



Mental Health  
Commission  
of Canada

Commission de  
la santé mentale  
du Canada

# RE-AIMing e-Mental Health: A Rapid Review of Current Research

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## Report to the Mental Health Commission of Canada

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## Executive Summary

Decision makers and service providers in the mental health sector need up-to-date, evidence-based information to guide them in shaping how e-mental health care can be optimized in Canada. Guided by the strategic priorities of the Mental Health Commission of Canada (MHCC), the purpose of this rapid review was to map recent research on e-mental health interventions and describe trends in the factors that either catalyze or deter implementation. Using the RE-AIM Framework, 261 relevant articles were located and systematically reviewed around the themes of *reach, effectiveness, adoption, implementation and maintenance*. The results point to opportunities and gaps in the current research literature and provide five key recommendations on where capacity-building work and new lines of research inquiry are most needed, namely: scaling up existing services; reflecting priority populations; co-defining and measuring costs and benefits; finding balanced solutions; and advancing system integration.

## Overview

High rates of mental health problems and low levels of access to traditional mental health services (i.e. delivered one-on-one in clinic settings), continue to be cited as reasons to more quickly integrate innovative approaches to providing services.<sup>1</sup> This, combined with exponential growth in communication technologies and development of effective digital interventions to address mental health, has made improving the design and application of e-health technologies a mental health priority of national concern. In response, in Canada's first mental health strategy, *Changing Directions, Changing Lives*<sup>2</sup>, the MHCC recommended increasing "the use of tele-mental health and e-mental health by building better infrastructure, providing on-going training and support, and greater flexibility in how services are funded." Today, technology allows people to work through coping strategies for depression with the help of a chatbot, face a phobia using a virtual reality headset, or learn how to manage anxiety through a self-guided online program. Booking appointments online, video calls, or text messaging with therapists whom you do not ever have to meet in person, are all now possible pathways to mental health care. Not unlike e-health services generally, the uptake of e-mental health care in Canada still faces certain limitations.<sup>3</sup> These include the fact that such interventions:

- Are complex, i.e. consist of several interacting components, target different groups, have multiple and variable outcomes, and/or permit personalization or tailoring.
- Are context-dependent i.e. are influenced by the rapidly changing technologies that are available and used by the public and providers.
- Perform differently depending on the way they are implemented.
- Have different effects on different individuals.

Furthermore, e-mental health research typically assesses and appraises interventions in head-to-head comparisons, while decision making needs an integrated perspective on the value of a technology within the larger system. Given these levels of complexity, it is important to document and synthesize available information as fully as possible and to assess if and how this may affect the uptake of e-mental health services.

## Goals of the Scoping Review

Despite the clear potential of digital technology to connect people and health services in new ways, evidence suggests that this potential is not being fully realized in Canada.<sup>4,5</sup> The purpose of this rapid scoping review was to provide a comprehensive overview of current understandings about e-mental health interventions, so that decision makers and service providers have up-to-date information to guide them. This review is an important tool for synthesizing a vast amount of information about the factors that could either catalyze or deter implementation of e-mental health interventions and services in Canada. The high-level questions guiding the review were:

- What is the evidence on effectiveness and cost-effectiveness of e-mental health in treating mental illness or substance use problems?
- What factors may influence the effect of e-mental health on health outcomes?
- What is the evidence of effectiveness of e-mental health for specific population groups (e.g. children, youth and emerging adults, and minority groups such as First Nations, Inuit, Métis; and/or other population groups)?

## Background

The diagnosis, care and treatment of mental health disorders have become matters of increasingly grave concern.<sup>6</sup> Despite the tremendous emotional, social and economic impact of mental health problems, collectively, only a small number of individuals with mental illness receive the appropriate treatment for their disorder.<sup>7,8</sup> Mental health problems are a leading cause of morbidity in Canada, to the extent that improved access to mental health care is urgently required.<sup>9,10</sup> Bridging the gaps between the onset of mental health problems and illnesses, proper diagnosis and the provision of appropriate care is critical.<sup>11</sup> Innovative technology has begun to find its place in the treatment of a variety of mental health disorders, offering hope that it will be possible to improve on the current scenario of high demand for, and limited access to, mental health services.<sup>12</sup>

Riper et al.<sup>13</sup> suggest e-mental health “as a generic term to describe the use of information and communication technology – in particular the many technologies related to the internet – when these technologies are used to support and improve mental health conditions and mental health care, including care for people with substance use and comorbid disorders” (p.1). This encompasses mental health promotion and the prevention, screening, diagnosis and treatment of mental health problems. Although some may refer to e-mental health solely as internet-based interventions,<sup>14</sup> this term encompasses a variety of modalities, including videoconferencing, computer games, web-based therapy, text messages, or virtual reality. These technologies may “have the capacity to not only overcome traditional geographical, attitudinal and financial barriers to access to care, but also to lower overall delivery costs and reduce demands on the clinical workforce” (p.2).<sup>15</sup> Given the great potential these technologies hold to address the increasingly intense demand for mental health services, continual review of the growing body of literature is essential to ensuring a comprehensive and up-to-date knowledge base for decision making and service design.

The area of e-mental health is a rapidly growing area of mental health research.<sup>16</sup> Technology is advancing and the use of technology is changing quickly.<sup>17</sup> At the same time, more individuals with mental health disorders are turning to technology for help.<sup>18</sup> Many recent reviews have demonstrated the positive effects of using e-mental health interventions<sup>19</sup> for psychiatric disorders,<sup>20</sup> anxiety disorders,<sup>21,22</sup> depressive disorders,<sup>23</sup> addictions,<sup>24</sup> eating disorders,<sup>25</sup> and attention deficit-hyperactivity disorders.<sup>26</sup> Within these specialized clinical domains and across technology applications, evidence that e-mental health interventions can be effective is growing. However, broader trends and gaps for e-mental health in general are still not well understood. Frequent reviews are needed to evaluate the current state of e-mental health evidence, given the accelerated proliferation of research in this area. A rapid review of e-mental health initiatives conducted by Lal and Adair<sup>13</sup> highlighted the importance of evaluating clinical initiatives and the need for reviews to target a wider variety of mental health disorders to be more inclusive. There is a pressing imperative to expand and update the knowledge base regarding e-mental health initiatives across the spectrum.

## Methodology

This review was structured according to the Arksey and O’Malley<sup>27</sup> five-step approach:

1. Clarify the scope of the review
2. Search for evidence
3. Appraise the literature and extract data
4. Chart the data
5. Collate, summarize and report

Below we describe in general terms the procedure that we followed at each step.

### *Clarify the scope*

To clarify the scope of the rapid review, our team met and consulted with staff at the MHCC to review the key research questions and previous work in the area. We were especially interested in understanding how this rapid review could provide usable and actionable information for policy makers and practitioners<sup>28</sup> who often find it challenging to make decisions regarding investing—or disinvesting—in e-mental health interventions. These tend to be complex and comprise multiple components, which may act independently or interdependently, offering no means of truly discerning or isolating the “active ingredient.”<sup>29</sup> The MHCC hosted a national roundtable on e-mental health in January 2017 to provide a forum for stakeholders to ask questions, discuss the issues and challenges they encounter, and describe the ways in which summary information would be most useful to them. We attempted to incorporate these perspectives in conducting our review.

### *Search for Evidence*

As an update to Lal & Adair, (2014)<sup>14</sup> this rapid scoping review synthesized national and international research published from 2010 to 2016 inclusive. Since this review was conducted within an abbreviated time frame, we did not attempt an exhaustive search for all evidence; instead, we captured a comprehensive snapshot of research in the field. We included only English-language articles about studies that evaluated a technology-based health intervention. Interventions could be user-led and did not require clinician involvement. Studies had to involve at least 10 participants. We excluded manuscripts that were categorized as a review, commentary, theoretical paper, published abstract, dissertation, book chapter, design paper, research protocol, or editorial—or if it did not report on empirical or evaluative data. An information specialist constructed, pilot-tested and ran our search strategies for each database. Our team defined the search strategies by consensus, informed by important MeSH (medical subject headings) terms and key words from previously published systematic reviews in the field, as well as by relevant terms for mental health conditions and the technology used (search terms are provided in Appendix 1). In November 2016, we searched 15 major databases (e.g. MEDLINE®, CINAHL®, EMBASE, ProQuest Theses and Dissertations, OVID HealthStar, Cochrane Database of Systematic Reviews, Health Technology Assessment Database, PsycINFO®, ACM Digital Library, IEEE Library). The literature search results were uploaded to EndNote X7 and duplicates removed.

### *Appraisal*

To identify which studies to include in our review, we involved two independent reviewers (two research assistants) to correctly apply the inclusion/exclusion criteria using a two-step process. At the title, abstract, or descriptors-level of screening, the reviewers independently screened citations to identify potentially relevant articles for full review. At the full-text stage of screening, 40 potentially eligible articles were randomly assigned to the pair of investigators to screen independently. Pairs of coders met to resolve discrepancies and reach consensus. The research team met for weekly progress updates and to resolve discrepancies.

The methodological quality of the studies we included varied considerably, as evidenced by their differing analytic approaches, sample sizes and study designs. We decided that all studies, even those of poorer quality, might offer important insights into broad trends in e-mental health research that could aid in informed decision making. Therefore, all studies that met inclusion criteria were included in the synthesis.

### *Chart the Data*

We created a data-charting form to collect and sort key pieces of information from the full text of each study, using the RE-AIM Framework. Data extracted from the literature included standard study information (such as author, year of publication, sample size) and additional information to examine mental health populations and outcomes (such as target population, type of technology, type of intervention, treatment outcomes, and treatment effect). The independent coders and one of the senior investigators undertook a trial charting exercise and team consultation to ensure consistency with the questions and purpose—in keeping with the suggestion of Daudt et al.<sup>30</sup> For a subset of 20 articles identified for inclusion, we extracted data from evidence sources (research assistant #1), which were checked for accuracy and completeness by a second reviewer (research assistant #2).

### *Collate, summarize and report*

It is important to note that, unlike a typical systematic review with stringent inclusion/exclusion criteria, we aimed to include and analyze a broad range of research. This limits our ability to provide detailed analysis of individual programs or studies, but allows us to present a few relevant trends. We used a narrative synthesis of the findings to report results derived from this review.

### **RE-AIM Framework**

The RE-AIM (Reach, Effectiveness, Adoption, Implementation and Maintenance) Framework<sup>31</sup> bridges the gap between research and practice by specifying the key steps involved in successfully applying programs and policies in real-world settings. It provides a framework to ask critical questions to help program planners, evaluators and policy-makers maximize their chances of successfully adopting evidence-based interventions. It is a recommended framework for integrating e-health research into practice and policy.<sup>32</sup>

The RE-AIM Framework has also been used to shed light on the relative strengths and weaknesses of different approaches to health care services such as in-person counselling, telephone counselling, and internet resources.<sup>33</sup> The overall goal of the framework is to focus attention and critical thinking on essential program

elements that can improve the sustainable adoption and implementation of effective programs and policies. Decision-makers may wish to place greater emphasis on some RE-AIM dimensions than others. Some may be concerned primarily with how clinically effective an intervention is, others with reaching the largest number of clients, and still others in selecting the program most likely to be implemented consistently.<sup>34</sup> For this reason, our goal was to broadly explore what the RE-AIM elements currently look like in relationship to the most recent research on e-mental health.

**Table 1. RE-AIM Definitions**

<b>Dimension</b>	<b>Original definition<sup>35</sup></b>	<b>Definition for this rapid review</b>
Reach	Proportion of the target population that participates in an intervention	Features of clients and settings in which e-mental health care is being studied and implemented
Effectiveness	Success rate if implemented according to guidelines; defined as positive outcomes minus negative outcomes	Outcomes (positive and negative) regarding the individual, organizational and social impacts of e-mental health care
Adoption	Proportion of settings, practices and implementation plans that will adopt this intervention	The infrastructure, funding and capacity-building activities needed to implement e-mental health care
Implementation	Extent to which the intervention is implemented as intended in the real world	The features of e-mental health care interventions as well as the human, and information and technology resources required to deliver them in the real world
Maintenance	Extent to which a program is sustained over time	Extent to which the e-mental health care interventions studied are sustained over time

## Strengths and Limitations

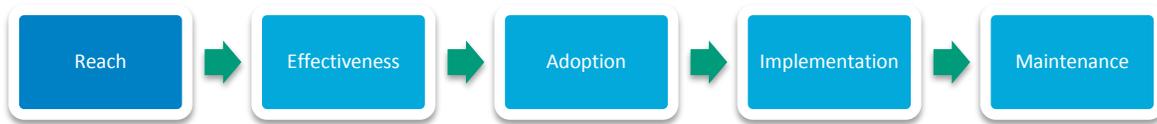
This rapid scoping review has several strengths, including the breadth of the searches undertaken. We searched 15 major databases. Furthermore, no restrictions were made based on methodological quality, which reduced the risk that relevant studies would be missed. The study selection process involved pilot-testing and coding in duplicate, reducing the risk of reviewer error or bias. An additional strength was the deliberate use of broad inclusion criteria, which enabled us to map most of the evidence base related to current e-mental health research.

This review is inherently limited by the fact that its purpose was to scope and map a complex body of literature without describing the studies in detail. We did not apply meta-analytic techniques to determine the magnitude of change observed and we did not screen for methodological quality. It is conceivable that studies would have scored differently in an efficacy-based review. Nevertheless, the objective of this review was achieved because it has increased our knowledge and understanding of the current evidence base, informed an ongoing process of evaluating Canada’s role and progress in e-mental health delivery and innovation, and highlighted gaps in the intervention literature.

## Results

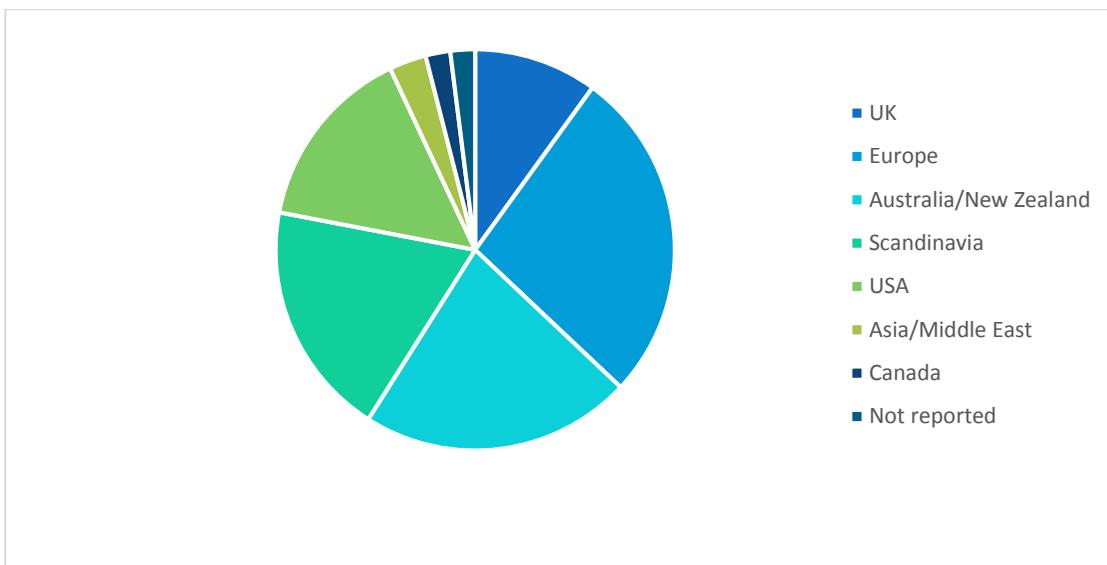
Our search strategy identified 4991 potentially relevant studies. After removing duplicates, 4120 studies were included in the initial screening. From there, a further 197 studies were excluded because they were systematic reviews or meta-analyses. Following screening at the title and abstract level, 462 full-text articles were reviewed in detail, resulting in the inclusion of 261 studies in the actual review. It is important to note that research in this field continues to grow rapidly; 34 per cent of the included studies were published between 2015 and 2016.

## Reach: The Clients and Settings of e-Mental Health Intervention Research



### Target Population

The studies we included in our review represented a number of primarily high-income countries, the most prominent being western European countries outside the UK (e.g. Netherlands, Switzerland, Germany [27%] and Australia/New Zealand [22%]). They also included Scandinavian countries (19%), the USA (15%), UK (10%), Asian/Middle Eastern countries (3%) and Canada (2%).



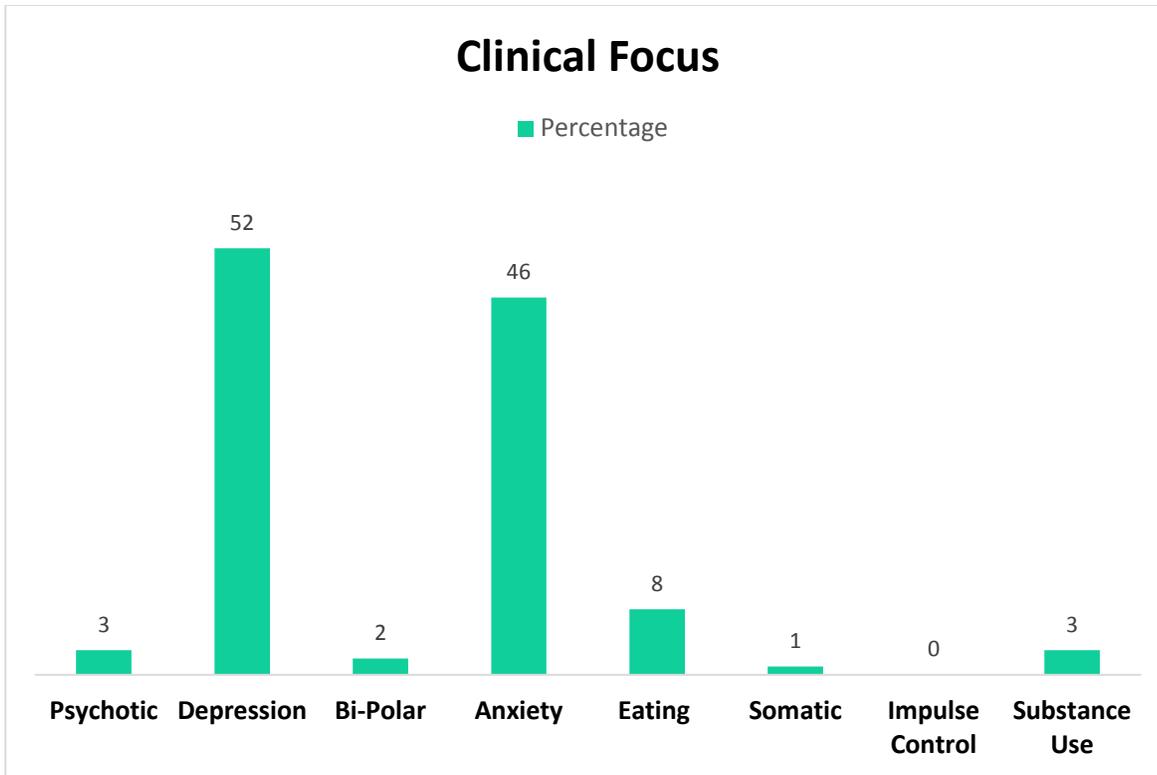
**Figure 1: Percentage of studies conducted in each country or region**

The 261 studies provided variable detail on their study samples and the characteristics of e-mental health users. Program development targeted different age groups with tailored programs, with young people and children (less than age 18) being the primary target population in 10 per cent of the studies. Only one study (less than 1%) specifically targeted male participants, five studies (less than 1%) targeted employees or workers; six studies (less than 1%) targeted military veterans or active service members, 17 studies (7%) targeted women (most commonly, post-partum). Half of the studies provided information on the socioeconomic status of study participants. Where information was provided, the participants recruited appeared to be weighted towards middle-to-high income earners. Inclusion/exclusion criteria for studies typically required fluency in the mainstream language as well as technical requirements (access to a computer, internet) and often excluded individuals with suicidal ideation, psychosis or recent medication changes. Only 37 per cent of studies cited statistics on the primary geographic location of participants (urban versus rural). Of those reporting, only three per cent of settings were identified as primarily rural communities. These factors, individually or in combination, could have contributed to the weighting of study participants to higher socioeconomic status.

The median number of participants across all studies was 60 (ranging from 10 to 1929). In most cases (66%), the number of study participants exposed to the e-mental health intervention or services was less than 100 people. In 21 per cent of studies, the number of participants exposed to the e-mental health treatment during the study was less than 30. Attrition rates ranged considerably, but overall 78 per cent of studies reported that at least 50 per cent of the study participants completed the e-mental health intervention.

**Clinical Features**

Clinical outcomes were measured in heterogeneous ways, ranging from self-reported symptoms, quality of life reports or indicators, and visits to emergency departments. The majority of studies identified depression (52%) and anxiety (46%) as the primary clinical focus of the intervention under study. Fifteen per cent of the studies reported on interventions specifically treating comorbid disorders. Most studies (80%) reported targeting clinical levels of mental disorder severity (i.e., required that participants scored above a certain threshold for clinical diagnosis or had a diagnosis from a health care professional). Over a third of the studies (35%) reported targeting multiple levels of severity (non-clinical, and/or subclinical, clinical).



**Figure 2: Percentage of studies reported targeting clinical domain**

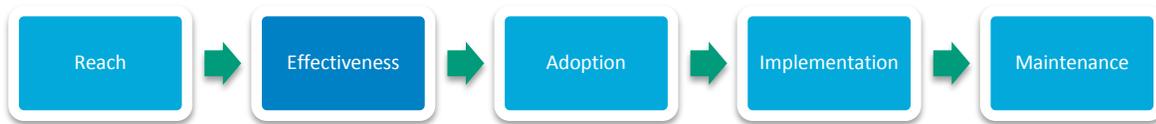
**Technology Features**

Although many different technologies are represented in the studies we reviewed, the majority of the interventions in the studies involved the use of email (86%), web-based platform (portals, video-conferencing, online learning system) (67%), social media (8%), instant messaging (7%), and mobile phone applications (6%) to deliver the e-mental health service (see Table 2 for full list). The e-mental health intervention used in 22 per cent of the studies involved the combination of two or more of these technologies.

**Table 2. Technologies used in delivering e-mental health services**

Technology	%
Email	89
Web-platform (login required)	67
Website (no login)	15
Social media platform	8
Instant messaging	7
Mobile phone	6
Virtual reality	4
Video-conferencing	3
Game	2
Remote sensor	0

## Effectiveness: The Individual, Organizational and Social Impacts Being Measured



Efficacy-effectiveness was the most consistently reported RE-AIM component across all studies. Outcome types (see Table 3) varied but, globally, clinical measures were reported in 98 per cent of the studies, satisfaction measures in 30 per cent, usage metrics in 25 per cent and psychosocial measures in 17 per cent. Fewer of the studies reported on health system use (5%) or measured the impact on health system processes (6%).

Table 3. Description of measures used to track e-mental health effectiveness

Outcome type	Examples
<b>Clinical</b>	Symptomatology, functioning, diagnosis, quality of life
<b>Psychosocial</b>	Self-efficacy, normative beliefs, stages of change
<b>Health system usage</b>	Physician visits, use of pharmacotherapy, referrals to specialists, emergency room visits
<b>Usage</b>	Number of logins, number of modules or activities completed
<b>Satisfaction</b>	Preferences, enjoyment, satisfaction, usefulness
<b>Health system processes</b>	Cost, workflow, productivity, staffing, quality of care, wait list reduction

Almost all of the studies reported on primary outcomes among the patient population (95%), with only a small portion reporting on clinician outcomes (4%) such as satisfaction. Of the 261 studies, 215 (83%) reported that the intervention resulted in statistically significant positive change on primary outcomes and eight per cent reported mixed outcomes. Across all studies the evaluative focus was largely on testing e-mental health interventions (88%) as opposed to public health promotion (2%), prevention (8%) or relapse prevention (5%).

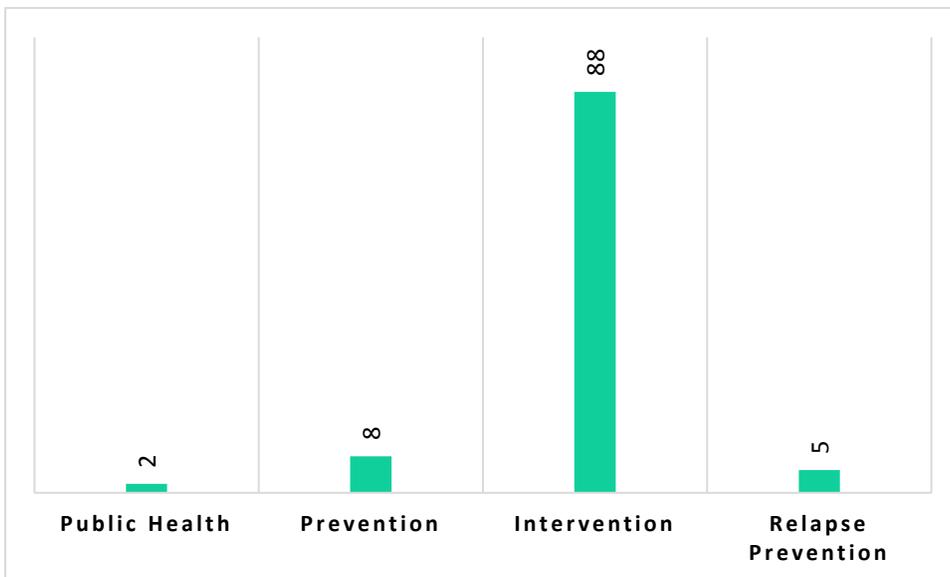
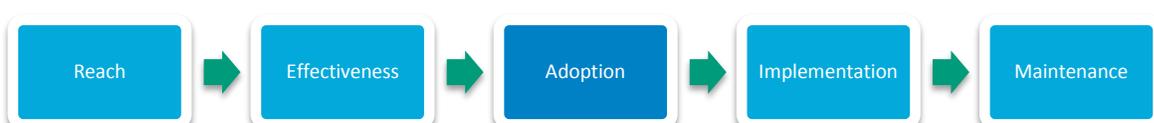


Figure 3. Percentage of studies with program goal focused on public health (e.g. mental health literacy); early prevention (e.g. screening for risk- factors); intervention (clinical populations) or relapse prevention (post-treatment support)

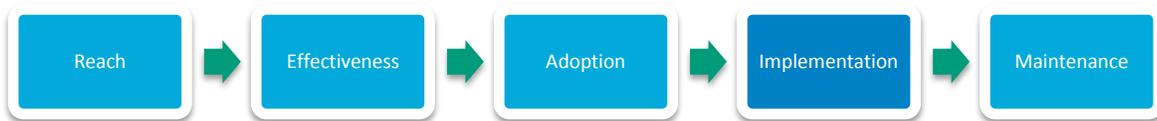
## Adoption: The infrastructure, Funding and Capacity-building Needs



Among the studies in the review, 234 (90%) described interventions in which the client accessed the services or program in locations convenient to them (i.e. home, school or work). Only three per cent involved accessing the service through a primary care centre, five per cent through a secondary care site (e.g. community clinic); and

only two per cent were accessed in acute care (e.g. hospital). Funding for intervention development and deployment ranged significantly, with 19 per cent of study authors reporting that they received at least some funding from non-profit organizations; 56 per cent from government, five per cent from private-for profit companies and six per cent from public schools or universities. One quarter of the studies (25%) reported that the intervention under study had been an adaptation from a previous program (e.g. paper-based manual now available as online course) and 28 per cent reported that at least some specialized training was required for clinicians to use the e-mental health intervention.

## Implementation: The Human and Technology Resources Required to Deliver e-Mental Health



As expected, there was significant diversity in the kinds of interventions and the level of expected client engagement. The average number of “sessions” or interactions clients were expected to undertake with the e-mental health intervention was eight [ranging from 1 to 60]. The average number of weeks clients were expected to need to complete the intervention was 10 [ranging from less than a week to 52 weeks]. Only five per cent (n=13) of the studies reported specifically on the content of the intervention being culturally responsive (i.e. used materials that explicitly reflected cultural views and values of a group or encouraged clients to engage in sharing about their culture). These often included the use of culturally specific visuals (e.g. images of people within that cultural group) or tailoring content around the expected life experience of a particular group. The extent to which interventions provided access to human resources and supports was fairly consistent. A little over half (58%) of the studies reported that psychologists or psychiatrists had an ongoing role in helping clients use the interventions. This was followed by peers (15%), nurses (3%), family doctors (2%), social workers (1%) and teachers (1%). None of the studies reported that interventions involved youth workers, justice workers, employment counsellors, faith-based personnel, peers or elders in the delivery of care.

Barriers to implementation were only reported by a small number of studies. The most common type of barriers mentioned occurred at the individual level (e.g. motivation) with 11 per cent of authors positing that individual factors (client or clinician) significantly impacted implementation. Technical problems and/or organizational issues (e.g. lack of staffing) were only reported in four per cent of the studies.

Most studies (94%) did not report cost considerations when detailing implementation. Of the 16 studies that did report on costs, most (63%) reported on comparative cost of the intervention and control groups or the cost of the e-mental health intervention compared to “traditional” service delivery. All the studies reporting on cost showed either cost-equivalency or cost-savings compared to the delivery of existing services.

## Maintenance: The Long-term Sustainability of e-Mental Health Interventions



Eighty-eight percent of the studies reported at least one follow-up assessment to track changes in the primary outcome. Among those reporting on follow-ups, most noted that the follow-up occurred immediately after exposure to the intervention—34 per cent (n=58) reported that follow-up took place within three months of the client receiving treatment. One third (30%) of studies reporting on follow-ups monitored client outcomes at six to 12 months, post-intervention, and 11 per cent reported on follow-ups beyond 12 months. Thirty-five per cent of the studies reported that individual effects of the intervention were maintained and observed beyond six months. The adoption status of e-mental health interventions was not reported in any of the studies, nor was the number of years the program had been operating at the time of data collection.

## Discussion

A key principle from the RE-AIM perspective is that a public health impact can be improved by maximizing outcomes for each dimension. While all studies explore measures of effectiveness, future work on e-mental health would benefit from studies that systematically test and report on reach, adoption, implementation and maintenance.

## Reach

The studies we reviewed were mostly small clinical trials conducted with self-selected users. Sample sizes and the characteristics of participants were reported consistently across studies; however, factors related to the representativeness of the participants who were willing to take part were less frequently reported. The paucity of data regarding the geographic and socioeconomic representativeness of the studies raises questions regarding the extent to which their findings can be generalized. As it stands, the studies provide little empirical evidence to support the oft-promoted vision of e-mental health as a potential solution to rurally located and financially burdened clients who experience barriers in accessing traditional mental health care services. Based on the studies we reviewed—in which only 37 per cent reported the geographic location of participants—we see minimal evidence that these services are reaching rural/ remote communities to any great extent. Highlighting these gaps and potential biases does not undermine the value of these mental health services—instead, it points to areas that are important to consider to ensure that e-mental health initiatives overcome inequalities rather than exacerbate or replicate them. More research is clearly needed to understand the reasons some people choose not to use e-mental health services, so that future efforts are adequately informed and therefore appropriately planned and implemented. Multiple indicators to accurately communicate the number, proportion, and representativeness of participants, settings, and staff involved in e-mental health are needed.<sup>36</sup> The findings of this review underscore the need for improved knowledge about service delivery within the demographic groups who are not using e-mental health services.

Although some interventions were specifically designed for youth (less than age18), most targeted a wide range of adult populations (aged 18 to 65). There was little or no indication in the studies we reviewed of how the interventions were tailored to the varying needs of adults across this diverse life span. Only a few studies reported on specific efforts made to be culturally and technologically responsive to the targeted client population. Further research to identify how and to what extent interventions should be modified or adapted to maximize participation within and across sub-populations is needed. Sample sizes in mental health research are notoriously low<sup>37</sup> and our findings show that, while a high volume of studies are being conducted in e-mental health, sample sizes are typically still small. The fact that large-scale trials or cohorts are still very rare limits our ability to explore patterns of uptake and use. We can ascertain that technologies used to deliver e-mental health services continue to be dominated by online learning portals/web-based programs, video-conferencing and email—however, research on interventions that make use of social media, remote monitoring, mobile apps, and complex combinations of technology, is increasing.

## Effectiveness

As the purpose of this review was to examine gaps and trends within the most recent body of literature, we included primary studies reporting both effective and ineffective results. In so doing, we hoped to limit the risk of obscuring important barriers or facilitators. All the studies we reviewed reported on intervention outcomes but demonstrated incredible diversity in how success was operationalized and defined. Contemporary program evaluation and outcomes research has shown a substantial shift toward programmatic, iterative evaluations that consider a range of success benchmarks including satisfaction, cost, process of care, quality of life, etc.<sup>38</sup> This shift, however, is not evident in the e-mental health literature to date. There continues to be very limited reporting as to how e-mental health services impact system workflow, clinician experiences and the downstream effects of these services on other forms of health system use. While the impact of these interventions on client quality of life is clearly the primary concern, deeper insight into the impact of e-mental health on the knowledge, skills and attitudes of providers could have implications for implementation planning and provider uptake. Furthermore, consistent with other recent findings,<sup>39</sup> our review shows limited long-term follow-up. This limits our understanding of how experiences with e-mental health care impacts clients and clinicians over the long term. Mental health problems are not just acute problems—they are often chronic—yet, there are few examples of long-term management using e-mental health interventions.

Prevention and health promotion should be seen as distinct from treatment and intervention, but complementary in their common goal of reducing the burden of mental, emotional, and behavioral disorders on the healthy development of all people. There is limited breadth of research across the health intervention spectrum. Research should focus on interventions that occur before the onset of disorder but might also be broadened to include health promotion and prevention of relapse for those at risk.

## Adoption

The most commonly described adoption elements were the location of the intervention and the human resources or staff who supported its delivery. The majority of e-mental health interventions in our review were supported by specialists (e.g. psychologists, counsellors). The role that major social institutions outside the health care system could play in delivering these services (education, justice, etc.) remains unclear. Understanding how different clinical settings vary with respect to available resources, level of expertise and commitment to using any e-mental health intervention is critical for modeling impact if it were to be scaled up. In situations where there are substantial differences across participating sites, programs can be adjusted in order to be applied successfully in those locations. However, the studies we reviewed were vague and inconsistent in their reporting of requirements for staff, training and settings. Important unanswered questions remain about which providers adopt e-mental health services within their practice and the kinds of socio-technical skills they require to initiate and persist in using these services.<sup>40</sup> The research remains unclear regarding the kinds of staff who deliver the programs (i.e. mental health professional versus more general health professional, educator or trained non-professional) and the kinds of settings where the programs are delivered. As a result, it is difficult to draw conclusions as to whether or not these interventions can be scaled or generalized to other settings.

## Implementation

With respect to implementation, policymakers and funders need clear and accurate information about how closely interventions adhere to best practices, how long they last, how often clients must be in contact with the interventions, and how much it costs to deliver them. Although the research-to-practice gap is not unique to mental health, the inclusion of—and reliance on—technology poses unique challenges. The studies we reviewed revealed a huge range of client and provider expectations around the promise, experience and results of e-mental health services. The spectrum of services ranges from short, one-time interventions that take less than an hour for a client to complete, all the way to weekly sessions in which the client is expected to participate, complete ongoing activities and interact with their health care provider repeatedly over the period of a year or more. These varying levels of intensity, duration, time commitment and motivational requirements must be considered in addition to whether or not an intervention works. That the mean number of interactions across studies was eight suggests that sustained contact over time may increase the likelihood of mental health improvements and spin-off benefits to providers and the health care system. However, since the majority of interventions in the studies targeted anxiety and depression, it is difficult to generalize across clinical contexts.

The quality of cost data in the literature is less than optimal and little information is collected in a systematic, controlled, prospective way. Cost measures of delivering e-mental health services were reported in only six per cent of the studies we reviewed, and each presented a unique formula or model for arriving at that costing estimate. Given that e-mental health services are frequently cited as potential methods of extending effective care in a cost-effective manner, this lack of published evidence about costs is disconcerting. Particularly, the differentiation of cost-savings for the individual versus those for the health care system are not well captured in the research literature. Even if cost savings are realized through reduced travel time (individual cost savings), sustainability can be challenged by infrastructure costs and low reimbursement by public payers or private insurance (health system).

The lack of information about the capital investment needed to develop services, and the ongoing and recurrent expenditures (human resources and technology upgrades/infrastructure) required to maintain them, makes it difficult for providers to plan how these services can be financed outside the research funding environment. We still don't have clarity about which factors, under which circumstances, most influence the successful implementation of an e-mental health intervention in the real world. Increasingly, stakeholders are voicing concern about poor tracking of implementation costs.<sup>41</sup> Because of this lack of consistent, reported cost data, there is concern that the potential economic benefits are being oversold, while the true investment required to implement services iteratively and effectively<sup>42</sup> is being underestimated.

We know that the culture of the client, clinician and—in the case of e-mental health interventions—the “content” of the treatment, affect health and illness.<sup>43</sup> Culturally sensitive care, with attention to differences, facilitates quality care, trust, safety and privacy. Satisfaction is clearly tied to cultural, ethnic and language experiences. That so few of the studies in our review addressed or discussed the representativeness of their study population, or detailed how diversity was addressed in the “content” of the intervention, suggests that a lack of culturally sensitive e-mental health care may be limiting successful implementation. A delicate issue is the tension between a generalized intervention, which promotes fidelity to treatment protocols and allows maximum user uptake, and the nuanced needs of cultural groups and of individuals within those groups. Notably, our review supports findings from a recent review of Indigenous mental health care<sup>44</sup> in Canada that calls for deeper and more sustained engagement with a diverse range of persons with lived experiences, as well as their families, in the co-design of these interventions. Such an approach can help reduce cultural barriers that impact implementation in later stages.<sup>45</sup>

## Maintenance

Consistent with other reviews using the RE-AIM Framework, and with e-health research in general, maintenance was the least-reported dimension across studies.<sup>46</sup> Assessing maintenance requires consideration of both the individual and system-level aspects of e-mental health service delivery. The ongoing cost of continued delivery and institutionalization of interventions was seldom reported; however, because most studies did not have a goal to achieve sustainability and focused primarily on effect (i.e. Does the intervention work?), it is likely that these measures were not considered relevant. Comprehensive economic analyses—such as estimating and modeling long-term benefits and costs from a societal perspective—can be complex, time consuming and expensive endeavors. However, even basic information about the cost to replicate implementation in a similar context could greatly improve the knowledge base in this area.<sup>47</sup> Internationally, countries presented a kaleidoscope of funding models for the interventions being developed and studied. These were often complex partnerships across research-granting bodies, government agencies and private or not-for-profit organizations. This suggests a need for high-level coordination and strategic planning to ensure funding is stable across the development, testing and implementation cycles. The volume of small pilot or feasibility trials demonstrating effectiveness suggests considerable effort should be made to identify how the interventions (if proven effective) will be sustained and how they can be scaled up within health care systems.

## Recommendations:

### Recommendation 1: Scale Up Existing Services

Experience gleaned from the rapid review shows the process of integrating e-mental health as a routine health care tool faces many challenges, is very complex, and requires a significant investment of time in most cases. The research-to-practice gap remains an issue. This review suggests there are many viable e-mental health interventions and services that are demonstrating positive effects and the rate of development is increasing. Scalability and transferability of these interventions is of primary importance. With so many small studies around the world showing promising results, the challenge now is how to mobilize those interventions in new contexts. Building on services that have shown positive effects could create momentum without requiring major expenditures in new development costs.

### Recommendation 2: Reflect Priority Populations

The goal of all e-mental health care is to find an optimal solution to the most pressing (existing or anticipated) mental health problems. There is a major disconnect between what we claim e-mental health care could do for marginalized or disadvantaged clients and the kinds of academic research being conducted. If improved access for rural communities and broader inclusion of disadvantaged sub-populations (categorized by culture, ethnicity, age, clinical areas, etc.) in mental health care are priority drivers for new services, then the type of research conducted and research participants enrolled should reflect those priorities. We have an ethical responsibility to ensure that the development of new e-mental health services does not just provide alternative options for those who already access mental health care, but create new pathways to care for those underserved in the current system.

### Recommendation 3: Co-define and Measure Cost-Benefit

Information on the costs of e-mental health interventions is needed within the evaluation framework of interventions been tested. Documenting value for money can support decision making in the field, but can also form the basis for developing business models and facilitating payment systems to support scaled-up services.<sup>48</sup> However, what researchers perceive as valuable cost-benefit measures and methods of validation are not always what is needed to inform decisions at the ground level. Knowledge sharing around meaningful costs-benefit analyses is an important step in catalyzing the research-to-practice transition.

### Recommendation 4: Find Balanced Solutions

E-mental health solutions that are identified for implementation should be balanced so they are technologically appropriate and culturally sensitive. Appropriate technology can be defined as the easiest technological solution that achieves the desired purpose within the social, cultural, environmental and economic conditions of the setting in which it is to be applied.<sup>47</sup> In this way, an appropriate technology would typically be simple to adopt and require fewer resources to operate and maintain (making it more likely to be sustainable and environmentally friendly).

Cultural sensitivity requires solutions to respect local traditions, expectations of the health care system, beliefs about health and disease, health literacy and usage patterns of existing health care services. Ignoring local culture may undermine efforts to introduce e-mental health initiatives and limit the ability to take what has worked elsewhere in the world and have it fit within the Canadian experience. Likewise, insufficient local resources may lead to errors in delivery and the application of e-mental health services that hold little fidelity to the desired therapeutic approach. Solid experience and knowledge of cultural limitations must guide the design and implementation of e-mental health solutions. Continued efforts to co-design interventions alongside persons with lived experience and their families and caregivers could improve relevance and, in turn, uptake.

### Recommendation 5: System Integration

If e-mental health continues to be conceptualized as a separate or parallel health care delivery system, and not as an integrated part of an overarching strategy to support mental health, then the long-term potential of investing in these services may never be realized. While work must be done to translate research into practice more rapidly, it is also critical that funding mechanisms are designed to acknowledge the iterative nature of the field and nimbly adapt based on cycles of continuous improvement. Although resources devoted to updating the technology may be reduced over time, ongoing involvement by health administrators will be necessary to ensure new e-mental health services are institutionalized and identify where other services might be replaced or discontinued.

## Conclusion

As the complexities of implementing e-mental health interventions become ever-more apparent, it becomes increasingly important to systematically review and assess new research. In order to address the gaps between research, policy, and practice, we have applied the RE-AIM Framework to conduct a rapid scoping review of the current e-mental health research landscape. The framework provided an excellent tool to systematically identify facilitators, challenges, opportunities and persistent gaps in evaluating and reporting on e-mental health care. The usefulness of scoping reviews depends on the evidence available. This review highlights inconsistencies in the degree to which authors reported on each RE-AIM dimension. Innovators as well as researchers should focus on measuring the effectiveness of e-mental health interventions, but factors regarding implementation, adoption and maintenance must also be included in the evaluation process. Policymakers, health care teams and people living with mental health problems and illnesses need better evidence about how e-mental health can best be integrated into their care pathways and whether it is delivering on promises of improved access for underserved populations. The next generation of e-mental health care solutions in Canada should benefit from the lessons of the many new approaches emerging across the country and worldwide.

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