RESEARCH SHOP

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Best Practices and Innovative Examples of an e-Mental Health Platform for the Prevention and Treatment of Eating Disorders

Prepared for

Body Brave

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Executive Summary

Body Brave is interested in supporting the development of an e-Mental health platform for the prevention and treatment of eating disorders. The McMaster Research shop conducted research to provide context and identify best practices and innovative examples of what a cutting edge, cost-effective e-Mental health platform might look like. This report includes an overview of e-Mental health and evidence for the effectiveness of e-Mental health interventions in the prevention and treatment of eating disorders. It also includes an environmental scan that evaluates numerous innovative examples of e-Mental health platforms (both for multiple psychiatric disorders and platforms specific to eating disorders).

Alongside the evolution of technology, e-Mental health services have expanded to encompass a wide range of promising services, including computerized interventions, telehealth and telemedicine, wearable monitoring, big data and machine learning, virtual reality, online peer support, and gaming. These technologies encompass a "cultural change" in mental health care by giving patients the power to exercise greater control over their treatment at their convenience, reducing barriers to accessing treatment. Individuals with eating disorders may be more willing and able to seek treatment through e-Mental health technologies, creating a strong rationale for supporting the availability of these digital and online approaches.

Evidence on the effectiveness of e-Mental health technologies for eating disorders is promising but still in early stages. Promising treatment approaches via e-Mental health platforms include CBT, acceptance-based therapy, and interpersonal therapy. In addition, the state of best practice is tending towards offering a "stepped care" (i.e., "flexible") model where treatment intensity is varied according to the severity and/or complexity of a patient's symptoms, and whereby treatments are customized for the individual (in contrast to a "one-size-fits-all" approach). Using evidence-based treatment approaches and a stepped care can have a positive impact on eating disorder prevention and recovery and, from a resource-allocation perspective, can be more efficient than traditional therapeutic approaches. These insights, however, should be interpreted carefully, due to the infancy of e-Mental health platforms and a low number of peer-reviewed studies supporting these claims. Though limited evidence exists, web-based training programs in eating disorders for health professionals may also be an important dimension of an online platform.

Results from the environmental scan identified 10 innovative e-Mental health platforms for the prevention and treatment of multiple psychiatric disorders, and five innovative platforms for the prevention and treatment specifically of eating disorders. The majority

of platforms were developed in English-speaking countries, including Canada. To the author's knowledge, as of May 2019, only one innovative platform specifically for the treatment of eating disorders exists in Canada and is part of a private eating disorder recovery centre. The most common intervention approaches on these platforms incorporate principles of CBT in their treatment program, however a subset also incorporate principles from acceptance-based, mindfulness, and other therapies.

All platforms we reviewed use a computerized intervention (e.g., a website accessed using a phone, laptop, or desktop) supplemented by additional technologies like telehealth/telemedicine (e.g., telephone therapy), online peer support, and/or machine learning. More sophisticated platforms use a variety of media (e.g. video, text, audio) to educate users on their disorder and give them skills to manage their symptoms. For platforms specific to eating disorders, the content of online treatment modules consists largely of education about eating disorders, early warning signs, and self-help strategies. Therapy-assisted platforms use chat software, email, and teleconferencing to support users through programming and administer treatment. Platforms using online peer support allow users can share recovery experiences, give/receive positive affirmations, and exchange coping strategies. Approximately half of the platforms have peer-reviewed studies on the effectiveness of the platforms; a smaller number have reliable evaluations of cost-effectiveness. Cost-effectiveness for the platforms was mainly due to direct savings through reduced medical visits related to their disorder.

Results from our research suggest that developing an e-Mental health platform for the prevention and recovery of eating disorders may be a wise investment, if not now then as a future initiative. Based on our research, we provided several recommendations to Body Brave with regards to moving forward with plans to develop a platform, including: 1) Continue to become familiarized with the e-Mental health landscape in Canada, 2) use evidence-based intervention approaches, 3) incorporate multiple technologies, 4) consider novel technologies (with caution), and 5) keep up to date on the research.

1.0 Introduction

1.1 Background

Brave Body is a charitable organization dedicated to providing timely, quality support and guidance to anyone struggling with body image issues, disordered eating, and eating disorders. A part of Body Brave's mission is to offer accessible treatment services to address gaps in the continuum of care for those struggling with these illnesses. Body Brave is also active in pushing for innovative, national strategies that will change the way eating disorders are perceived and addressed and is committed to reducing stigma and creating awareness.

Body Brave approached the Research Shop in the Fall of 2018 with an interest in developing an e-Mental health platform that would provide easily accessible services and resources to people struggling with (and people that treat) eating disorders. Before developing such a platform, however, the organization first wanted to learn what innovative technologies and best practices are available to guide their process. The McMaster Research Shop agreed to take on the project and this report is a summary of our research methods, findings, and recommendations.

1.2 Structure of report

Research for this project was structured around the following research question:

What are the most cutting edge and cost-effective e-Mental health approaches/e-mental health technological platforms that could provide services to people with eating disorders?

Specifically, Body Brave was interested in the following:

- What best practices exist for e-Mental health service provision,
- Opportunities and challenges with using e-Mental health platforms,
- What technologies are available to provide e-Mental health services,
- Innovative examples of e-Mental health platforms, and
- Effectiveness of different e-Mental health approaches and platforms.

This report presents what is known, as well as what is not known, about the most cutting edge and cost-effective e-Mental health approaches for treating people with eating disorders. The next section, Methods, gives an overview of our research process,

which includes a literature review of relevant e-Mental health literature and an environmental scan of innovative e-Mental health platforms for the treatment of psychiatric disorders (including eating disorders).

We divided results from the literature review into two sections:

- An overview of e-Mental health, including innovations in e-Mental health technologies and its benefits and limitations, and
- A review of considerations for the use of e-Mental health in the prevention and treatment of eating disorders, including a summary of promising treatment models, a review of the evidence for the effectiveness of different approaches, and online training opportunities for health professionals.

Results from the environmental scan follow the literature review. The report concludes with recommendations for Body Brave to consider moving forward with their plans to develop an e-Mental health platform for the prevention and treatment of eating disorders.

2.0 Methods

2.1 Literature review

For the literature review, for a broad overview of e-Mental health and technological innovations, we consulted prominent Canadian mental health organizations such as Canada Health Infoway and the Mental Health Commission of Canada. For our review of promising treatment models and the effectiveness of different e-Mental health approaches, we searched scholarly databases included Google Scholar, PubMed, and the McMaster library databases. Search terms included "e-mental health approaches/effectiveness/models," "online eating disorder treatment approaches/effectiveness/models," "online eating disorder education practitioners," "e-mental health cost effectiveness", and "online eating disorder cost effectiveness," among others.

2.2 Environmental scan

For the environmental scan, our first step was to decide what kinds of e-Mental health interventions we would be evaluating (i.e., define what is an "innovative e-Mental health platform"). One criterion was that platforms must be delivered or enhanced primarily through the Internet (e.g., apps, videoconferencing, and instant messaging)—but that may incorporate related technologies (e.g. telephone counselling)—and must be used

to help prevent and/or treat mental health disorders. We also decided that platforms, in order to be innovative, must include at least two of a range of technological interventions available (see section 3.1).

Accordingly, we excluded the following e-Mental health interventions:

- Related technologies with limited (or no) internet component (e.g., crisis telephone hotlines),
- Platforms demonstrating limited service delivery innovation (e.g., text-based counselling or online psychoeducation modules that don't use any additional technologies), and
- Patient portals with a focus on managing health records and information with little to no prevention or treatment focus (e.g., Ontario Shores).

To search for relevant platforms, we first surveyed the Ontario Telemedicine Network website, and discovered the platforms "Big White Wall" and "Bounceback." From there, we searched Google and various academic databases using search terms like "e-mental health Canada," "online anxiety treatment," "online mental health," "mobile apps for mood," etc. To search for platforms specific to treating eating disorders, we used search terms like "online eating disorder recovery/intervention," "e-health eating disorder," "online eating disorder recovery/intervention platform," and "eating disorder treatment online." If we discovered a website for a platform using a standard Google search, after recording relevant details about the platform, if no evidence was available about the effectiveness of the platform, we entered the platform's name into Google Scholar to see if any peer-reviewed evaluations existed.

2.3 Limitations

There were two main limitations to this research that impacted our findings. Firstly, because e-Mental health is a relatively new field, not a lot of peer-reviewed research is available that evaluates the effectiveness of platforms in preventing and/or treating psychiatric disorders. Very few evaluations exist to determine the cost-effectiveness of platforms. As such, many of the claims about e-Mental health (e.g., that they reduce barriers to treatment and/or they're as effective of traditional face-to-face therapy) are tentative until they can be validated by the research community.

Secondly, conducting an environmental scan was difficult because many platforms are still in development, or accessed privately through institutions, which prevented us from being able to collect information about them (e.g., they did not have a website accessible to the public). For the platforms that we were able to collect information on

for our scan, not all the parameters we wanted to evaluate were available. When evaluating intervention approaches, many platforms did not state what therapeutic approaches they used when designing their treatment programs. Because the research team was not constituted by mental health professionals, we were only able to collect information that was explicitly stated and available in content about the platforms. As such, we cannot claim that our environmental scan is fully comprehensive, nor that we captured all examples of innovative platforms in our scan.

3.0 e-Mental Health: An Overview

e-Mental health refers to the delivery and/or enhancement of mental health services through the Internet and related technologies, including digital, online, and mobile applications (Mental Health Commission of Canada, 2012). The following section reviews innovations in e-Mental health and technologies, and well as the benefits and limitations to this technology in mental health care.

3.1 Innovation in e-Mental health technologies

Technology is evolving rapidly, and with it comes changes to the ways practitioners diagnose, prevent, manage, and treat mental health disorders. Online self-guided psychoeducational programming, teleconference counselling, peer support forums, mood- and behaviour-tracking smartphone applications, and even virtual reality are all examples of technological innovations for mental health services delivery. These technologies have been shown to be useful for preventing and/or treating a number of psychiatric conditions, including depression, anxiety, post-traumatic stress disorder, and eating disorders.

Technology can build a more responsive and efficient mental health care system. The Mental Health Commission of Canada (2014) has published a briefing document that outlines the most popular technologies supporting e-Mental health in Canada. We provide a summary of seven of these technologies in Table 1, below, so that readers are familiar with the options available for an e-Mental health platform geared towards treating eating disorders.

Table 1. Summary of promising e-Mental health technologies.

Technology	Description
Computerized interventions	Deliver services directly to patients through a computing device (e.g., laptop, smartphone), usually via a website or app, with or without the aid of a person. Services might include self-help resources, simulated therapy sessions, visualization/breathing exercises, and peer support forums or chat rooms.

Telehealth and telemedicine	Delivers services and information at a distance, such as through the use of a telephone or teleconference software (e.g., Skype). Examples include telephone counselling and psychotherapy sessions over Skype.
Wearable computing and monitoring	Includes innovations such as Apple Watch and Google Glass, as well as apps that monitor activities, physiology, and habits, offering sophisticated, real-time data to patients and clinicians. These can range from simple measures such as weight and sleep patterns to other measurements like diet, exercise, and mood.
Big data and Machine learning	Refers to the use of large amounts of data and/or predictive algorithms to predict future behaviour and customize treatments. Examples in mental health include using predictive analytic software to detect people at high risk of suicide (e.g., through monitoring social media activity and detecting suicidal "signatures" through content posting) and using user-inputted data to customize treatment programs.
Virtual reality	Uses computerized simulations to create scenarios that patients observe and/or work through to treat an underlying disorder. An example includes replicating real-life traumatic situations to help people confront and work through their post-traumatic stress disorder.
Online peer support	Provides the opportunity to seek and obtain support from others experiencing similar mental health issues. An example is a peer support internet forum for individuals experiencing depression, where users are able to share experiences and coping mechanisms and provide positive messaging to others.
Gaming	Offers an engaging environment, particularly for youth, to teach cognitive behavioural skills to people with mental health issues. An example is a game where players go on a "quest" and have to fight negative automatic thoughts in order to progress.

3.2 Benefits of e-Mental health

According to the Mental Health Commission of Canada, e-Mental health is not just about the technology used to treat disorders—it also represents "a cultural change in mental health care, in that it is empowering clients to exercise greater choice and control" (2017, p.1). For instance, rather than waiting for an in-person appointment, clients can access online psychoeducational content available 24 hours a day and seven days per week at their convenience. Not only does this allow clients to access services on their own time, but those intimidated by accessing in-person services are able to reliably seek treatment from the comfort of their home.

As technology and e-Mental health options evolve, the availability and use of these services is increasing rapidly, primarily for two reasons:

1. High rates of mental health problems and low levels of access to traditional mental health services (i.e., delivered one-on-one in clinical settings). In Canada's first mental health strategy, "Changing Directions, Changing Lives," the Mental Health Commission of Canada recommended increasing "the use of tele-

mental health and e-mental health by building better infrastructure, providing ongoing training and support, and greater flexibility in how services are funded" (2012, p.89). e-Mental health can meet the burgeoning need for mental health services by offering patients flexible, patient-centered treatment options that can be accessed at a distance.

2. Advances in technology and digital communications continue at an exponential rate, engendering new ways of accessing services. Nearly all Canadians under the age of 45 use the internet every day, with 76% of users having access to a smartphone and 71% a laptop or notebook (Statistics Canada, 2017). For the majority, this means getting help online via a digital platform is easy and convenient.

In sum, mental health services delivered through accessible digital technologies have been, and stand to continue, filling a critical service gap in mental health treatment.

3.3 Limitations to e-Mental health

It is important to highlight several challenges in the innovation and delivery of e-Mental health services. The "digital divide" in Canada means that 14% of homes - most concentrated in rural communities - still lack broadband connection (Huyhn & Malli, 2018). For those that do have access to an internet connection, basic packages can be expensive and slow download speeds can make accessing the internet difficult. It is also important to note that some people do not have the digital literacy skills to use new technologies for mental health treatment. The needs of these groups, which include older adults, people who are homeless, and people in geographic locations with limited or no access to reliable internet, should not be neglected when innovating new e-Mental health interventions (Mental Health Commission of Canada, 2017).

e-Mental health interventions also entail a broad range of security concerns. Clients interacting with a digital service create new digital forms of data, and therefore comprehensive data security procedures are required to protect confidentiality and privacy (Bennett, Bennett, & Griffiths, 2010). This will require involving information technology specialists in all stages of the design and delivery of an e-Mental health intervention and familiarizing support staff with the security measures required to protect users' data. Developing these measures will require adequate resources and expertise, such as a partnerships with information-technology specialists and firms.

Lastly, some researchers have noted a lack of research supporting claims about the benefits of new e-Mental health technologies (Bauer et al., 2013; Lal & Adair, 2014; Musiat & Tarrier, 2014). For instance, some question the ability of professionals to

establish therapeutic relationships online (Emmelkamp, 2005) and the effectiveness of online programs without guidance from a trained professional (Baumeister, Reichler, Munzinger, & Lin, 2014). Overall, many researchers suggest that more studies are needed to support many of the claims of e-Mental health services and provide evidence for their effectiveness.

4.0 e-Mental Health Approaches to the Prevention and Treatment of Eating Disorders

4.1 Improving access to treatment

The number of people seeking treatment for eating disorders is low compared to the number of people experiencing these conditions. Several practical reasons preventing people from getting help include, but are not limited to, cost, hassle, shame, and lack of treatment providers (Clement et al., 2012). e-Mental health technologies could be one of the ways to reduce these barriers, which is necessary for addressing the gap in service access.

Individuals with an eating disorder may be more willing and able to seek treatment through e-Mental health technologies. According to Juarascio et al., (2015), in their review of smartphone applications for the treatment of eating disorders, e-Mental health technologies could be a palatable first step to seeking treatment for those expressing anxiety or ambivalence about entering a treatment program:

> "Smartphone apps can allow patients to approach treatment at an individualized pace, which may address some concerns about ambivalence towards treatment and help patients feel more in control of their treatment. The accessibility of apps could also address problems of cost and hassle; the confidentiality and privacy of apps could reduce shame experienced by seeking in-person treatment" (p.2).

e-Mental health technologies could also increase geographic access to treatment. According to the Canadian parliament's Report of the Standing Committee on the Status of Women, there is a profound shortage of specialists and treatment programs for eating disorders in Canada (LeBlanc, 2014) and access varies widely between communities. In particular, people suffering from eating disorders in rural communities may lack access to a proximate treatment location. Having online treatment options could break down these geographic barriers by allowing people to access treatment from their homes.

In sum, there's a strong rationale for increasing the availability of e-Mental health approaches to the treatment of eating disorders. This section reviews some of the most promising treatment approaches and evidence of their effectiveness in treating eating disorders.

4.2 Promising treatment approaches

An important dimension of any e-Mental health initiative is its treatment approach, i.e. the psychological and/or social interventions aiming to improve a client's mental health. This section briefly reviews three promising treatment approaches that have proven to be effective in treating eating disorders: cognitive behavioural therapy (CBT), acceptance-based therapy, and interpersonal therapy (IPT). We also review the concept of a "stepped care" approach, which outlines the potential for a flexible, rather than a "one size fits all," approach to e-Mental health.

4.2.1 Cognitive-behavioural therapy (CBT)

One of the most researched forms of psychotherapy, CBT is also a leading therapeutic approach to eating disorders. The principle of using CBT for eating disorders arises from the notion that the core psychopathology of eating disorders is the over-evaluation of shape and weight, which is cognitive in nature (Murphy et al., 2010). In particular, Enhanced-CBT(CBT-E) has been a behavioural intervention specific to eating disorders (Cooper & Fairburn, 2011). The main components of CBT-E include self-monitoring, eliminating rigid dieting, and decreasing urges of disordered eating by participating in alternative activities (Juarascio et al., 2015). This form of therapy has shown to eliminate binge eating in 30-50% of all cases with the remaining cases showing improvements (Wilson, Grilo, & Vitousek, 2007).

4.2.2 Acceptance-based therapy

Acceptance-based therapy is a mindfulness-based therapy with the goal of creating a positive and meaningful life while also accepting the pain that is naturally a part of this life (Harris, 2006). The therapy stresses being fully present and engaged in order to take mindful action (Harris, 2006). The underlying theory for the use of acceptance therapy is that disordered behaviours aim to avoid or escape aversive internal experiences (Baer, Fischer, & Huss, 2005). In the context of eating disorders, acceptance-based therapy emphasizes accepting thoughts and feelings related to eating and then working towards goals to overcome challenges (Baer, Fischer, & Huss, 2005). The six core principles of acceptance-based therapy include defusion (ability to detach from thoughts), acceptance, contact with the present moment, the observing

self, values, and committed action (Harris, 2006). Therapy involves exercises based on each one of these principles. The main goal of therapy is to accept what is not in control (e.g., thoughts and emotions about eating) but act on what can be controlled (e.g., the way they choose to respond to their thoughts).

4.2.3 Interpersonal therapy (IPT)

IPT focuses on identifying and modifying interpersonal problems that contribute to the maintenance of eating disorders (Wilson, Grilo, & Vitousek, 2007). IPT theory suggests that interpersonal problems likely predate the onset but are also a consequence of eating disorders, and that certain symptoms of the disease (e.g., social withdrawal, poor self-image) prevent the development of meaningful relationships (Murphy et al., 2012). This approach is usually considered to be an alternative to CBT, and the two treatments show similar levels of effectiveness for treating bulimia nervosa after at least a year of treatment (Agras et al., 2000).

4.2.4 A stepped care approach

In psychological treatment, the state of best practice is tending towards offering a "stepped care" approach. A stepped care approach is a model of health care where lower-cost, minimally intensive treatments (e.g., peer support, online psychoeducation, etc.,) are administered to patients exhibiting less severe symptoms, and higher-cost, highly intensive treatments (e.g., one-on-one therapy) are administered to patients with more severe symptoms (Bower & Gilbody, 2005). Patients can begin at different "steps" of a continuum of treatment options according to the severity of their disorder and the likelihood of how well they'll respond to different treatments. Patients can "step up" or "step down" their treatment depending on judgements of the patient's progress, either through self- or external monitoring (Bower & Gilbody, 2005).

An evaluation of an eating disorder recovery platform in Germany exemplifies what an online stepped care approach might look like (Kindermann, Moessner, Ozer, & Bauer, 2017)

> "After registration, participants have unlimited access to all modules including psychoeducative materials, a peer-moderated discussion forum, chat sessions provided by a psychologist in a group or individual setting, and a supportive monitoring system providing individualized feedback on current ED-related attitudes and behaviors. The monitoring questionnaires can be completed either via logging in to the ProYouth platform or by simply clicking on a link provided in

an email. Participants who report substantial symptoms in the monitoring are actively contacted by a ProYouth counselor via email, and invited to an individual chat session with a counselor in order to clarify their problems and support them in finding more intense support (i.e., professional treatment) if needed" (p.1216).

In the online treatment of eating disorders, from a resource-allocation perspective, using a stepped care approach ensures that the most expensive and intensive approaches (e.g., individual therapy) are being reserved for those experiencing the most severe symptoms. From a patient perspective, this flexible procedure, in contrast to a "one size fits all" approach, means that users receive the most appropriate interventions for their condition at the times when they're most needed (Bauer, Moessner, Wolf, Haug, & Kordy, 2009).

4.3 Evidence for the effectiveness of different approaches

4.3.1 Intervention Outcomes

Evidence on the effectiveness of e-Mental health for eating disorders is promising but still in its early stages, and further research is needed (Bauer et al., 2013; Bauer et al. 2019). Still, here we present some key highlights about what is known from the current literature on the effectiveness of such interventions:

- A study of one fully automated internet-based eating disorder program found it was effective in treating some symptoms of eating disorders. Some participants also accessed support from a counsellor through digital means, which increased participants' satisfaction with the program, but did not affect the outcomes for their eating disorder symptoms.
- Users of e-interventions aimed at eating disorder prevention or early intervention often experience more severe symptoms than the target population for the type of intervention. Such platforms may not be the most appropriate form of intervention for these users. On the other hand, they may provide a point of access to in-person treatment where there is high resistance to seeking support (Moessner et al., 2016a; Bauer et al. 2019).
- Some studies also suggest that e-mental health for eating disorders could be incorporated into a stepped approach to treatment that could bridge the gap between the need for eating disorder supports and available services (Aardoom et al., 2016). Some interventions can roughly double the number of participants who are willing to seek in-person therapeutic treatment (Moessner et al. 2016a).

- Intervention flexibility so that participants can adjust the level of intensity of program modules, supports, and interventions they access appears to be an important factor in both effectiveness and cost-effectiveness of web-based eating disorder prevention and treatment interventions (Kinderman and Moessner, 2017; Bauer et al. 2019).
- A review of mobile phone apps aimed at treating eating disorders showed that few used evidence-based tools or made particular use of smartphone capabilities (Juarascio et al., 2014).
- A large, randomized control trial evaluating the effectiveness and cost-effectiveness is underway by a research consortium, and evidence-based modules are being added to the program being evaluated. The study is well-designed and addresses many of the gaps in the current knowledge base, such as including more male-identified participants and looking at cost-effectiveness. Unfortunately, results from this robust study are not yet available (Bauer et al. 2019).

4.3.2 Cost-effectiveness

Cost-effectiveness is another important consideration in assessing the value of e-mental health for eating disorders. Literature on this specific topic is also limited, and results are mixed. Part of what complicates assessing this literature is the value-based differences in how (and how much) different effects or impacts are valued. Here, we present what is known about cost-effectiveness of e-Mental health interventions for eating disorders:

- Participants tend to use flexible e-mental health interventions for eating disorders more often as they experience more symptoms, which suggests efficient resource allocation that is participant-driven (Kinderman and Moessner, 2017).
- One review of 95 studies on a particular type of e-mental health support (computerized cognitive behavioural therapy) found on the whole that such programs were generally cost-effective and less costly than traditional, in-person therapies. However, studies that analyzed costs often did not include costs to participants such as paying for internet access (Mussiat and Terrier, 2014).
- In another study, providing computerized CBT had higher costs of delivery than traditional in-person CBT, but the economic impact in terms of employment time lost due to anxiety and depression outweighed the delivery-cost difference considerably, resulting in a high degree of cost-effectiveness (McCrone et al., 2004).

- Outside of funded studies that offer paid incentives to participate, motivating people to take part in eating disorder prevention programs is very difficult. An introductory presentation combined with an in-school workshop was the most effective and cost-effective dissemination strategy examined. This strategy was one of the costlier to implement, but also had the greatest effects on participant uptake (Moessner et al., 2016b).

4.4 Online training and education for health professionals

Early detection and treatment of eating disorders are essential to ensuring the best possible health outcomes. Several studies have reported, however, that health professionals in a variety of clinical fields lack confidence in their ability to detect, diagnose, and treat people with eating disorders (Girz, Robinson, & Tessierm, 2014; Linville et al., 2010). Part of the problem is a lack of training and educational resources to help health professionals address these limitations (Surgenor & Maguire, 2013).

Online training programs are an enticing option to facilitate skill development for health professionals because they are a cost-effective way to scale up access to education for geographically dispersed learners. Although very few studies evaluate the effectiveness of online training programs for health professionals, a recent study found that an online training program in eating disorders significantly increased confidence, knowledge, skills, and attitudes towards the identification and treatment of eating disorders (Macguire et al., 2019). Each of the study's 1813 health professionals (from a wide range of disciplines and work settings) completed five self-directed modules, each taking approximately 3.5 hours to complete, including: Understanding Eating Disorders and Diagnosis, Assessment, Preparation for Treatment, Treatment Approaches, and Management. A study in 2017 found similar results in using an online program to train therapists in the application of CBT-E (Fairburn et al., 2017). This program consisted of two parts. The first part was a highly practical 9-hour course containing. The second part consisted of a library of supplementary educational materials, such as how to treat subgroups of patients (e.g., those severely underweight, those with severe low self-esteem). 80% of participating health professionals completed the program and reported gaining confidence in the application of CBT-E protocols. The study concluded by stating that "web-centered training [could] provide a means of … overcoming a major obstacle to the dissemination of psychological treatments" (Fairburn et al., 2017, p. 214).

Studies attribute the success of training programs to their multidimension approach, including the use of cutting-edge technologies like expert videos, roleplays, and interactive exercises and quizzes (Dimeff et al., 2009; Macguire et al., 2019). One study

emphasized the effectiveness of using simulated client-therapist interactions to educate training participants, in which participants can determine the therapist's behaviour in a hypothetical setting (Dimeff et al., 2009). All online training programs incorporated knowledge tests accompanied by feedback to gauge participants' learning progress.

Despite the promising studies reviewed above, there's currently not enough evidence to draw conclusions about the utility of online training programs for health professionals in eating disorders. In a critical review of the effectiveness of therapist training methods, a 2010 study cautions that self-directed training strategies, including online trainings, may only lead to slight improvements in knowledge, skills, and/or competencies (Herschell et al., 2010), and that these programs should only be used in a larger training curriculum involving expert consultation (Dimeff et al., 2009). Given their broad application, however, and considering the more recent research, online training programs should not be discredited as a low-cost and effective way to widely disseminate eating disorder training to health professionals.

5.0 Environmental Scan of Innovative e-Mental Health Platforms

This section provides the results of our environmental scan of innovative e-Mental health platforms (see section 2.2 for how we defined "innovative" and 2.3 for the limitations of our scan). We divided results between platforms for the prevention and treatment of multiple psychiatric disorders, i.e. generalized platforms, and those specific to the prevention and treatment specifically of eating disorders.

5.1 Platforms for the prevention and treatment of multiple psychiatric disorders

In total, we found 10 innovative e-Mental health platforms for the prevention and treatment of multiple psychiatric disorders. A summary of these platforms may be found in Table 2.

Jurisdiction and target population

All platforms we reviewed were in English and created for English-speaking countries. Five of the platforms we reviewed operate in Canada, with two (Big White Wall and Bounceback) offering services specifically to Ontario residents. Two platforms operate in the United States, and one platform operates in Australia. Two platforms are accessible to citizens worldwide.

Two of the platforms (Foundry and BreathingRoom) are tailored to youth (ages 12-24). All platforms are geared towards treating a number of common psychiatric conditions, including stress, anxiety, panic attacks, and depression. A few of the platforms also stated treating psychosis, PTSD, insomnia, and/or substance abuse.

Intervention approach

Not all platforms stated the therapeutic approach to their intervention. Of the platforms that stated their approach, the majority (5) used principles of CBT in designing their treatment program. Two platforms also stated incorporating principles from acceptance-based therapy, with one platform additionally employing principles from positive psychology, "mindfulness," and motivational interviewing.

Technology and features

All platforms we reviewed used a computerized intervention (e.g., a website accessed using a phone, laptop, or desktop) supplemented by additional technologies such as telehealth/telemedicine and online peer support. Most platforms required users to complete some form of self-assessment, usually before accessing the platform and then periodically through their treatment program (i.e., self-monitoring). Treatment modules consisted of a range of media, including readings, videos, worksheets/activities, and audio. The content of these modules ranged from self-improvement tools and resources (e.g., goal setting), to information about user's condition(s), to developing specific skills for self-managing mental illness. Six of the platforms were therapist-assisted, who communicate with users by phone, teleconference, instant messaging, and/or email. Therapists worked to customize self-help programming for users, administered treatment, and supported users through content modules. Three platforms used online peer support, such as a peer support forum and chat room, where individuals could share their experience, support others on their recovery journey through positive messaging, and ask for/share strategies on managing their mental health.

Efficacy and cost effectiveness

Four of the platforms (Strongest Families, myStrength, BreathingRoom, and myCompass) are supported by peer-reviewed studies suggesting that their treatment programs can significantly reduce the occurrence and severity of the psychiatric disorders they're designed to treat. Other platforms made claims about their efficacy, but these claims were either unsupported by data or were based on research

unsupported by a peer-review process. The majority of mobile phone applications for the management and treatment of psychiatric disorders have not been examined critically or scientifically. Only two of the platforms conducted an economic evaluation assessing cost effectiveness (Big White Wall and myStrength). Findings from the economic evaluations suggest that using the platforms resulted in significant direct cost savings through fewer medical visits relating to their mental health (e.g., Big White Wall states using the platform led to net savings of $615 per patient per year).

Table 2. Scan of innovative e-Mental health platforms for multiple psychiatric disorders.

Platform Name	Jurisdiction/ Target population	Technology	Intervention approach	Features/Services	Efficacy/Cost effectiveness
Big White Wall	-Ontario (through Ontario Telemedicine Network)	Computerized intervention; Online peer support	CBT	-Online mental health and wellbeing service for those (age 16+) experiencing stress, anxiety, depression, addictions, etc. -Free to Ontario residents with an eligible postal code -24/7 monitoring by clinically trained "wall guides" -Self-improvement tools and resources, and access to self-guided courses -Anonymous peer support, allowing members to seek and provide feedback in a safe environment -Ability to express thoughts and feelings through "bricks," i.e. creative	-In England (where the platform also operates), health providers pay $166 to give patients access to the platform for 6 months; live one-on-one therapy costs $125 per 50-minute session (MHN, 2009) -Self-reported outcomes (i.e., lacking scientific credibility) include 67% of patients reporting improvement to wellbeing; half report sharing an issue for the first time on platform -Economic evaluation suggest members had one fewer medical visit related to their mental health, leading to net savings of $615 per patient per year (Gniewosz, 2011)
BounceBack	-Ontario (through Ontario Telemedicine Network)	Computerized intervention; Telehealth/ telemedicine	CBT	-Adults and youth (age 15+) learn skills to better manage symptoms of mild to moderate depression and anxiety -Free to Ontario residents; requires referral from primary care provider (or can self-refer)	N/A

				-Online videos provide practical tips on managing mood, healthy living, sleeping better, and other coping strategies -Program involves three to six phone calls with a coach who helps with skill development, motivation, and progress monitoring -Client selects from 20 workbook topics, e.g. changing unhelpful thinking habits, suited to their needs Service available in 15 different languages	
Strongest Families	-Canada (service areas vary)	Computerized intervention; Telehealth/ telemedicine		-Services targeted to children and youth (age ranging from 3 to 17) experiencing attention deficit, oppositional defiance, and anxiety disorders -Currently offers six different programs, dependent on the client's needs -Combination of online self-help tools and "coaching at a distance" (i.e., telephone coaching) -Requires referral from health care provider	-Programs proven in clinical trials at IWK Health Care Centre in Halifax, Nova Scotia -2017/2018 outcome success rates are 95% resolved, 3% improved, and 2% not improved (McGrath et al., 2011)
Mobile applications (over 30,000 available through app	-Various	Computerized intervention; Other technologies vary by app	Various	-Provides users with momentary assessment tools to self-report mood and function -Allows clinicians to monitor client mood and function; allows users to	-Less than 2% of existing apps are integrated with electronic medical records, making access difficult by clinicians (Areán, Ly, & Andersson, 2016)

stores, e.g. [Intellicare suite](#))				learn about their mood patterns, improve their mood, and self-manage mental illness -Can be integrated with physiological sensors to monitor physical activity levels and measure users' response to stress and mood fluctuations -Integration with social media can serve as proxy for social connectivity--a possible indicator of changes in psychopathology -Treatment-focused apps offer users access to psychoeducation resources and activities that support skills for depression and anxiety (e.g., breathing exercises, positive thinking, etc.) -Mobile phone ownership is high (and increasing) across ethnic and income groups, making this technology format highly accessible -Can be a form of expedient, cost effective treatment for those with or without geographic treatment barriers	-Concerns around data security/privacy; little to no regulation in this field -The majority of mental health apps have not been examined critically or scientifically, raising concerns about their efficacy (Areán, Ly, & Andersson, 2016; Van Ameringen et al., 2017)
[Therapy Assistance Online (TAO) Connect](#)	-US -Schools and institutions (student population)	Computerized intervention; Telehealth/ telemedicine		-Therapist-assisted and self-help platform -Digital platform with tools and educational materials to help user understand and change their thought patterns	

				-Contains educational modules, assessments, AI interactive tools based on natural language processing and push notifications to encourage and remind users -Include short phone and/or video calls with therapist	
myStrength	-US	Computerized intervention, Machine learning	CBT; Acceptance-based; Positive psychology; Mindfulness; Motivational interviewing	-Evidence based and clinically reviewed -Targets depression, anxiety, stress, substance abuse, chronic pain and insomnia -Available 24 hours a day and 7 days a week -Allows you to track a customizable range of measures to increase self-awareness and reinforce habit change; these dimensions include tracking -Allows users to enter in their emotional states and adjusts each day based on present emotional and motivational states through the use of a machine learning algorithm that individualizes the experience -Platform provides inspirational resources, interactive programs and community support	-Studies suggest the platform is 83% as effective as face-to-face therapy, with users experiencing a 74% improvement in depression scores -An economic impact assessment suggests a 4.8x return on investment through direct healthcare savings costs, as well as indirect savings (e.g., less missed work days)
Beacon	-Canada	Computerized intervention;	-CBT	-Helps those with mild to moderate depression, anxiety, panic and PTSD	-One-time cost of $595

		Telemedicine/ telehealth		-Platform starts with a personal assessment of the user so that a BEACON therapist can tailor care -Platform involves a therapist being assigned to each user who will respond within 1-2 business days -The therapist assigns online readings and activities, guiding them through the process -The therapist is only available for the first 12 weeks, available at an additional cost after that period	
Foundry	-BC, Canada -Targets youth aged 12-24 years of age	Computerized intervention; Telemedicine/ telehealth; Online peer support	Various	-Platform deals with mental health topics of anxiety, body image & eating, low mood & depression, questioning reality (psychosis) and stress -Brings a range of services into a single place, including online self-help modules and access to phone support, peer support, and online chat. -Resources specific to the body image & eating include modules that provide information to users and an 'Eating and Body Image self-check', which is a self-evaluation for those struggling with eating and body image issues -Includes a tips page which links to more resources	

				-Platform does not necessarily provide direct intervention but the layout of the information and the self-evaluation tools as well as the UI is really great -Links to apps and self-help courses	
BreathingRoom	-Youth, aged 13-24	Computerized intervention; Online peer support	CBT, Acceptance-based	-Helps youth develop strategies to manage stress, anxiety, and depression. -Online modules include graphic designs, video clips illustrating teaching content, music clips, peer sharing, relaxation techniques including visualization, an online journal, and links to other helpful resources.	A randomized, clinical control trial determined the platform is an effective online intervention for youth experiencing mild to moderate depressive disorder (Rickhi et al., 2015)
myCompass	-Australia (Black Dog Institute)	-Computerized intervention; Telehealth/ telemedicine		-"A personalized self-help tool for your mental health" -Includes 1 health toolkit, 14 interactive activities -Activities include SMART Goal setting, managing fear and anxiety, Breathing & Relaxation, etc. -Features include symptom tracking & feedback, interactive learning activities, 'snippets' (motivational messages + tips), knowledge centre with information and a personalized experience through the algorithms that learn from the activities the user takes part in	-Free to use -Efficacy was demonstrated in a randomized control trial where there was a significant decrease in depressive and anxiety symptoms at the post-intervention time point but there was no significant decrease observed at follow-up (Proudfoot et al., 2013). This suggests that the platform will need to be used on a continuous basis to be effective

				-Focus on treating anxiety, depression and stress -Healthcare providers also use the platform to support their patients -Only recommended for mild to moderate anxiety, depression and stress	

5.2 Platforms for the prevention and treatment specifically of eating disorders

In total, we found five innovative e-Mental health platforms specifically for the prevention and treatment of eating disorders. A summary of these platforms may be found in Table 3.

Jurisdiction and target population

Two of the platforms we reviewed are available in Germany, and one is available in the Netherlands. One platform is available in the United States. One platform is accessible through a private Canadian eating disorder treatment centre. One is downloadable through mobile phone app stores and is available to anyone who can read English. Two of the platforms are designed specifically for students.

Intervention approach

Not all platforms stated the therapeutic approach to their intervention, although two identified using a "stepped care" approach in the design of their platform. Of the platforms that state their approach, three use principles of CBT in their treatment program, and one of those three also incorporates principles of acceptance-based therapy.

Technology and features

All platforms we reviewed use a computerized intervention (e.g., a website accessed using a phone, laptop, or desktop) supplemented by therapist support. Almost all platforms use some form of monitoring and feedback system to track user progress and symptoms. The content of online treatment modules consists largely of education about eating disorders, warning signs, and self-help strategies. Therapy-assisted platforms use chat software, email, and teleconferencing to support users through programming and administer treatment. Two platforms use online peer support so that users can share recovery experiences, give/receive positive affirmations, and exchange coping strategies.

Efficacy and cost effectiveness

Three of the platforms (Featback, Student Bodies, and Recovery Record) have peer-reviewed studies evaluating their potential to manage eating disorders. To the authors'

knowledge, there are no economic evaluations of the cost effectiveness of these platforms.

Table 3. Scan of innovative e-Mental health platforms for the prevention and treatment of eating disorders.

Platform Name(s)	Jurisdiction/ Target population	Technology	Intervention approach	Features/Services	Efficacy/Cost effectiveness
Es[s]prit	-Germany -College students	Computerized intervention; Telehealth/ telemedicine; Online peer support	Stepped care	-Uses a stepped care approach, which modifies treatment intensity according to the needs of the individual -Comprehensive screening process consisting of a Weight Concern Scale and the Short Evaluation of Eating Disorders -Online education material about various forms of eating disorders, early warning signs, and self-help strategies -Internet forum for information exchange and peer support, moderated by ES[S]PRIT staff member -Automated, online monitoring system to track and manage progress and relapse -Online individual and group counselling sessions via chat software	
Featback	-Netherlands	Computerized intervention; Machine learning; Telemedicine/ telehealth	CBT	-Access to online psychoeducation material, entirely self-guided (i.e., freedom to choose what and when to read)	-A study found that Featback was superior to a waiting list control in reducing bulimic psychopathology; they did not find similar effects for

				-Monitoring and feedback system consisting of a weekly email with a link to a monitoring questionnaire; algorithm provides a tailored feedback message according to the status of the participant -Availability of therapist support via email, chat, or teleconferencing software, scheduled through web portal	anorectic psychopathology (Aardoom et al., 2016)
Student Bodies	-U.S. and German -Developed for students	Computerized intervention; Telemedicine/ telehealth	CBT	-A structured, eight-week online course designed to give students the knowledge and skills to protect against the development of an eating disorder -Students log in to a password-protected internet platform where they can access course content -Students also have access to a support forum moderated by a clinical psychologist and a self-monitoring journal	-A study found that the 8-week course significantly reduced weight and shape concerns for up to 2 years following the program (Taylor et al., 2006). It also decreased risk for the onset of an eating disorder in high-risk groups.
Recovery Record	-Accessible to any English-speaking users and clinicians	Computerized intervention; Telemedicine/ telehealth; Online peer support	CBT; Acceptance-based	-One of the most comprehensive eating disorder mobile applications that exists to date -Contains a diversity of features such as self-monitoring, personalized coping strategies, social connection, and a portal to connect with the user's clinician	-Evaluated as delivering the most empirically-supported content rooted in CBT and acceptance-based interventions (Juarascio et al., 2015) -App is free to patients but there is a cost to provider after they have reached a certain threshold of their patients using the platform

				-Uses evidence-based interventions (rooted in CBT) allowing users to log their food intake, energy level, specific emotions, and other contextual details around the meal (i.e., Electronic Momentary Assessment) -Notable feature includes ability to "pair up" with another Recovery Record user to share recovery experiences, posting activity to a newsfeed, and give/receive positive affirmations -Clinician version of app allows clinicians to view user data (with their permission), including food and thought records, and coping strategies used	-Lots of higher education institutes, such as Stanford and Duke are partners -HIPPA compliant -5 stars with 600,000+ users
Westwind Online Counselling	-Private Canadian treatment centre	Computerized intervention; Telemedicine/ telehealth	Stepped care	-Periodic coaching sessions with a counsellor and dietician -Daily email connection and support -Weekly online learning modules and activities -Stepped care approach tailored to client's individual needs and budget	

Recommendations

Results from our environmental scan suggest that there is only one e-Mental health platform designed specifically for Canadian patients, and this platform is only available through a private eating disorder recovery institution. Body Brave may be well-positioned to develop an eating disorder recovery platform to improve service access in their jurisdiction. Based on our research, we recommend that Body Brave take the following points into consideration when moving forward with plans to develop a platform:

1. **Continue to become familiarized with the e-Mental health landscape in Canada.** Developing an e-Mental health platform will require extensive knowledge and resources making it challenging to implement. The Mental Health Commission of Canada has developed a toolkit to support the implementation of e-Mental health initiatives for mental healthcare stakeholders and provides a roadmap for launching a new initiative, which Body Brave should consult.

2. **Use evidence-based intervention approaches.** Research suggests CBT is the standard for treating eating disorders, but there's the opportunity to move beyond CBT to incorporate other evidence-based approaches such as acceptance-based. Moreover, rather than developing a platform with standardized treatment, Body Brave should consider how implementing a stepped care approach can offer more resource-efficient and individualized programs for users according to their specific struggle.

3. **Incorporate multiple technologies.** The most innovative platforms we reviewed incorporated a diversity of technologies into their treatment programs. As research suggests that computerized interventions are more successful when users are supported by a therapist, incorporating telehealth technologies such as phone and video counselling can support better patient outcomes. Online peer support is another effective technology to complement a platform.

4. **Consider novel technologies (with caution).** Virtual reality, gaming, big data, and machine learning are all technologies with untapped potential in the prevention and treatment of eating disorders, offering Body Brave the opportunity to experiment with cutting-edge technology. It should be noted, however, that because these technologies are very new to the treatment of mental health disorders, the evidence pool for their effectiveness is incredibly limited (Clus, Larsen, Lemey, & Berrouiguet, 2018).

5. **Keep up to date on the research.** Results from our research suggest that there's still a limited number of studies evaluating the effectiveness of e-Mental

health approaches to the prevention and treatment of psychiatric disorders. There was a pronounced lack of literature evaluating the cost-effectiveness of such platforms. Body Brave may choose to wait until more comprehensive, peer-reviewed studies are able to evaluate the claims that e-Mental health platforms are at least as effective as, or complementary to, conventional treatments (e.g., Bauer et al., 2019). Similarly, although online training programs in eating disorders for health professionals are an enticing way to disseminate training, Body Brave should proceed with caution due to the low number of studies (albeit promising studies) evaluating the effectiveness of such an approach.

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