The development of a national nutrition and mental health research agenda with comparison of priorities among diverse stakeholders

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Abstract

Objective: To develop a national nutrition and mental health research agenda based on the engagement of diverse stakeholders and to assess research priorities by stakeholder groups.

Design: A staged, integrated and participatory initiative was implemented to structure a national nutrition and mental health research agenda that included: (i) national stakeholder consultations to prioritize research questions; (ii) a workshop involving national representatives from research, policy and practice to further define priorities; (iii) triangulation of data to formulate the agenda; and (iv) test hypotheses about stakeholder influences on decision making.

Setting: Canada.

Subjects: Diverse stakeholders including researchers, academics, administrators, service providers, policy makers, practitioners, non-profit, industry and funding agency representatives, front-line workers, individuals with lived experience of a mental health condition and those who provide care for them.

Results: This first-of-its-kind research priority-setting initiative showed points of agreement among diverse stakeholders (*n* 899) on research priorities aimed at service provision; however, respondents with lived experience of a mental health condition (themselves or a family member) placed emphasis on prevention and mental health promotion-based research. The final integrated agenda identified four research priorities, including programmes and services, service provider roles, the determinants of health and knowledge translation and exchange. These research priorities aim to identify effective models of care, enhance collaboration, inform policy makers and foster knowledge dissemination.

Conclusions: Since a predictor of research uptake is the involvement of relevant stakeholders, a sustained and deliberate effort must continue to engage collaboration that will lead to the optimization of nutrition and mental health-related outcomes.

Nutrition interventions are integral in mental health promotion and mental illness prevention, treatment and rehabilitation[1]. In recent years, there has been substantial progress in nutrition and mental health research that has coincided with increased worldwide attention[2]. However, across disciplines including nutrition and mental health, gaps continue to exist between research, health priorities, policy and practice[3–6].

Nutrition and mental health intersect in many ways[7]. Medical nutrition therapy is a cornerstone in psychiatric treatment that can help optimize the structure and function of neurons and brain centres. Furthermore, nutritional interventions as part of integrated programmes foster social inclusion, self-reliance, food security and healthy body image, as well as health and social equities. Given that a substantial portion of the global burden of disease is attributable to mental health conditions[8,9] and that diet is the leading risk factor of the global burden of disease[10], integrated nutrition and mental health research directives are needed to advance mental health.

While there is a need to engage diverse stakeholders to define research priorities, currently no collaborative

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nutrition and mental health research agendas exist. In 2009, the Lancet Mental Health Group set priorities for global mental health that identified what health policy and systems research was needed to examine the effects of integration of management of child and adolescent mental disorders with physical diseases, including poor nutrition[11]. The International Society for Nutritional Psychiatry Research completed a Delphi process to inform a consensus statement from experts and stakeholders with an interest in nutritional psychiatry to help guide research, clinical guidelines and public policy[12].

In the development of research priorities, several challenges have been identified. While some issues that have global impacts merit the development of international investigative agendas, the research outcomes may not adequately address health problems in a given country[4]. Second, many agenda-setting processes tend to use single methods that involve funders and scientists with little input from policy makers and those with experiential knowledge, which limits exploration of differing perspectives, is subject to expert opinion bias and can result in specious consensus with limited external validity[11,13–15]. Conversely, the use of mixed methods and the engagement of diverse groups recognizes the importance of experiential knowledge and ultimately creates results that are more likely to be used to improve the system[16–19].

In recent years, funding bodies have emphasized the importance of citizen engagement (i.e. meaningful involvement of individual citizens in research, planning and implementation) in research and policy development[20,21]. 'Citizens' include interested representatives from the general public, consumers of health services, patients, caregivers, advocates, affected communities and voluntary health organizations[21]. Although citizen engagement is integral to planning processes, little is known about its influence in higher-level decision making. To align with the evidence that early and continued involvement of stakeholders predicts research uptake[18,21,22], we instituted an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda that aimed to: (i) include diverse stakeholders; (ii) identify specific research criteria and priorities to form a coherent nutrition and mental health investigative strategy; (iii) foster collaborations and knowledge mobilization; and (iv) test hypotheses about stakeholder characteristics and research prioritization.

Method

The Canadian community mental health system

To understand contextual factors that help shape the research agenda, one must understand the Canadian mental health system (includes ten provinces and three territories) which comprises the following characteristics[23]: (i) a mix of institution-based services delivered by unionized professionals and non-unionized voluntary-sector providers; (ii) universal coverage of hospital and physician (including psychiatry services) and voluntary-sector providers, but not allied health professionals (e.g. dietitians, psychologists) with independent practices; and (iii) regionalized care delivery (in most provinces) that results in differentiation of community mental health services. In addition, several philosophies guide practice that include[24–31]: (i) team-based care that provides rehabilitation and recovery services and offers integrated interventions (e.g. medical, housing, financial, vocational, social) to individuals with high needs; (ii) recovery movements that emphasize participation of peer support workers within services, self-determination, respectful and collaborative partnerships, and consumer-operated programmes; (iii) recognition of historical neglect that has led to goals in providing comprehensive, team-based care to mitigate suffering to affected individuals, families and communities[26–30]; and (iv) evidence-based practices that includes ongoing front-line staff and team leaders' training and high-quality services[30,31]. Among mental health stakeholders, the philosophy that people with lived experience of a mental health condition should participate in research and administrative decisions is increasingly common.

Nutrition and mental health research agenda-setting processes

The nutrition and mental health research agenda development project was a collaborative effort of the Canadian Mental Health Association (Ontario), Dietitians of Canada and the University of British Columbia. Representatives from each of these agencies and institutions as well as a hired project coordinator formed the core working group. A detailed project report, including measurement tools, is available[32].

The agenda-setting process included a multistep, participatory and mixed-methods approach to solicit, structure and prioritize investigative themes from diverse stakeholders. Complementary opportunities for participating included in-person, online and telephone-based methods that helped ensure robust representation.

Formation of an advisory group and scoping review

To act as expert consultants to the core working group, a nine-member national advisory committee was convened that included representatives from public health, dietetics, psychiatry, research, knowledge translation, policy, government and food systems that provided direction on identifying and recruiting participants, structuring core concepts, as well as data collection, analysis and reporting processes.

A scoping review was conducted to synthesize a wide range of nutrition and mental health literature to facilitate the development of research questions[33,34]. The scoping

review followed from a literature synthesis about nutrition and mental health completed in December 2012[7] and included nutrition investigations and programmes that related to conditions outlined in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-V)[35]. The information was located by a structured literature review of databases (Medline, PsychInfo, Cumulative Index to Nursing and Allied Health Literature, Allied and Complementary Medicine) including studies since 2006, followed by citation searches, locating grey literature from government and agencies (e.g. Mental Health Commission of Canada, WHO) and contacting different stakeholders about current initiatives. All relevant sources were categorized by country/area, individuals involved, description of the programme or study (e.g. method), and main results or outcomes.

Stakeholder consultation

National stakeholder online survey: development and description. Results of the scoping review helped shape the research questions to include in the national online stakeholder survey. The questionnaire incorporated the principles of web-based survey development[36] and was administered using FluidSurveys[TM(37)]. Efforts were made to create a survey that was understood by a diverse range of stakeholders. The development process was guided by the advisory committee, two stakeholder interviews (an individual with lived experience of a mental health condition and a social worker working in mental health services) and pilot work with five individuals (allied health professionals and individuals with lived experience) to ensure all understood the research questions.

The survey was comprised of four main sections. The first component included questions about demographics (e.g. age, sex, region) and stakeholder group. In the second part of the survey, respondents were asked to specify among a list of mental health conditions (e.g. anxiety, autism spectrum, attention deficit hyperactivity, bipolar, depressive, eating, neurocognitive, neurodevelopment, schizophrenia spectrum, substance use/addictions, and trauma and stressor-related disorders) the ones that should be prioritized for research. In the next section, respondents chose research priorities among a list of special populations (i.e. children and youth, First Nations, Inuit and Metis, homeless or marginally housed, newcomers to Canada, older adults, persons living in remote or rural locations, persons living in a group home or institution, persons living with a developmental disability, women in the perinatal period).

In the fourth section, participants prioritized research questions based on a two-stage process. First, the research questions were presented in three categories that included queries related to: (i) improving the health of people living with mental health conditions (five questions); (ii) improving community nutrition and mental health programmes and services (seven questions); and (iii) promoting mental health and/or preventing or delaying the onset of mental health conditions (three questions). Participants were then asked to indicate how important they thought it was for researchers to address the research questions outlined using a five-point Likert-type scale of importance (i.e. range from 'very important' to 'not important') and an option to provide 'no opinion'. They were then asked to select the one research question they thought was the most important within each of the three categories. As a final prioritizing step, all research questions from the three categories were presented and participants were asked to select the top three they believed would have the greatest impact on nutrition and mental health. Throughout the survey, respondents were given open-ended questions designed to elicit feedback about other research questions that should be included, the rationale for their research question selections, the agenda-setting process and suggestions of stakeholders that should be consulted for in-depth interviews.

National stakeholder online survey: dissemination. The online survey was nationally disseminated for six weeks to the extensive network generated by the advisory committee. Potential participants were made aware of the survey through direct email notifications and advertisements through relevant media channels (e.g. Twitter, LinkedIn, electronic newsletters). In addition, a snowball approach was used where survey participants were encouraged to actively engage other interested parties. During the data collection period, responses were carefully monitored to ensure representation from various stakeholders.

National stakeholder online survey: analysis. Data quality was verified by checking for duplication of Internet Protocol addresses and conducting cross-tabulations of related variables (e.g. indicated years of practice with respondent age). The survey results were analysed using descriptive statistics (e.g. frequencies, means). To test hypotheses related to participant characteristics and research prioritization, inferential analysis according to stakeholder subgroups and research questions was conducted using binomial tests of two proportions, χ^2 and Fisher exact statistics.

Key informant consultation. The online survey participants provided more than 100 stakeholder contacts that the advisory committee reviewed. Nine key informants representing all stakeholder groups were identified and interviews were conducted to explore emergent concepts about nutrition and mental health research and to identify divergent perspectives. The telephone-based interviews were semi-structured, lasted about 30 min and were conducted by the project coordinator. During the interviews, participants were asked to reflect on the priority research areas and rankings from the national online survey. Interviews were recorded (with consent) and transcribed by two transcription service providers. The transcripts' texts were analysed using thematic analyses[38].

For the remaining key informant contacts with complete information (n 105), an online questionnaire was distributed. The survey included questions about demographics, stakeholder group affiliation, barriers to uptake of research findings, potential funders and research partners, as well as perspectives on knowledge dissemination.

The main intent of the key informant consultations was to help identify criteria for establishing nutrition and mental health research priorities that would be used in the national workshop. As part of the scoping review, an extensive search was conducted to locate research priority-setting approaches and a final list of criteria was derived based on those used by the Council on Health Research for Development[39]. An electronic invitation to complete the questionnaire was distributed to the key informants and was active during December 2013.

Research agenda formulation

After integrating the data from the scoping review, online stakeholder survey and key informant consultations, potential research topics and questions were formulated to present to a defined diverse group of sixteen stakeholders at a national workshop held in Toronto, Ontario in February 2014. The workshop objectives included: (i) reaffirming the elements of nutrition and mental health research, including guiding principles; (ii) reaching consensus on Canadian nutrition and mental health research priorities; and (iii) discussing strategies to implement the research agenda. Prior to the workshop, participants were given background readings (i.e. scoping review, survey results) to facilitate their understanding of current directions in Canadian nutrition and mental health research and project objectives.

During the workshop, a variety of formats were used to enable egalitarian and meaningful dialogue, including brief didactic presentations, small group work, facilitated group discussions, a criteria-setting task and brainstorming exercises. The priority-setting exercise included work in small groups to establish a priority rating for each of the nutrition and mental health research questions, utilizing criteria categories defined from the key informant consultation. Workshop participants then reviewed the results of the priority-setting exercise and had small and large group dialogues about the current Canadian nutrition and mental health context and how the outcomes of the defined research agenda may be implemented to inform current practice, policy and research. As a final step, participants were asked to complete a workshop evaluation.

The final analysis involved synthesizing the research priorities from the multistep process that included drawing upon thematic analysis from the textual data, integrating these themes with the information from the scoping review and quantitative survey data, and examining associations between stakeholder types and research priorities. Using a triangulation design model, quantitative and qualitative data were first analysed independently (in parallel) and then discussed among the core team to achieve concurrent triangulation[17].

Results

Scoping review

The scoping review resulted in the development of a document[40] that detailed current community and clinical-based mental health research, programmes and services, and collaborations in Canada and internationally. The review provided evidence that supports the many links that exist between food and nutrient intake and mental health. However, these findings need to be translated to community settings and their impact on mental health assessed. Results of the scoping review also highlighted how community-level nutrition programming related to mental health varies across Canada; most were embedded within larger initiatives, with nutrition interventions being a subset of the curriculum. In summary, the review identified a need for more nutrition and mental health research in areas such as health promotion, prevention, intervention and rehabilitation as a means to develop programming and policy.

National consultation

National stakeholder online survey

Online survey respondents (Table 1) were all adults (aged 18 years or older) and from all regions and stakeholder groups. Of the 811 participants, most respondents (89 %) were female and between the ages of 18 and 59 years (88 %). Although there was some variation among the stakeholder groups, the main mental health condition-specific research priorities identified included depression (n 712, 88 %), anxiety (n 640, 79 %) and disordered eating (n 628, 77 %). Pregnancy-related mental health conditions were added by some (n 28, 3 %) as another research priority. The majority of respondents indicated that children and youth (n 470, 58 %) were top priority; however, more than half of the participants (n 411, 51 %) also identified that all population groups were equally important. Individuals with limited income were added by about 3 % of respondents (n 29) as a population group that requires higher priority.

The pooled results indicated that the top three research questions were: (i) 'How does food and/or nutrient intake affect specific mental health conditions?'; (ii) 'How do life situations (e.g. housing, income, education, employment) affect the type and amount of food that people eat and what impact does that have on their mental health?'; and (iii) 'What programmes or services do people living with mental health conditions need with respect to food access, nutrition and/or cooking skills?'. There were some differences among the stakeholder groups (Table 2). As examples, dietitians and managers selected research questions related to food skills training, managers also

Table 1 Characteristics of national online survey respondents and key informants in an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda

| | Online survey participants | | | | | | Key informant participants | | | | | |
| | Total (n 811) | | LE† (n 244) | | FM‡ (n 344) | | Total (n 63) | | LE† (n 30) | | FM‡ (n 36) | |
Characteristic	n	%§	n	%§	n	%§	n	%§	n	%§	n	%§
1. Regions (total responses: n 793 for online survey; n 62 for key informant participants)												
British Columbia plus Yukon	134	17	56	23	65	19	16	25	10	33	11	31
Alberta, Saskatchewan, Manitoba, Northwest Territories, Nunavut	177	22	50	20	76	22	9	14	7	23	6	17
Ontario	414	51	113	46	158	46	32	51	12	40	17	47
Quebec, New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island	68	8	19	8	34	10	5	8	2	7	2	6
2. Community size (total responses: n 807 for online survey; n 63 for key informant participants)												
Metropolitan: population 500 000+	218	27	66	27	93	27	23	37	10	33	14	39
Large city: population 100 000 to 499 999	231	28	77	32	98	28	15	24	5	17	6	17
Medium city: population 30 000 to 99 999	157	19	44	18	67	19	10	16	7	23	7	19
Small city, towns, villages and rural areas: population ≤29 999	201	24	54	22	82	24	15	24	8	27	9	25
3. Stakeholder groups‖ (total responses: n 811 for online survey; n 63 for key informant consultations. Respondents could select ≥1 category)												
Service provider¶	433	53	138	57	186	54	37	59	16	53	22	61
Registered dietitian (includes community, clinical, administrative)	299	37	55	23	116	34	25	40	8	27	13	36
Advocacy work related to mental health	135	17	59	24	92	27	14	22	9	30	11	31
Volunteer in a nutrition and/or mental health setting	120	15	61	25	77	22	16	25	14	47	12	33
Researcher in nutrition and/or mental health research (includes academic, clinical and independent consultants)	109	13	36	15	53	15	18	29	10	33	11	31
Manager/director of a mental health programme or organization†† or policy work‡‡	118	15	40	16	63	18	6	10	5	17	5	14
Lived experience of a mental health condition	244	30	–	–	154	45	30	48	–	–	22	61
Family member of someone with a lived experience of a mental health condition(s)	344	42	154	63	–	–	36	57	22	73	–	–

†Lived experience.
‡Family member with lived experience.
§Percentages reported used column total as denominator.
‖There were seventeen respondents who indicated their stakeholder role was as a post-secondary student; due to the small sample size subgroup analysis was not conducted on this group. Stakeholder totals are greater than sample total as respondents could select all groups they identified with.
¶Respondents indicated their service provider roles included nurse (RN, LPN, NP), support/peer support worker, counsellor, psychologist, psychometrist and social worker.
††Respondents indicated their manager/director roles included programmes and services, executive director, patient/client care, social worker and behavioural therapy.
‡‡Working or have worked in public policy: public policy roles included public health professional, health promoter, policy analyst and health adviser.

Table 2 Top three prioritized research questions by category: results from national online stakeholder survey and national stakeholder workshop in an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda

Research question	Rank (R) and percentage (%) of total for indicated category by participant-defined stakeholder group†																				
	Service provider‡						Registered dietitian						Advocacy§						Volunteer‖						Researcher¶						Manager/director††						Public policy‡‡					
	T (n 433)		LE (n 138)		FM (n 186)		T (n 299)		LE (n 55)		FM (n 116)		T (n 135)		LE (n 59)		FM (n 92)		T (n 120)		LE (n 61)		FM (n 77)		T (n 109)		LE (n 36)		FM (n 53)		T (n 70)		LE (n 23)		FM (n 36)		T (n 48)		LE (n 17)		LE§§ (n 51)	
	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%	R	%
Category 1: Research questions aimed to improve the health of people living with mental health conditions (4 of 5 questions total ranked in the top 3)																																										
(i) How does food and/or nutrient intake affect specific MHC?	**1**	**40**	**3**	**33**	4	32	**2**	**34**	**1**	**35**	**1**	**36**	**2**	**36**	4	31	**3**	**34**	**1**	**40**	**3**	**36**	**3**	**34**	**1**	**39**	**1**	**39**	**2**	**36**	**2**	**34**	**2**	**35**	**1**	**39**	8	10	**1**	**53**	**1**	**24**
(ii) For those people living with a MHC, does food skills training‖‖ have an impact on their mental health?	6	21	9	7	7	12	**3**	**28**	4	23	5	25	10	15	14	2	13	5	11	13	14	2	11	10	8	19	8*	8	8	15	**2**	**34**	15	0	7*	14	4	15	15	2	14	2
(iii) How do life situations¶¶ affect the type and amount of food that people eat and what impact does that have on their mental health?	**3**	**30**	**2**	**42**	**2**	**37**	4	26	**3**	**29**	4	28	**1**	**42**	**1**	**51**	**2**	**39**	**3**	**32**	**1**	**46**	**2**	**38**	**3**	**32**	4	28	4	26	**3**	**33**	**1**	**43**	5	28	**1**	**40**	7	6	7	8
(iv) What food-related policies would help people living with a MHC?	10	15	7	12	10	11	12	16	6	20	10	15	7	19	7	12	8	13	9	18	7	11	12	9	9	17	7	11	9	9	5	21	4	17	9	11	**1**	**40**	7	6	15	0
Category 2: Research questions aimed to improve community nutrition and mental health programmes and services (3 of 7 questions total ranked in top 3)																																										
(i) What programmes or services do people living with a MHC need with respect to food access, nutrition and/or cooking skills?	**2**	**32**	4	32	**3**	**34**	**1**	**36**	**2**	**33**	**3**	**29**	**3**	**30**	**3**	**32**	4	31	**2**	**33**	5	25	4	31	**2**	**33**	**2**	**33**	**3**	**34**	5	21	**3**	**26**	4	31	**2**	**35**	**3**	**8**	**3**	**18**
(ii) What are the barriers to receiving nutrition services††† for individuals living with a MHC?	**3**	**30**	5	26	6	20	5	23	6	20	**2**	**32**	5	27	5	25	6	18	5	27	4	26	7	23	5	22	6	17	6	19	8	14	**2**	**35**	6	17	4	15	7	6	7	8

Table 2 *Continued*

Research question	Service provider‡ T (n 433) R	%	LE (n 138) R	%	FM (n 186) R	%	Registered dietitian T (n 299) R	%	LE (n 55) R	%	FM (n 116) R	%	Advocacy§ T (n 135) R	%	LE (n 59) R	%	FM (n 92) R	%	Volunteer‖ T (n 120) R	%	LE (n 61) R	%	FM (n 77) R	%	Researcher¶ T (n 109) R	%	LE (n 36) R	%	FM (n 53) R	%	Manager/director†† T (n 70) R	%	LE (n 23) R	%	FM (n 36) R	%	Public policy‡‡ T (n 48) R	%	LE (n 17) R	%	LE§§ (n 51) R	%
(iii) What are the roles of non-dietitian service providers for providing nutrition information or support to clients who are living with a MHC?	14	8	8	9	10	11	15	2	12	7	12	11	14	8	9	10	11	11	14	8	11	13	11	10	12	5	14	3	9	9	**1**	**71**	9**	4	7**	14	9	6	13	4	5	10

Category 3: Research questions aimed to promote mental health and/or prevent or delay the onset of mental health conditions (2 of 3 questions total ranked in top 3)

Research question	Service provider‡ T (n 433) R	%	LE (n 138) R	%	FM (n 186) R	%	Registered dietitian T (n 299) R	%	LE (n 55) R	%	FM (n 116) R	%	Advocacy§ T (n 135) R	%	LE (n 59) R	%	FM (n 92) R	%	Volunteer‖ T (n 120) R	%	LE (n 61) R	%	FM (n 77) R	%	Researcher¶ T (n 109) R	%	LE (n 36) R	%	FM (n 53) R	%	Manager/director†† T (n 70) R	%	LE (n 23) R	%	FM (n 36) R	%	Public policy‡‡ T (n 48) R	%	LE (n 17) R	%	LE§§ (n 51) R	%
(i) How does a healthy diet and/or access to healthy food promote mental health?	7	20	**1**	**44**	**1**	**44**	9	17	7	18	9	20	6	23	**2**	**47**	**1**	**45**	4	28	**2**	**41**	**1**	**42**	6	21	**3**	**31**	**1**	**43**	5	21	**3**	**26**	**3**	**33**	8	10	**2**	**10**	**2**	**20**
(ii) How do intakes of certain foods and/or nutrients prevent or delay the onset of MHC?	8	19	6	14	5	24	8	18	7	18	7	24	9	16	5	25	5	29	7	23	6	23	5	27	10	16	4	28	5	25	4	24	**1**	**43**	**2**	**36**	**3**	**23**	3	**8**	4	12

T, total responses for stakeholder category; LE, total responses within the stakeholder category that also have lived experience of a mental health condition; FM, total responses within the stakeholder category that also have a family member with lived experience of a mental health condition; MHC, mental health condition.
Bold represents the top three ranking research priorities identified within the defined stakeholder group.
Research question cells with heavy line borders represent the top three research priorities identified at the national workshop; questions 2(i) and 2(iii) had equal scoring.
Significant differences in the proportion of respondents in this group compared with those in the primary identified stakeholder category: *$P < 0.05$, **$P < 0.001$.
†Totals of stakeholder groups may differ as some indicated more than one type.
‡Working or have worked as a service provider for individuals with a mental health condition(s); service provider roles included nurse (RN, LPN, NP), support/peer support worker, counsellor, psychologist, psychometrist and social worker.
§Working or have worked in advocacy related to mental health.
‖Working or have worked as a volunteer in a nutrition and/or mental health setting.
¶Working or have worked in nutrition and/or mental health research; researcher roles included academia, clinical research and research consultation.
††Working or have worked as a manager/director of a mental health programme or organization; manager/director roles included programmes and services, executive director, patient/client care, dietitian, social worker and behavioural therapy.
‡‡Working or have worked in public policy; public policy roles included public health professional, health promoter, policy analyst and health advisor.
§§Stakeholders who only indicated they had lived experience of a mental health condition(s).
‖‖Examples: counselling, cooking programmes.
¶¶Housing, income, education, employment.
†††Examples: diabetes, heart disease.

Table 3 Original criteria ranked by key informants and finalized criteria for national workshop prioritizing exercises in an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda

Original criteria ranked by key informants	Criteria developed by advisory committee based on key informant rankings			
	Criteria category	Asks…	Factors to consider	
1. Impact on health 2. Community concern/ demand 3. Applicability of research outcome 4. Adequacy of current knowledge base (avoid duplication) 5. Economic impact 6. Magnitude of the problem 7. Partnership building 8. Feasibility 9. Ethical acceptability 10. Relevance 11. Urgency 12. Equity focus 13. Funding support potential 14. Political acceptability	Appropriateness	Should we do it?	Ethical and cultural issues • Ethically and morally acceptable • Culturally appropriate • Non-reliance on food industry	Availability and adequacy of current information • Adequacy of current research-based information (avoid duplication) • Availability of pre-existing data
	Relevancy	Why should we do it?	Equity-focused and community concern/ demand • Contribution to better equity in health • Serves community concern/demand • Broad in scope	Burden of illness (size and severity of problem) • Burden of illness • Magnitude of the issue • Interconnected with social determinants of health (poverty, food insecurity, housing)
	Chance of success	Can we do it?	Capacity of the system to undertake the research • Competency • Infrastructure, mechanisms • Support system • Resources	Cost justification • Likelihood of partnership building • Reasonable approach • Funding potential • Political acceptability • Pragmatic
	Impact of the research outcome	What do stakeholders get out of it?	Chances of implementation of research recommendations • Applicability to current practice • Forward/upstream thinking	Reduction of the burden, including costs and quality of life • Impact of research on mental health and quality of life within the population • Economic impact • Fiscal rewards for balancing healthy living and healthy mind

chose questions about the role of non-dietitian service providers, and public policy stakeholders prioritized research pertaining to food-related policies. For participants with lived experience, the priorities were relatively consistent with the overall group; however, they tended to select more Category 3 (i.e. mental health promotion and illness prevention) research questions. Significant differences between the proportions of those selecting lower-ranked research questions were found for service providers, researchers and managers/directors in the topic areas of food skills training and the roles of non-dietitian service providers.

Key informant interview and survey
The response rate of the key informant questionnaire was approximately 60 %. Participants were primarily from the provinces of Ontario and British Columbia (Table 1). More than 70 % of the participants identified impact on health and community concern/demand as key criteria for setting research priorities and no significant differences among the key informants were found in defining research priorities. Triangulation of the data from key informant interview and survey identified four criteria that were considered most important. After consultation with the

advisory committee, the criteria were refined with descriptions to use in priority-setting activities at the national workshop (Table 3).

Nine in-depth, telephone-based, key informant interviews with representatives from management, public policy and service provision (i.e. psychiatry, addiction, pharmacy, occupational therapy) were conducted by the project coordinator during December 2013 and January 2014. The transcribed textual data were categorized in three areas (current gaps in research, priority setting and perceived barriers) and at least two themes were defined within each category (Table 4).

Research agenda formulation
Workshop participants came from five different provinces representing western, central and eastern regions and included academic researchers, mental health, nutrition and community health-service providers, government, and policy makers. The top research priorities identified from the priority-scoring exercise using the criteria categories (items 3 and 4 had equal scoring) were: (i) 'What are the barriers to receiving nutrition services for individuals living with mental health conditions?'; (ii) 'What food-related policies would help people living with mental health

Table 4 Summary of thematic analysis of key informant interviews (*n* 9) in an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda

Category 1: Gaps in current nutrition and mental health research
   Theme 1: Tools for practice – best practices, screening, peer support, educational materials and strategies
      Examples of comments:
         • Effective education strategies and materials for mental health populations
         • How can service providers support nutrition-related behaviour change in mental health populations?
   Theme 2: Address determinants of health – social, individual behaviours and environmental
      Examples of comments:
         • Geographical influence on mental health populations
         • Link between social determinants of health and mental health: homelessness, addictions, food insecurity
   Theme 3: Vulnerable populations – children, youth, elderly, homelessness, addictions (including during pregnancy)
      Examples of comments:
         • Limited research with nutrition and mental health in vulnerable populations
         • Pregnant women and use of methadone to manage addictions – impacts on unborn child
   Theme 4: Knowledge translation
      Examples of comments:
         • Knowledge translation to health professionals and staff, including interventions for individuals experiencing metabolic complications from medications
         • Manual/compendium of different resources and tools easily accessible for mental health workers to utilize
         • Establishing best practices in nutrition education, skill development, and nutrition literacy related to mental health

Category 2: Research priority setting
   Theme 1: Pragmatic and engaging
      Examples of comments:
         • Peers engage peers in nutrition and mental health
         • Embed a mental health promotion lens to nutrition
         • Make current nutrition and mental health-related research practical to incorporate on the front line
   Theme 2: Inclusion and equity focus
      Examples of comments:
         • Culturally respectful and accessible by marginalized individuals
         • Include nutrition components in treatment plans
         • Inclusion of lived experience mental health stakeholders as part of research
   Theme 3: Scope of reach – influence policy, address multiple conditions and populations
      Examples of comments:
         • Work with food industry to create healthier 'fast foods'
         • Ability to influence policy and/or system change
         • Impact on multiple conditions related to mental health

Category 3: Perceived barriers
   Theme 1: Systemic changes and messaging – school curriculum, costs, congruence with current public policy, private sector, address all determinants, stigma
      Examples of comments:
         • Post-secondary curriculums that include mental health and nutrition
         • Cost of implementing change, not well received in a 'business model'
         • Overwhelming to address all of the variables affecting this issue (e.g. social determinants of health)
         • Do research without creating guilt among those with lived experience

conditions?'; (iii) 'What programmes or services do people living with mental health conditions need with respect to food access, nutrition and/or cooking skills?'; and (iv) 'What are the roles of non-dietitian service providers for providing nutrition information or support to clients who are living with mental health conditions?'. Furthermore, workshop participants extensively discussed how there is a need for more effective knowledge translation and exchange about existing and future nutrition and mental health research.

The evaluations from workshop participants were positive, with a median assessment rating of 4·11 from a range of 0 to 5. All indicated they had an opportunity to participate and the most useful components of the workshop included discovering what nutrition and mental health research has been done or is in progress, clear tasks and multidisciplinary collaboration. Means in which the workshop could have been more effective included

providing the scope of exercises ahead of time and having a second meeting to see how the information from the workshop will be used.

When the top research priorities from the online stakeholder survey (had no criteria) were combined with the priorities identified in the workshop (used specified criteria), all of the investigative gaps identified from the scoping review were included.

The inclusion of those with lived experience in the decision-making process did not significantly alter the research priorities identified (Table 2). However, thematic analysis of the textual data from key informant interviews as well as the online stakeholder and key informant surveys (Tables 4 and 5) provided important insights about research and knowledge dissemination. In particular, those with mental health conditions emphasized the need for research as four key themes (Table 5): (i) applied and pragmatic; (ii) inclusive and equity-focused; (iii) fostering mental

Table 5 Key themes from participants from textual data (online stakeholder survey, key informant consultation) in an integrated, citizen-engaged, mixed-methods initiative to establish a Canadian nutrition and mental health research agenda

Theme 1: Applied and pragmatic
- 'Natural nutritional supplements: the inadequacy of the knowledge base and lack of quality regulation. Some natural supplements may be very helpful, others not. Consumers need reliable information.'
- 'Having research-based data that explains how eating impacts mental health, both positively and negatively, will provide the information needed to motivate government, service providers and those with lived experience (and without) to eat in a way that will benefit them physically and mentally.'
- 'Always, my priorities are to see such research focused on relevance and direct application: follow-through. And the funding and infrastructure to make sure changes first occur and then are ongoing.'
- 'It must be pragmatic, the need is so great and the time was yesterday. Create a plan that has some more immediate implementation, in order to help stakeholders feel that things are happening. Research and a report for the sake of it kills the energy of those in the front line who witness the pain and suffering daily.'

Theme 2: Inclusive and equity-focused
- 'It just needs to be more accessible, promoted, equal and positive. It needs to reach rural and small towns in a way that is not intrusive that meets someone on their level. An example, a single mom with previous mental health concerns subsisting on Ontario Works may not know how to be active and engaged with proper nutrition for their developing child or themselves...'
- 'I would hope that all research would be informed by an overarching concern for – and consultation with – people with lived experience and with families of those with lived experience.'
- 'Food insecurity is, and remains a significant issue for individuals that we serve in our programmes and services. This links directly to the issue of poverty and other social determinants of health. Without understanding these core issues, actions to support nutrition and mental health will be limited in scope.'
- 'Addressing social determinants of health will help to address issues of lack of, access to and education about food and nutrition.'
- 'Poverty, food security and mental health are interconnected. People most impacted have only PWD as an income source and have limited food options as a result.'
- 'I think determining barriers and assessing the impact that the social determinants of health has on a person with a mental health condition is paramount in establishing effective nutrition services for those living with a mental health condition.'

Theme 3: Fostering mental health literacy
- '... I would consider both the individual's perceived benefit, but also exploring the impact of stigma and prejudices and disrespect and how if affects the services that are offered, or not offered to help with meeting nutrition needs.'
- 'To me these three questions are the most important because there is so much stigma that exists for people living with mental illness. Coupling that with other barriers (like limited knowledge, access or understanding of how nutrition plays a role in mental health and mental illness) people living with MI will not learn the benefits of how to flourish in life, even when living with a mental illness.'
- 'I feel weight bias impact on mental health should be included as part or on its own as larger bodied people are often stigmatized which can lead to poor mental health and health behaviours whereas if people received kind, compassionate care free of weight bias, their other mental health issues (if any) would not be amplified.'
- 'Some people seem to fall through the cracks of the system. It is still a stigma, especially in smaller communities.'
- 'Time, money, commitment and the desire to drive change and sustainability in the stigma reduction.'
- 'It is excellent that you are making this type of research a priority. I hope the outcomes will benefit people with lived experience and not stigmatize their families.'

Theme 4: Interdisciplinary and participatory research
- 'One thing does not cure everything, i.e. diet is not the be all end all for everyone.'
- 'While biochemical research and understanding is necessary, there is a need to understand the environment and determinants of mental health that also affect nutritional intakes and access.'
- 'Obesity and mental health (schizophrenia, depression, eating disorder). Two multifactorial disorders requiring interdisciplinary treatment and very common in Canada.'
- 'Important to engage community partners in a positive way.'
- 'Please collaborate with consumers as peer researchers with equal control of projects.'

PWD, persons with disabilities; MI, mental illness.

health literacy; and (iv) interdisciplinary investigation. Integration of all of the data sources from this citizen-engaged and mixed-methods process led to the articulation of a research agenda (Fig. 1) that defines a set of research criteria, guidelines and four broad investigative priorities that reflects the needs and perspectives of diverse stakeholders.

Discussion

The results of the current citizen-engaged research agenda-setting process identified four investigative priorities for mental health and nutrition that included programmes and services, service provider roles, the determinants of health, and knowledge translation and exchange that aims to identify effective models of care, enhance service collaboration, inform policy and foster knowledge dissemination. Second, this process identified research priority criteria that included appropriateness, relevancy, chance of success and impact of research outcome. Third, the agenda set out guidelines for research initiatives that included being applied and pragmatic, inclusive and equity-focused, fostering mental health literacy and being interdisciplinary. Finally, the citizen-engaged process that was employed facilitated learning about setting research priorities related to mixed methods, engagement of diverse stakeholders and knowledge dissemination processes.
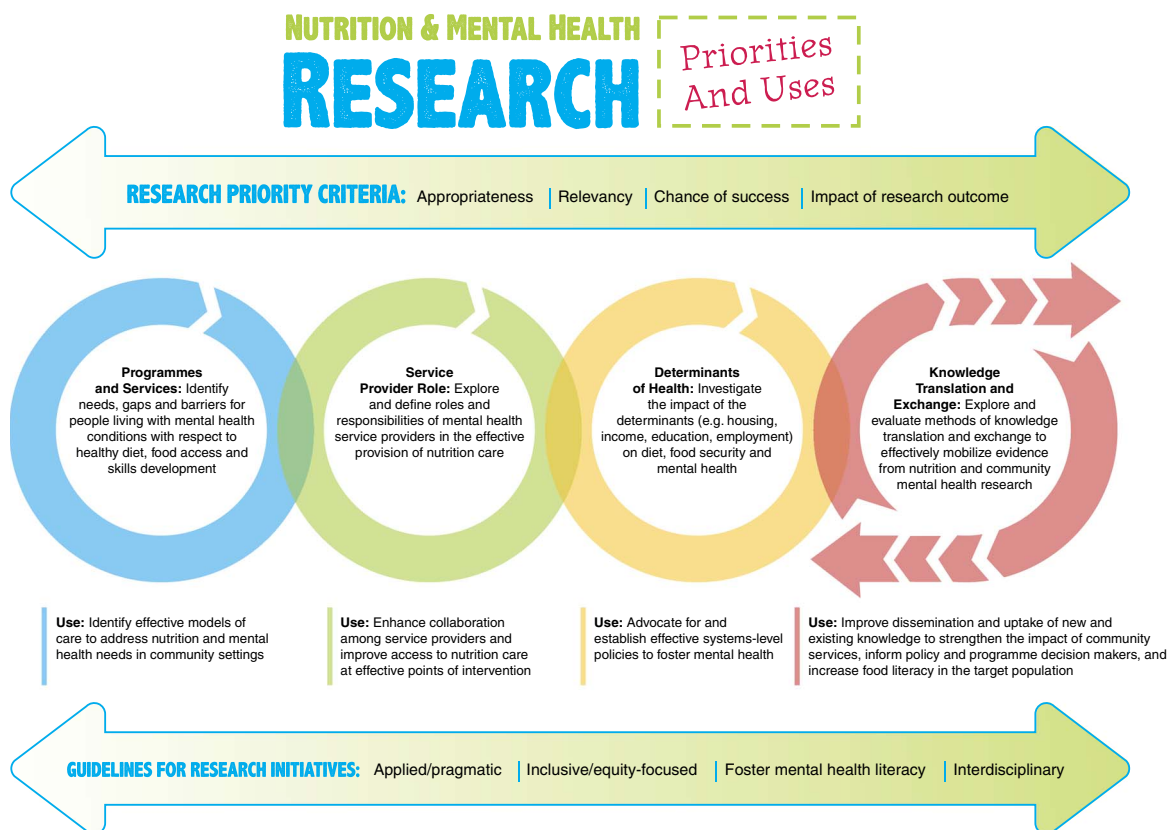
Fig. 1 (colour online) Conceptual framework of Canadian nutrition and mental health research agenda

Use of mixed methods in research agenda-setting

The present project was the first to apply citizen-engaged and mixed methods to establish a nutrition and mental health research agenda. The process, which involved a complex stakeholder community, resulted in a wide-ranging research agenda aimed at multiple levels and cross-sectoral collaboration[41]. The use of mixed methods enabled a logical and progressive sequence of activities – from the identification of research questions, the prioritization by diverse stakeholders, to more complex activities of prioritizing the questions using specified criteria – that enhanced understanding of what was valued by different stakeholders. A surprising result was the number of responses to the online survey from participants who identified themselves as having mental health issues. This outcome may have been due to the use of different means of engagement (e.g. online, telephone interviews) which fostered involvement by alleviating the effects of stigma[42]. Finally, the results indicated that no individual topic scored consistently across all measures, stakeholders and procedures, suggesting that while research priorities should be set broadly they may also need to be tailored according to the stakeholders involved.

Effects of citizen engagement on research agenda-setting

As the literature suggests, engaging 'experts by experience' supports empowerment and can lead to improved services[43]. Our findings were consistent with others that indicate individuals with lived experience are capable of research prioritization and that citizen engagement can help foster sharing of practical and conceptual knowledge among stakeholders[44,45], broaden research agendas[42,43,46] and lead to improved quality and external validity of research[47,48].

Stakeholders with lived experience of mental health issues (personally or through family members) tended to differ from the core group by prioritizing research questions aimed at promoting mental health or preventing or delaying the onset of mental health conditions. This may suggest that individuals with lived experience of a mental health condition recognize the value of focusing on mental health promotion and upstream prevention.

Some lessons were learned that could help with future initiatives. For example, further success may have occurred if focus groups with individuals who have mental health conditions were conducted or by having peer research assistants help recruit potential respondents, as direct and repeated engagement of affected individuals can facilitate and enhance debate about research[49,50]. Furthermore, an ongoing challenge will be to sustain collaboration among stakeholders.

Perspectives on knowledge dissemination

An important process learning outcome was the identified need for integrated knowledge translation. In recent years, a number of studies have been done in nutrition and

mental health; however, stakeholders at the national workshop identified that the uptake of this knowledge has been limited. This issue has been identified by others who suggest that knowledge translation models that function in a unidirectional manner from researchers to stakeholders limit the uptake of empirically supported treatments, lead to gaps between research and its application, and result in reduced returns in public funds invested in research[51,52]. To address these challenges, integrated models of knowledge dissemination involving enhanced reciprocal exchanges and collaboration between researchers and stakeholders are needed[52–54]. For example, consultation with diverse stakeholders enabled us to adjust the research agenda to include knowledge translation and exchange as a priority as it was identified as a practical issue that exists in nutrition and mental health systems.

Limitations

Some limitations to our approach must be noted. The response rate for the key informant survey was conservative and this was likely due to the proximity in timing around the winter holidays. Although the population involved was relatively diverse, a larger sample size within certain subsets (e.g. post-secondary students) may have extended the findings. It is difficult to judge how representative of the broader community the online survey sample was as recruitment focused on established networks of the advisory committee. In addition, it cannot be determined if the slight differences in research priorities between the online survey and stakeholder workshop can be attributed to the influence of decision making of those with lived experience or simply because of the absence or presence of defining criteria. However, the research agenda emerged from different processes, did not attach emphasis on a single method and aligned with the investigative gaps found from the scoping review.

Other limitations include the challenges that participants identified. Respondents believed that research uptake will be hindered if results pointed to a need for increased allocation of public funds to address mental health. Without policy support, such research endeavours may be deterred. There is also concern about the underfunding of community-based research and limited interest for addressing nutrition and mental health due to associated stigmas and scepticism regarding outcomes. Finally, while the development of an agenda is important to providing investigative directions, it must also be stressed that the final product will be defined by underlying contextual assumptions. In particular, an issue to consider is how nutrition (e.g. diet quality, food insecurity, nutrient intakes) and mental health (e.g. psychiatric symptoms, condition, general mental well-being) are defined in studies and the subsequent interpretation, generalizability and transference of the results.

Conclusion

A recent expert consensus statement on research needs in mental health emphasized that protective factors should be prioritized when planning future research strategies[55]. Optimal nutrition is one fundamental determinant that can help prevent or reduce vulnerability to mental ill health. As the nutrition and mental health evidence continues to evolve, it faces challenges such as increasing health-care costs, limited public investments aimed at health equity[56] and the implementation of various service delivery models. These barriers have made the establishment of nutrition and mental health research priorities increasingly critical and highlight the need to create meaningful research agendas that involve diverse stakeholders.

The outcomes of this research agenda that used citizen-engaged and mixed-method approaches included four investigative priorities aimed at programmes, services, provider roles, the determinants of health and knowledge uptake, which can help identify effective models of care, develop policy and foster effective knowledge dissemination. Based on our experiences, we recommend the following to others to consider when developing research agendas: (i) engage diverse stakeholders from project conceptualization; (ii) utilize mixed methods of data collection to enable breadth and depth of understanding of the issues; and (iii) include different options for stakeholder engagement. Research agendas are an opportunity to bring awareness to issues, direct investigative efforts and provide a basis for funding development and allocation. Because research agendas are living documents that develop as part of contextual factors, all stakeholders need to support their development, actively apply them and participate in their evolution.

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