me hungry enough to eat also
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
4. When I see a real delicacy, I often get so hungry that I have to eat it right away
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
5. I get so hungry that my stomach often seems like a bottomless pit
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
6. I am always hungry so it is hard for me to stop eating before I finish the food on my plate
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
7. I am always hungry enough to eat at any time
   a. Definitely true
   b. Mostly true
   c. Mostly false
   d. Definitely false
8. How often do you feel hungry?
   a. Only at mealtimes
   b. Sometimes between meals
   c. Often between meals
   d. Almost always
9. Do you do on eating binges though you are not hungry?
   a. Never
   b. Rarely
   c. Sometimes

d. At least once a week

Emotional Eating

1. When I feel anxious, I find myself eating
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false
2. When I feel blue, I often overeat
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false
3. When I feel lonely, I console myself by eating
    a. Definitely true
    b. Mostly true
    c. Mostly false
    d. Definitely false

R2

For more information about R2 or to discover how you can bring the program to your organization, business or educational setting, please contact us.

Paul McGuinness
Operations Manager

rrc@dal.ca
(902) 494-8482

Michael Ungar, PhD
Director

michael.ungar@dal.ca
(902) 229-0434

RRC - Evaluation and Training Institute