SUPPORT FEATURES FOR ONLINE COGNITIVE BEHAVIOURAL THERAPY INTERVENTIONS FOR ADOLESCENTS AND YOUNG ADULTS

SUPPORT FEATURES FOR ONLINE COGNITIVE BEHAVIOURAL THERAPY INTERVENTIONS FOR ADOLESCENTS AND YOUNG ADULTS: A SCOPING REVIEW

BY:

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Abstract

Adolescent and young Canadians are a group with the highest rates of symptoms of anxiety and depression. Such conditions, when unaddressed, negatively impact the development of a person, restricting their chances of attaining a fulfilling future and career. Even when deciding to reach out to access care, the process can be a challenging one with many barriers along the way.

Online therapies in the form of online Cognitive Behavioural Therapies, have shown to be a promising format for some, but have faced some shortcomings with low uptake and variable results. Adding guidance and support to such therapies has been shown to help address these barriers.

The objective of this research is to explore how support is currently provided for online cognitive behaviour therapies for anxiety and depression, targeting adolescents and young adults. To achieve this objective a scoping review methodology was utilized to identify relevant articles. The approach taken in a scoping review methodology allows for identification of a wide range of articles, which was necessary in this case because research isolating support features from other interventions is very limited. The scoping review identified fifty articles to be reviewed, and they were analyzed using a framework created for this review. The framework covered human, delivery, and design factors. Consultations with five key informants was also used to identify more findings related to the themes identified in the framework and to complement the findings from the articles in the scoping review.

The resulting picture identified the field of support for online CBT for anxiety and depression in adolescents and young adults, covering a field with a great diversity ranging from

virtual guides to face-to-face support from therapists. The features were organized into groups of ‘toolkits’ that can be considered by CBT developers for different situations and needs.

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List of Abbreviations

CBT - Cognitive Behavioural Therapy

cCBT - computerized Cognitive Behavioural Therapy

CCHS-MH - Canadian Community Health Survey- Mental Health

CIHI - Canadian Institute for Health Information

DSM-5 Diagnostic and Statistical Manual of Mental Disorders, Fifth

ED - Emergency Department

MREB - McMaster's Research Ethics Board

OCBT - Online Cognitive Behavioural Therapy

OCD - Obsessive Compulsive Disorder

PTSD - Posttraumatic Stress Disorder

RCT - Randomized Controlled Trial

WHO – World Health Organization

1. Introduction

1.1 Background

A look at the list of disorders that place the most burden on the quality of life will lead to a big surprise for some. As Alongside cardiovascular and circulatory disorders, mental illness is one of the leading disorders that burdens populations (1). And that makes a person wonder how such a large group of conditions tucked away from the consciousness of many in society, can have such a large impact? A key factor that compounds the problem and complicates the lives of people burdened by the challenge of illness, either by living with it, or supporting someone living with it, is the fact that a person with a mental illness has to live with a condition that accompanies them in almost every aspect of their life (2). In addition, they are often forced to deal with a lack of self-awareness regarding the nature of the condition they are facing (3). This lack of awareness results from a lack of education that would help them recognize what is going on with them, in a society that is not aware of what they are going through, and that too often stigmatizes them rather than offering the understanding and compassion they need. But even if a person and his/her support providers overcome the stigma of seeking help for a mental health issue, finding care is difficult and in some cases a near impossible task (3–5). This brings up the question; Can eHealth and the tools that it encompasses help address some of the access issues that a mentally ill person faces?

It is redundant to mention how impactful the Internet and other related technologies have become to the lives of everyone. People have become accustomed to using their online devices to be informed about the world around them, and to gain information about issues including their health (6). A growing body of research and products is beginning to focus on utilizing mental

health promotion and intervention programs through the Internet (7–9). The object of this thesis is to focus on a prominent method of delivering mental healthcare online, which is Online Cognitive Behavioural Therapy (OCBT). Adolescent and young adults have been chosen as the population segment to study, as they are a group highly impacted by mental health problems (10). This is also a group for whom the use of early intervention tools that are easily accessible may be of great value (11–14). As the most common mental health disorders in this age group (15,16), anxiety and depression were chosen as the disorders of focus for this study.

This study does not aim to prove the effectiveness of available OCBT tools. Rather it is intended to provide a clearer view of available online methods for providing support and guidance to youths suffering from mental health problems that are amenable to online treatment. Descriptions of support and guidance in OCBT are not presented separately or prominently in most research studies. The aim of this thesis is to provide a picture of OCBT support features through a literature review that summarizes and disseminates published approaches to support utilized in various OCBT interventions for this population. To achieve this goal, a scoping review methodology is utilized. This is a research effort that balances a comprehensive, wide breadth coverage of research sources that in themselves vary in degree of depth. In contrast to systematic reviews, scoping reviews focus on providing a description of the state of a field as opposed to focusing on evaluating the quality of the evidence(17). The methodology of scoping reviews guiding this study also utilizes key informant consultations which help to elaborate on the study findings with perspectives from professionals working in the youth mental health field.(18)

1.2 Defining Mental Health and Mental Disorders

Throughout this discussion it is important to keep in mind the importance of a healthy mental state for both individuals and society. According to the World Health Organization (WHO) mental health is defined as: "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community"(19). A mental illness on the other hand can be defined as: "alterations in thinking, mood or behaviour—or some combination thereof—associated with significant distress and impaired functioning"(20). It is important to note that mental health is not merely a lack of a mental illness but a state of wellness for individuals without a diagnosis of mental illness, as well as a state that individuals with a diagnosed mental health problem strive to achieve (19).

1.3 Prevalence of Mental Health Problems in Canada

The Canadian Community Health Survey- Mental Health (CCHS-MH) is one of the few sources that provide statistics on the state of mental health problems for Canadians. Findings from the 2010 survey show that 1 in 3 Canadians have dealt with a mental health or an addiction issue at one point in their lives (15). The data also show that within a 12-month time frame one in five Canadians have reported dealing with symptoms that qualify as a diagnosis of a mental health or addiction problem (15). But beyond the numbers, what are the experiences of these individuals that make up such a large proportion of the Canadian population, whose experiences are hidden to many?

1.4 Canadian Experience in Accessing Care

There are testimonies of Canadians from all around the country who contributed to the report by the Canadian Senate entitled "Out Of The Shadows At Last" (20). Here, a picture emerges of the barriers and the hardships that Canadians living with a mental illness have to face in order to access the help and support they need. This report describes individuals confused and frustrated with a system that is disjointed and nearly impossible for persons requiring its services to understand (20). People with mental illnesses talk about a lack of knowledge in society about mental illnesses, and too often a lack of compassion, even in healthcare settings. Mental health services were described as confusing to access in a system that is fragmented, and where in many cases needed services are non-existent (20). All of this is compounded by a strong stigma regarding mental illness, adding another barrier for someone wanting to reach out for help, but worried about the stigma they will face in their personal and professional life (20).

The following testimony is by a Canadian, who describes how challenging the journey to access care can be, especially when contrasted with access to other healthcare services: (20)

> "Trying to get help is a frustrating, lonely journey. Most people make many, many calls in an effort to get help. When you finally find something that looks hopeful, you get on a ten month waiting list... it is like showing up in emergency with a broken bone and being told, yes, it is really broken, so try and do what you can with it and we will see you in ten months".

1.5 Depression and Anxiety

The two mental disorders with the largest impact on the Canadian population are depression and anxiety.

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) definition, depressive disorders are a group of disorders that share a common feature of a mental mood that is sad, empty, or irritable, as well as accompanying physical and cognitive changes that affect a person's ability to function in daily life (21). Depressive disorders include disruptive mood dysregulation disorder, major depressive disorder, persistent depressive disorder, premenstrual dysphoric disorder, substance/medication-induced depressive disorder, depressive disorder due to another medical condition, other specified depressive disorder, and unspecified depressive disorder. Although this group of disorders share common features, they differ in their presumed etiology, duration, and timing among other considerations (21). Major depressive disorder is the most prominent of these conditions. It involves a discrete episode of sadness that is at least two weeks in duration, and it involves changes in feelings, cognition, affect, and neurovegetative functions. Between episodes of sadness a person reverts back to states of remission (21). The DSM-5 diagnostic criteria include the presence of five out of nine clearly defined symptoms that include, in addition to depressed mood and loss of interest: changes in sleep and weight, diminished ability to think, agitation or psychomotor retardation, and thoughts of death and suicide. Such symptoms are seen to be severe enough to affect a person's functioning in various aspects of life (21).

Fear and anxiety are responses that every person faces. Fear is the emotional and accompanying physical response to an imminent threat, either real or perceived. In a fearful situation, the body gets aroused to act because of the response of the autonomic system (the fight or flight response), thoughts of immediate danger, and escape behavior. Anxiety is the state of anticipation of a future threat, and is accompanied by muscle tension, behaviours of caution or avoidance of the anticipated threat (22). When anxiety or fear become excessive or persist

beyond what is appropriate for a person's development period they start becoming considered as anxiety disorders. Anxiety disorders are also persistent (persistence typically defined as lasting as 6 months or more). A clinician needs to make the determination that the fear or anxiety is excessive or out of proportion, taking into account the development period and cultural contextual factors, such as the symptoms of substance use or medication or other medical conditions (22).

The DSM-5 includes the following disorders in the group of anxiety disorders: Separation anxiety disorder, selective mutism, specific phobia, social anxiety disorder (social phobia), panic disorder, agoraphobia, generalized anxiety disorder, other specific anxiety disorder, and unspecified anxiety disorder (22).

1.6 Adolescence and Young Adulthood: An Appropriate Time for Early Intervention That Faces Barriers to Care

1.6.1 State of mental health in Canada for this age group

The CCHS-MH survey identifies the 15-29 age group as the one with the highest reported rates of depression and anxiety (15,16). Addressing anxiety and depression is important, not just because of the high rates in this age group, but also because of the impact of such problems in such a critical age of a person's development (10). Many young people that experience anxiety or depression symptoms go on to develop full-blown disorders at an older age (11–14). Anxiety and depression are associated with risks of academic underachievement, leading to dropping out from secondary education, and lower involvement in college education or trade and skill-based training, affecting their chances of attaining a fulfilling career (23,24). Such young people are

also more likely to live with nicotine, alcohol, or illicit substance dependence (23,24). Additionally, some young people living with anxiety and depression are more likely to be unemployed and become parents at an early age (23,24).

All the above-mentioned factors and more, highlight the critical need to provide young people with the proper resources that they need to overcome the challenges they face with anxiety and depression, but the current state regarding the inaccessibility of such resources to young Canadians shows that there is a lot of work to be done.

1.6.2 Where do young Canadians go to access support for their mental health needs and barriers to accessing care?

For the most part mental health care is accessed in the community setting, and for most young Canadians who end up seeking professional care, the family physician is the most common resource for seeking professional support for their mental health needs (25).Through access in community clinics, outreach programs, hospitals and schools, young people access additional professional mental health resources such as psychiatrists, psychologists and social workers (26).

Less common, but rapidly growing, is accessing mental health resources through visits to the Emergency Department (ED), and through hospitalization, either in community or specialized hospitals (26). For example, an analysis of Canadian Institute for Health Information (CIHI) data of ED visits in a community hospital in the Province of Alberta found that the majority of young people visiting the ED for a mental health problem had not previously reached out to a care provider in their community first (26). This may suggest that the increase in the utilization of EDs can be partially due to the difficulty of navigating the healthcare system in a

community setting. This gap of access to intermediate resources prior to a mental health crisis and an ED visit was highlighted by the child and youth mental health framework 'Evergreen', developed by the Mental Health Commission of Canada in a report on challenges that young people face when accessing care (27).

A 2010 backgrounder paper (19) summarized Canadian barriers to access to mental care based on system-level barriers, community barriers, and individual barriers (28). At the system level the barriers were due to a fragmented system in which mental health care resources operated in silos, with weak collaboration between services in primary care, community programs, and specialist mental health care. System level barriers identified included concerns regarding shortages of qualified staff (especially in rural areas), which lead to long wait times for families. This is especially frustrating when trying to navigate a complex system only to end up being placed on waitlists (27). Community barriers included the geographic location where young persons needing mental services live. This is especially critical in rural areas with a shortage of mental health care providers, forcing young persons to travel long distances at high cost, which may not be feasible in many situations (28). Aboriginal youth face an additional barrier over and above geographic location, as they deal with a mental health system and culture that is not fully aligned with their needs (28). At the individual level, stigma was identified as a major barrier of the young person trying to access care (28). Being conscious of how mental illnesses are stereotyped and negatively viewed, young persons could be very hesitant to decide to reach out for care. This hesitation is compounded by fear of being stigmatized by their own families (28).

1.7 Cognitive Behavioural Therapy

Cognitive Behavioural Therapy (CBT) is an evidence-based psychological treatment that is structured, time-oriented and problem focused. The term CBT includes a variety of therapies that contain cognitive and behavioural components (29).

The guiding theories behind CBT try to explain the interplay between thoughts (cognitions), emotions and behaviour. Cognitions are viewed to have a mediational role in the maintenance of emotional disorders. The theory assumes that changes in cognitions precede changes in emotion and behaviour, and the concept that these thoughts can be monitored and assessed, and that changes in thinking can lead to changes in behaviour and emotions (30).

Common features of CBT interventions include a functional analysis that assesses patient cognitions, emotions, and behaviours, a therapeutic model for psychotherapy based on the CBT guiding theory, a process to recognize thought patterns, and based on that a strategy to modify problematic thought patterns using behaviour and cognitive strategies.

When assessing thoughts, the CBT therapist tries to identify and address negative automatic thoughts, distortions in information processing and schemas, and cognitive errors. An example of such a theory is Beck's cognitive theory on depression (30,31). Beck's model focuses on three thought elements that contribute to a person's depression. These elements are the schema, automatic negative thoughts, and cognitive errors. Schemas are the stable patterns and thought structures through which the person organizes her/his experiences and behaviours, and influences that person's view of the world. These schemas result in the beliefs and rules that guide the person in various situations in life, and have a major role in determining the person's thoughts, feelings, and behaviour (30,31). The second cognitive component in Beck's theory is negative automatic thoughts (30,31). These thoughts affect how a person views her/his self, and the world around her/him. These include a negative view of one's own self, as maybe being

worthless, or unloved by others, a negative view about the world, and a negative outlook for the future as being hopeless and during which current problems will persist. Such thoughts are termed automatic as they seem to appear suddenly to the person, and they end up being accepted with no attempt at reflecting on their validity. The third and final cognitive component is cognitive errors, which are systematic logical errors in a person's way of thinking and assessment of internal and external stimuli. Cognitive errors include magnifications of the significance of a negative event over others, overgeneralization, and arbitrary inferences without supporting evidence (30,31).

But cognitions don't work alone at propagating a person's mental health problem, such as depression for example. After a trigger of a life event, negative cognitions, emotions, behaviours, and bodily reactions all feed into each other, leading to a spiral of deteriorating depression, that makes it harder for a person to address the event (30).

A typical CBT session starts with a review of a person's current state; their current mood, and recent events they have faced. This is followed by setting the agenda for the current session, and reviewing any homework completed in between sessions. The weekly session content is then delivered. This may vary, depending on the scheduled topic for that specific session. For example, this might include introducing activity scheduling, or identifying negative thoughts. The session concludes by setting the home tasks (homework) to be completed before the next session, gaining feedback from the user, and involving them in the discussion on the plan for the next session (29,30).

CBT is a time-limited therapy. This includes defining the session length, and the number of sessions for the therapy (29). Based on the user's needs and the goals identified, various CBT techniques can be employed. These might have a behavioural or cognitive focus, to help the user

achieve the goals of the therapy. Such techniques include: emotional recognition; activity scheduling; self-reward; social skill training; problem-solving skills training; self-monitoring; and cognitive restructuring (31).

1.8 Providing Mental Care Online

The current generation of youth is a generation that grew up with the Internet all around them, and Internet use occupies a central part of their daily life, including for their social activities and information seeking (32,33). Research shows that this extends to adolescents, and young adults seeking information on mental health through online means (34,35). They are comfortable with utilizing the Internet for such information (36). In Canada, the findings from the 2012 CCHS-MH survey identified the Internet as one of the leading sources for accessing mental health information. Thus, online mental health interventions could hold the potential for providing a means for convenient access to mental health resources, which is especially important in cases where such resources are hard to reach (37).

With a challenging environment that has so many barriers to receiving care, there is a need to research new venues to deliver care that can enhance and supplement traditional methods for delivering care. Delivering care online is one such method that presents itself as a suitable fit to help bridge the barriers facing a person in need of mental care. These include the following:

Ease of Access: For a person researching options to receive information and support for anxiety or depression, an online resource that is easy to reach and quick to access provides a convenient way to start receiving much needed support. This compares to the difficulty of

navigating a confusing mental healthcare system where even finding an entry point seems like a daunting task (38).

Overcoming Stigma: Although some progress is being made to overcoming stigma regarding mental health problems, deciding to receive in-person care for the first time can be a stressful experience that may lead many to avoid reaching out for help (5). Receiving information and care from the privacy of a person's own computing device can be a more appealing option. At least the person may start to feel comfortable with the idea of receiving help and support, assisting that person to feel more comfortable about reaching out for additional care if needed (39).

Overcoming limited resources and geographic isolation: Even if a person feels in a position of being comfortable to reach out and receive care, such resources can be very limited with long wait times. For someone in a rural area, this may include an additional barrier of long travel distances. Online resources can provide tools to receive help in a self-help format that would not require much specialist human-resources. In addition, if supported by a mental health provider, this would include an opportunity to increase the capacity for a mental health provider to provide care for an increased number of clients. For someone in a remote community where the closest resource for mental health care is many kilometers away, an online resource can help provide some support to relieve some of the burdens of accessing care in the community (38,40).

1.9 Online Cognitive Behavioural Therapy

My initial scan of the literature showed that the majority of the reported online interventions are based on Cognitive Behavioural Therapy (CBT)(41–43). This could be attributed to CBT's structured and systematic format and its sequential implementation, which makes it well suited

for computer-based interventions (44). The focus on online CBT in research is supported by various national guidelines recommending the use of computerized self-help therapies as part of the approved therapies for certain mental health disorders (45). Based on these observations I decided to focus on CBT based tools in my study.

Internet or computerized CBT can be seen as an extension of bibliotherapy, which is a delivery of therapy in a book format that people can use as a self-help tool, usually at their own pace with little support. Earlier attempts at providing online CBT attempted to deliver content in a manner that is similar to bibliotherapy, with weekly modules available in a downloadable text format. With the availability of higher bandwidth and better computer processing power, more multimedia elements have become available.

1.10 Supported and Guided CBT

Although the effects of computerized or Online CBT (OCBT) are generally positive, there is still variation between studies when it comes to outcomes, and the level of guidance is viewed as one of the reasons for such variation. Guidance seems to also have an impact on the level of adherence to the intervention, as interventions with more guidance seem to have lower drop-out rates as compared to interventions with no support and guidance.

Cuijpers et al. (37) conducted a systematic review and meta-analysis of studies comparing delivery of various interventions in guided self-help and face-to-face formats.(46) The content of the guided studies was delivered in various formats that included books, audio, and computerized and Internet delivery. The delivery of support to the users in the guided self-help group also was variable and was delivered through face-to-face, telephone, email, and other mediums. The findings supported the effectiveness of guided self-help, which was as effective as

face-to-face therapies, even showing a small positive effect size for supporting guided self-help delivery. The findings were also consistent when comparing impacts at 1-year follow-up. Engaging with a guided self-help intervention did not lead to an increase in drop-out rates, as they were consistent with the rates found in face-to-face interventions.

A systematic review by Baumeister et al. (38) aimed at providing an answer regarding the impact of guidance on the outcomes of online mental health interventions (47). The outcomes reviewed in this study were symptom severity, completion rates and number of completed modules. Focusing on guidance and qualifications of the guide, the studies included direct comparisons of guided versus unguided delivery, different doses of guidance, varying qualifications of the guidance provider, and the synchronicity and asynchronicity of the communication. When comparing guided versus unguided delivery of the same interventions, guided interventions provided more positive outcomes, both in reducing symptom severity and improving the completion of the programs (47).

1.11 A Note on Terminology

The discussion in this thesis is informed by research from different perspectives and scientific backgrounds. This variety has also introduced variation in terminology. For the sake of consistency a few terminology choices have used throughout this thesis. The first terminology decision is the use of the term ‘intervention’ to refer to any of the CBT programs. This choice covers the wide spectrum of programs that include promotion, prevention, and treatment. The second decision is to use the term ‘support features’ as opposed to using the term ‘guidance’. This includes a broader group of interventions such as guidance from a therapist, and interventions with automated support. Finally, although the focus is on online interventions, a

few interventions were labeled as computerized CBTs (cCBT)s by the intervention developers and that label was retained. The cCBTs were included in the study when they were identified by the developers as being able to be transformed into an online delivery format at some point.

1.12 Thesis Outline

This study contains five other chapters in addition to this introductory chapter. Chapter two, methodology, describes the choice of the scoping review methodology and the research effort undertaken for each step of the methodology. Chapter three outlines the literature review conducted to inform the development of a framework that was utilized to guide the coding of the studies that were found. Chapters four and five provide presentation of the results of this study along with discussion of the findings. The final chapter, chapter six, provides recommendations and a summary.

2. Methodology

The following sections will present the objectives that guided this thesis, along with sections discussing the research methodology selected to achieve those objectives.

2.1 Objectives

The objective of this study is to explore the ways support is provided for adolescents and young adults using online and computer-based CBT for anxiety and depression.

Separate reporting on support features is not readily available for this age group, so a review of the literature to identify support features in existing projects is warranted. A scan of the literature on guidelines, models, and frameworks guiding the design of support features for online and computerized interventions did not lead to identifying a single framework that allows a sufficient categorization and coding of the various factors relating to the design and delivery of a support features. This led to the need for an additional objective of this study, which is to provide a framework that guides the review of support features. The framework was used to organize the findings of support features in online and computerized anxiety and depression CBT interventions for adolescents and young adults. This can be modified based on additional emerging factors that reflect the needs of this particular population as well as the insight provided by researchers reporting on those interventions.

2.2 Literature Review Methodology

The scoping review methodology was chosen to guide the review of literature of computerized and online CBT interventions for adolescents and young adults focusing on the discussion of support features (17,18). A scoping review is a suitable methodology to deliver on the objectives of this research. Its broad focus serves the exploratory nature of the main

objective, especially in a landscape with a wide variability, such as the online mental health interventions field. This will answer the main research question, which is discussed in the following section. Scoping reviews also allow for a post hoc approach to the inclusion and exclusion criteria, further serving the exploratory nature of this research. Another important factor that informed the adoption of a scoping review methodology is the ability to incorporate the input of professionals from the field to both inform and validate the findings and their relevance to professionals for whom the findings of this research project would be of most interest. To provide more methodological integrity to this scoping review, I employed the Arksey and O'Malley methodological framework, and supplements to the framework provided by Levac et al. (17,18). This framework divides the process of a scoping review into six major stages: Identifying the research question; identifying relevant studies; study selection; charting the data, collating, summarizing and reporting the results; and consultation with key informants. The latter was employed to expand on the findings of the literature review. The following section details the process undertaken for each step, while Table (1), page 34, presents a summary of the results from each of the six steps.

2.2.1 Stage One: Identifying the research question

As mentioned earlier, the objective of this study is to provide a framework that informs developers of online and computerized CBT interventions about different approaches to incorporating support features in their interventions, including factors to consider in choosing them. This study will also provide a framework for researchers attempting to study the impact of individual elements of support features on outcomes and adherence.

The methodological framework guiding this research recommends that the research question should be broad enough to include a wide range of relevant articles related to the study aim (17,18). The research question guiding this review is: 'What are the support features that are available to provide support for Internet and computerized CBT interventions for youth? And what are the factors influencing the design of such features?

2.2.2 Stage Two: Identifying relevant studies

The identification of relevant studies required a definition of the databases utilized to locate the articles, an appropriate and relevant timeframe, a language for the publications reviewed and a definition of the researched population in the articles. The search terms and strategy were also outlined in this stage.

For databases, Medline and PsychINFO databases were reviewed, to include perspectives from different disciplines.

Timeframe and language of articles were decided as follows:

In their review of the literature on e-Mental health, conducted in 2014, Lal and Adair (48) found that, of all the reviewed articles published between 2000 and 2010, 79% were published between 2007 and 2010. Thus, I decided that a time frame between January 2000 and June 2016 would be an appropriate compromise given my time and resource limitations and to allow for the inclusion of a suitable number of articles. The literature search was limited to articles in English.

With respect to populations researched in the included articles, the age group to be included are youths between the age of 12-25 years old. This includes both the age groups of adolescents and young college students, as there tends to be some overlap in the studies evaluating both age groups.(49) Articles focusing on children were excluded, as related

interventions seem to be handled in a different manner (50,51). These interventions also typically involved support from parents,(52) warranting a different evaluation approach.

Search Strategy: To generate the search strategy, an initial general search using Google Scholar was conducted to locate articles about online and computerized CBT for adolescents and young adults. A list was compiled of relevant key terms. Pubmed subject headings were reviewed to identify subject headings that correspond to those identified in the research question.

Subject headings and key terms were utilized to search MEDLINE and PsychINFO. The search terms were a combination of diagnosis terms, intervention terms, and technology terms. Limits were applied, corresponding to the age groups of adolescents and young adults (12-24 years in MEDLINE, and 12-29 years in Psychinfo) and the time period was January 2000 to June 2016, as mentioned earlier.

The diagnosis terms were combined with an 'or' modifier and were as follows (includes subject headings and search terms): anxiety, anxiety disorders, performance anxiety, depression, depressive disorder, child and adolescent anxiety, adolescent anxiety, childhood depression, adolescent depression, phobic disorder, specific phobia, panic disorder, agoraphobia, panic, social anxiety disorder.

The intervention terms were guided by the focus of the research question on CBT and were as follows: cognitive therapy, cognitive behavioural therapy, CBT, cognitive behav*.

Finally, the technology terms included were chosen to be as broad as possible to account for the different devices utilized for the intervention or the support and were as follows: online systems, online, Internet, computers, computer*, computer-mediated communication, user-computer interface, communication, computer communication networks, computer-assisted

instructions, computer-mediated communication, e-mail, electronic mail, (diagnosis, computer-assisted), computer-assisted, telepsychology, video games, telephone, communications media, telemedicine, ehealth, telehealth, telepsychiatry, e-mental health, mobile applications, mobile, mobile phone, cell phone, mobile devices, cellular phones, app*, medical informatics, e-health applications, delivery of health care, medical informatics applications, telemental health, cCBT, Computer-aided psychotherapy, social networking, computer-based treatment, electronic communication, social media, online social networks, computer peripheral devices, messages.

2.2.3 Stage Three: Selecting the studies

Starting with a relatively broad question would generate a lot of articles to review. To help manage this issue Levac et al. (18) suggest utilizing the purpose of the study and the envisioned final result to provide a focus while choosing articles to be included. In a scoping review, it is suggested to limit the initial exclusion criteria to have a broad picture of the subject being studied.(17,18) But the scoping review framework includes another layer of post hoc inclusion and exclusion criteria that is created after the initial scan of the topic's related articles.(17) This post hoc approach was of benefit to me as a new researcher in the field since I needed the initial scan of the literature to include relevant studies. My final inclusion and exclusion criteria utilized were as follows:

- *Inclusion criteria*

  Selection criteria were the following:

  1. Interventions provided through a computerized device or the Internet.
  2. Interventions used in the context of prevention, promotion, or treatment.

3. Interventions designed for depression, depressive symptoms, generalized anxiety, social anxiety, and specific phobias.
4. Tools designed specifically for patient/consumer use, with care provider having a guiding or supporting role.
5. Studies focusing on the included youth population between the ages of 12 to 25, or a subgroup of this age range.
6. Tools based on Cognitive Behavioural Therapy (CBT).

- *Exclusion criteria*

On the other hand, the exclusion of articles was based on the following criteria:

1. Articles in which the intervention is predominantly therapist delivered. In these interventions, the online component is augmenting therapy provided by the therapist, as opposed to the focus of this review in which the focus is on self-help interventions in which the therapist's role would be entirely supportive.
2. Research focusing mainly on a population outside of the 12 to 25 age group.
3. Articles on interventions lacking any level of support.
4. Interventions specifically for Posttraumatic Stress Disorder (PTSD), and Obsessive Compulsive Disorder (OCD).

2.2.4 Stage Four: Charting the data

For the data charting stage, I extracted information from the articles and entered them into an MS Excel form. The extracted information consists of two groups that correspond to the level of analysis that will be conducted in the later stages of my research; general information and support-specific information.

- *General information group:*

The first information group provides a general view of the status of the literature covering computerized and Internet CBT for adolescents and young adults. This includes the following, corresponding to the elements identified by Arksey and O'Malley(17):

  - Authors, year of publication, study location;
  - Study population;
  - Focus of the intervention (prevention or treatment);
  - Aims of the study;
  - Methodology (identifying the type of the study and sample size);
  - Outcome measures;
  - Important results.

The above-mentioned items were easily identified as they were included in the standard sections of the articles. The focus of the intervention item was added as it was apparent that all studies were reporting on interventions that were either serving a preventive goal, or a more therapeutic goal for a population with an established diagnosis. The outcomes and important results items were written as summaries based on the descriptions provided in each study.

The information entered into a Microsoft Excel spread sheet was utilized to report the background information section of the results.

- *Support-specific information:*

The directed content analysis approach, as described by Hsieh and Shannon, was utilized to analyze the specific support content(53). Utilization of a content analysis strategy was especially important since the discussion of support features was not usually mentioned

separately in one section but was spread out in various sections of the articles. The directed approach was utilized since the review of current models and framework on support in behaviour change interventions resulted in a framework that could provide the categories needed to code and chart the content in the support discussion. The directed approach still allowed flexibility to generate additional categories and sub-categories based on the analysis of the text.(53)

Utilizing the directed content analysis approach, each article was reviewed and any mention of interaction with a user, human or automated interaction, was highlighted. The highlighted sections were further reviewed to isolate support that was part of the delivery of the intervention, and not communications that were part of an evaluation of an intervention; for example, communications with users regarding their attitudes on the interventions were excluded.

The isolated specific discussions about support were then coded, based on the factors of the framework that they fall under. If items identified did not seem to fit the categories identified in the framework, they were coded with a temporary label, and such items were evaluated at a following step. This helped to determine if they fitted within one of the categories in the framework, or if they would require being aggregated under a new category. The articles were reviewed again to ensure that no items were missed, or mislabelled in the first step, considering the updated categories and their definitions based on the evaluation of the first step.

The coded items were then entered in a Microsoft Excel spreadsheet, under columns of their corresponding category.

2.2.5 Stage Five: Collating, summarizing and reporting the results

The article review revealed that some articles were either part of a series reporting on the development of an intervention produced by a single team, or were various delivery formats of a single intervention by multiple teams. This observation led to the aggregation of the articles into groups of interventions, which helped provide a complete picture of a support feature that might not have been reported fully in one single article.

The general information group of items identified was used to provide a description of the environment of the interventions. Descriptive statistics were utilized to report on the distribution of: a) the countries the interventions were implemented in, b) depression and anxiety interventions, and c) prevention and treatment interventions. As the information presented was descriptive, no additional statistical software was utilized, and all analysis was conducted using the Excel sheets and manual calculations.

The findings generated in the second group, the support specific information, were organized under the updated framework, with discussion provided separately for each factor in the framework.

The framework was also utilized to provide a structured description of the support features for each of the identified interventions and each unique delivery method. Gaps were identified in the research reported, and additions to the framework were highlighted.

2.2.6 Stage Six: Consulting with key informants

Although labeled as the sixth stage, consultations with key informants overlapped with the previous two stages. These consultations were utilized as an opportunity to interview professionals from the field to update the design of the framework and expand on the content provided in the literature review. This expanded role of the consultation phase was also

encouraged by Levac et al. in their discussion of the consultation's role in methodology.(18) The following discussion outlines how the key informants were chosen, how ethical considerations were addressed, and how the interviews were conducted and analyzed.

- *Identifying the key informants*

Designing and implementing support features is a process that involves approaches informed by theories from both mental health and behavioural science, as well as information technology design. In many cases, the professionals involved in the design come with a perspective informed by their professional backgrounds, with a need to bridge the different approaches in the design process. The models informing the framework included in this study are informed by various models representing a spectrum of the backgrounds involved in the design of the online interventions. Thus, the validation of the framework, the additions informed by the scoping review, and the gaps in need of evaluation require the perspectives of professionals from the different backgrounds who are involved in the design of such applications. The key informants included a developer of online mental health interventions (Key Informant 1), a researcher informed on developments in the eMental health landscape in Canada (Key Informant 2), a mental health professional with knowledge of the practice policies related to the field (Key Informant 3), a frontline clinician working with adolescents and young adults (Key Informant 4), and a clinician interested in the development of an online mental health application (Key Informant 5).

Five semi-structured interviews were conducted with the above-mentioned professionals, all of whom are working in the field of child and adolescence mental health. The number is limited due to the focused purpose of this part of the sixth stage, and due to the limited resources imposed by the nature of this study (which was conducted by a single investigator). Recruitment

was conducted initially through contacts from the thesis supervisory committee, and through referrals from key informants participating in the research. Initial contact was by sending an email request to participate in the study. The sampling design was a convenience purposeful sampling technique (54) which satisfies the purpose of collating the accumulated emerging results.

- *Obtaining Ethical approval*

An application was made to McMaster's Research Ethics Board (MREB), and the necessary approval was obtained prior to the conduct of the key informant interviews. The interviews were deemed of low risk to key informants participating in the interviews and efforts were made to maintain confidentiality through all phases of the research project.

Conducting and analyzing the interviews:

In their discussion of the consultation phase Levac et al. recommend establishing a purpose for the interviews that uses the findings from stage five as a foundation for the consultation (18).

The interview guide developed for conducting the interviews aimed at exploring the thoughts and opinions of the key informants on each of the identified factors that made up the framework of the support features. The interviews also allowed for the exploration of additional factors and elements relevant to support features for adolescents and young adults that were not identified in the framework.

The interviews were conducted by the principal investigator (MZ), audio recorded and transcribed by MZ. Directed content analysis was utilized, and applied to the transcripts in a fashion similar to that described in the charting stage (53). For each interview transcript, quotes

were highlighted based on the categories included in the framework and quotes not fitting a specific category were given a temporary label, and then evaluated to determine if they fit under a larger category, or if a new category was needed.

Input from the interviews was utilized to update the framework, and to update the organization of the results of the scoping review in a way that reflects the new findings. Gaps between the key informants' input and the factors reported in the literature were also identified and outlined in the discussion of the findings.

Table 1: Summary of the scoping review stages

Scoping Review Stage	Main purpose	Outcomes/Comments
Stage one: Identifying the research question	Generating a research question that reflects the aims of the study	What are the support features available to provide support for Internet and computerized CBT interventions for youth? And what are the factors influencing the design of such features?
Stage two: Identifying relevant studies	Identifying the research strategy	• the databases: Medline, Psychinfo • Timeframe of the study: 2005-2016

		• Age groups: Adolescents and young adults (12 to 25 years old) • Details on Search terms, and research strategy
Stage three: Selecting the studies	Limiting the large number of results generated due to use of broad question by focusing the selection based on the objectives of the study.	Adhoc and posthoc, inclusion and exclusion criteria
Stage four: Charting the data	Reviewing the content of the articles, coding, and categorizing the content for further analysis	• Identifying and charting general information elements about each study. • Coding support elements in the articles using directed content analysis, utilizing a framework developed for this study
Stage five: Collating, summarizing and reporting the results	Utilizing the information identified in the charting stage and provide analysis,	Reporting and discussion on support features utilizing the structure of the updated

	reporting, and application of meaning to the results	framework to present the findings
Stage six: consultation with key informants and contrasting results with professional experience of key informants	Consulting with key informants to discuss preliminary findings, and expanding on the content identified in the literature review	Semi-structured interviews were conducted with five professionals from different backgrounds, and directed content analysis was utilized to report on the finding utilizing the study's framework

2.2.7 Designing the framework

Opting for a directed content analysis approach to conduct the data charting, as mentioned earlier, made it necessary to adopt a framework that would provide a basis for the review of both the content of the reviewed articles and interviews with the key informants. A review of the literature did not result in identifying a framework or model that focused on support features in online CBT interventions or a similar online therapy, but many of the reviewed frameworks and models contained components that were of relevance in understanding the components of a support intervention. Guided by the review of such frameworks and models, a framework on support features for online CBT interventions was created to guide the data charting for this research project. The following paragraph describes the process for creating the

framework, and the following chapter entitled ‘framework’ outlines the components of the framework and the rationale behind them.

The design of the framework started with Google Scholar, and a Medline search for models and methodology for online healthcare application design. This led to the identification of several models describing behavioural change through the use of online interventions and identifying design principles, and effective features. The articles were reviewed to identify the support process and factors perceived to be relevant to support were identified. An iterative process was utilized to organize the factors in a format that serves the purpose of the study. This resulted in grouping the factors based on their role in defining the role of support in the intervention, the delivery of the support interaction between the provider and the user, and finally, factors relating to the design of the support features itself.

3. Framework

As mentioned in the 'Methodology' chapter, a framework was needed to guide the data charting and the reporting of the study findings. Yet, a specific framework for support features in online CBT or similar mental health interventions was not identified. OCBTs are part of the larger field of online mental health and behaviour change interventions, and it was assumed that the major factors and dynamics described in established frameworks and models of this field would provide a starting point to guide the study of support features in OCBTs.

The first section in this chapter provides a summary of frameworks and models in the field that were reviewed to identify major factors to utilize in the charting and reporting. The section that follows details the Framework created with 8 identified components.

3.1 Summary of the Reviewed Frameworks and Models

The reviewed models and frameworks covered the design of online interventions from different perspectives. This included identifying the actors involved, the environment surrounding them, the aims and objectives of the design, and more specific considerations regarding the provision of support such as the relationship between the user and the provider and the media used to provide support.

The following table (Table 2) summarizes the frameworks and models included and the themes identified in them.

Table 2: Summary of studied frameworks and models

Author	Research, model, or framework	Summary
Morrison et al.(55)	What design features are used in effective e-health interventions? A review using techniques from Critical Interpretive Synthesis.	The review identified four core design features that possibly mediate the effect of the design on the outcome. A framework of e-health interventions delivered through the Internet was proposed as well.
Proudfoot et al.(56)	Establishing guidelines for executing and reporting Internet intervention research.	This study proposed a framework of guidelines to provide standards for the design and research reporting on Internet interventions.
Ritterband et al.(57)	A Behavior Change Model for Internet interventions.	Identifies the steps that an effective Internet intervention impacts to produce behavioural change.
Oinas-Kukkonen H, Harjumaa M.(58)	Persuasive System Design (PSD) model	Aims to understand how users are influenced by information technology, and proposes a design process for an effective persuasive

		system through computer mediated, or computer-human persuasion.
Mohr DC, Schuellr SM, Montague E, Burns MN, Rashidi P(59)	The Behavioral Intervention Technology model	A model that outlines the process of moving from the goal set for an online intervention to the outcome. This is done by breaking the process down into the aims, the intervention strategies, the elements used, the characteristics of the elements, and the workflow.
Mohr DC, Cuijpers P, Lehman K(60)	Supportive Accountability Model	A model that focuses on understanding support in online interventions. This model views the relationship between adherence, accountability, user motivation, and the communication media.
Newman et al.(8)	A review of technology-assisted self-help and minimal contact therapies for anxiety and depression: Is human contact necessary for therapeutic efficacy?	A categorization of online interventions based on the level of support provided.

3.2 A Framework Outlining Support in Online interventions

Informed by the reviewed frameworks and models which were mentioned in the previous section, a framework was created to guide the data charting from the scoping review and the key informant interview. When reviewing an intervention utilizing this framework the first item would be to determine the role that the support feature took within the larger online intervention. Then user and provider factors would be reviewed, focusing on how the intervention addressed those two key players. The next two factors in the framework focus on how support is delivered to the user, and what considerations the intervention took to address the relationship between the user and the provider. The three factors that follow will focus on the design process of the intervention reviewing the outline aim for the support feature, the strategy taken to realize the aims, and how the final feature took shape. The following discussion presents considerations for each factor.

1. Factor One: Support's role in the online intervention

The support process is one part of the larger online intervention, and the size of the role it takes depends on the extent to which the supportive interaction includes elements of therapeutic content as well. Newman et al. categorized online interventions based on the extent of support provided (face-to-face therapist contact in that case) into four categories (8). The first category is self-administered therapy, for which all the therapeutic input is done through the other components of the intervention, and any interaction is limited to beyond an initial assessment. The second category is predominantly self-help interventions. Such interventions are limited to 1.5 hours of therapist support, at most, throughout the length of the interventions, and are also limited to providing check-ins, assistance in the use of the self-help modules, and discussions at

the onset of the intervention regarding the therapeutic rationale. Minimal contact interventions, the third category, includes a more active involvement of a support provider, such as assisting the user with applying certain therapeutic techniques. This involves more time commitment and is more than the 1.5 hours committed in predominantly self-help interventions. The final category is therapist-administered therapies, which include regular delivery of face-to-face care, but also include self-help tools in a role to augment elements of care.

2. Factor Two: The user

The user of an online intervention is one of the major players to be considered when designing or evaluating any component of the intervention. Ritterband et al. focus on evaluating the user's characteristics as part of the evaluation of the steps involved in producing behaviour change by using an intervention (57). This model focused on seven areas of the user's characteristics to be studied that included the disease, demographics, traits, cognitive factors, beliefs and attitudes, physiological factors, and skills. Understanding user characteristics would help modify the intervention to better serve users with such characteristics. Such modifications include personalization and tailoring.

Personalization involves modifying the message to address the personal needs of the individual user. This includes for example a simple step such as addressing the user in first person, or more targeted effort such as providing a specific response to a problem she/he is facing. (57)

Tailoring is modifying the message to a specific population that shares a similar group of user characteristics (55). In the synthesis, the characteristics that were tailored were grouped into theoretical constructs, behavioural and demographic characteristics (55). Interventions that

utilized more than one variable in their tailoring were found to be associated with more effective interventions. Those three categories were observed to follow a hierarchy in their impact on effectiveness, with variables based on theoretical constructs having the largest effect on outcomes, followed by behaviour characteristics, and then demographic characteristics (55).

The supportive accountability model adds another user factor to be considered which is addressing the user's motivation level (60). Users are viewed as being at various points along a spectrum between users with high intrinsic motivation who find it easy to complete self-guided tasks with little need for support, and users with low levels of intrinsic motivation who require support and external motivation to complete a task. Intrinsic motivation has a more lasting impact, and support is seen as a tool to help the users move from reliance on extrinsic motivation to a state of higher intrinsic motivation. Thus, tailoring support needs to also include consideration of the users' level of motivation, and to increase the level of intrinsic motivation there is a need to provide the user with some flexibility in choosing the way tasks are completed or interaction is conducted.

3. Factor Three: The support provider

In their framework of guidelines for Internet intervention research, Proudfoot et al. identified two types of support providers as part of the major facets (necessary components) that are required to be defined for an Internet intervention (56). The framework also provided guidelines on how such facets should be reported. The first type of support is professional support, which is support provided by a health professional in the relevant field. This can include clinical psychologists, psychiatrists, primary care providers, or counsellors. In addition to

describing who is providing the support, the guideline requires a description of the type of assistance provided (56). The other type of support is described as "other support" which is a facet that includes support provided by people other than health professionals, such as a teacher, a technician or a research assistant. In addition to identifying the support provider, the 'other support' facet's guidelines suggest identifying the level of the support provided, for example one-on-one or group support, and the type of assistance provided. The guidelines include other elements regarding the timing and the medium which will be mentioned in other factors of the framework (56).

Automated support such as automatically generated messages or virtual guides can be considered a third type of support providers, since the user interacts with them and some sort of relationship is generated.

4. Factor Four: The delivery process

Factors to consider in the delivery process include the trigger to start the support process and the medium used to deliver the support message.

When evaluating the trigger for the supportive interaction the focus is on who, or in some cases what, started the supportive process. Support can be left to be initiated by the user on a need basis, for example when a user has a technical problem with using the intervention, or if she/he needs to clarify a certain point. Support can be initiated by the provider who might be delivering therapy, or promoting use, or responding to ongoing monitoring. Monitoring for certain criteria, such as a user scoring above a certain cut-off point on a risk assessment, can trigger the initiation of a supportive interaction by either the provider, or through an automated message. The interaction can also be triggered based on a pre-defined schedule either through automated messages or provider contact.

The communication medium to provide the support can vary between phone calls, mobile phone text messages, emails, or as prompts in the intervention itself either on the website or on the mobile phone. If more than one medium is used, a description of the communication strategy needs to be described to define the role of each medium (60).

5. Factor Five: Relationship

The therapeutic relationship is one of the most important factors in traditional face-to-face psychotherapies, and is viewed as an important factor in determining the outcomes of the therapy. The relationship between the patient and the therapist is expanded by having a third component which is the online intervention (51).

In their review of the therapeutic relationship in online mental health intervention, Cavanagh and Millings observed that the nature of the relationship varies, depending on the extent of the involvement of the therapist (51). In predominantly therapist-delivered interventions the relationship is found to be similar to that of face-to-face interaction, and the therapeutic relationship has a similar correlation with the outcomes (51).

For interventions with a more limited involvement of human support such as minimal contact interventions and predominantly self-help interventions, the supportive accountability model provides a better understanding of the factors at play in shaping the therapeutic relationship in such settings (60). Accountability to the coach is one of the components and it requires a sense of social presence, expectations to be well communicated by the user, and an element of performance monitoring, which also needs to be clarified to the user so it won't be perceived as intruding (60). The next factor would be perceived legitimacy of the coach (60). Legitimacy can be built into the intervention by demonstrating that the information is coming from a trustworthy source, such as an academic institution, and also demonstrating the expertise of the coach. The

coach and other team members involved in the communication should also be well introduced to the user through either a link on the website, or through an introductory message or conversation, as well as their signature on the messages (60).

The therapeutic relationship can also extend to interventions with no direct human support, such as pure self-help interventions (51). Such relationships can be maintained by paying attention to factors such as consistent voice-over or avatar addressing the user, whom the user can relate to. Also responsive feedback can be used, even if automated, with such feedback containing positive statements that promote empathy, and a sense of hope and belief in recovery. The credibility of the relationship can also be maintained by including scientific evidence and user testimonials (60).

6. Factor Six: Support Aim

The first step in designing or evaluating the intervention as a whole, or a component of the intervention, such as a support feature, is to understand the intention of the designers of the intervention and the goals they aimed to achieve by creating the intervention or the feature (59). Support feature aims can be grouped into two larger categories: Therapeutic or clinical aims, and usage or adherence aims. Therapeutic aims aim at delivering specific components of the therapy, for which the measured outcome would be symptom improvement for example, or a change of behaviour. Usage aims are more focused on supporting and enhancing uptake and maintaining use by the user (59).

7. Factor Seven: Support strategy

To start implementing the aims, clinical or usage, strategies must be first identified to map out how to conceptually achieve the aims (59).

Education is on example of a behaviour change strategy used to achieve a clinical or usage aim. The provider can focus on educating the user on the disorder they are dealing with, discussing their current and past states, and intended future state (59). When applied to usage aim, the education can focus on helping the user utilize different features in the intervention (59).

Goal setting is another relevant strategy that can be either applied to set clinical goals, such as behaviour scheduling and exposure, or can be applied to usage goals such as frequency of use or assignment completion (59).

Support can also employ monitoring and feedback strategies. The provider, or sometimes an automated support feature, can monitor recordings by the user regarding the progress of activities related to previously set goals, or monitor access to modules and progress through the online content. Based on monitoring, the human or automated supporter can provide feedback regarding the tasks that the user completed, feedback to a user's homework assignment, or results of a screener. As with other strategies, feedback can also be used for usage aims such as feedback regarding progress in the modules included in an intervention, or completion of homework assignments (59).

Motivation can be a strategy that can be employed by itself or in combination with feedback to encourage the user to increase usage of the intervention, or attain therapy goals. Motivation can take many shapes such as positive reinforcements, behavioral contracts, and social support (59).

Depending on the aims and the other factors at play in an intervention, the strategies chosen and the combination of strategies can vary beyond the few examples mentioned above.

8. Factor Eight: The support feature

The support feature is the result of the design process, and its final shape reflects the aims and strategies chosen by the design team. It is also shapes and is shaped by the interactions between the user, the provider and the delivery medium.

3.3 Summary

Figure 1 describes the design process taken in creating this framework. This includes the frameworks and models that were consulted, and the factors identified as the guiding points for data charting and reporting on the findings, which will be presented in the results and discussion chapters.

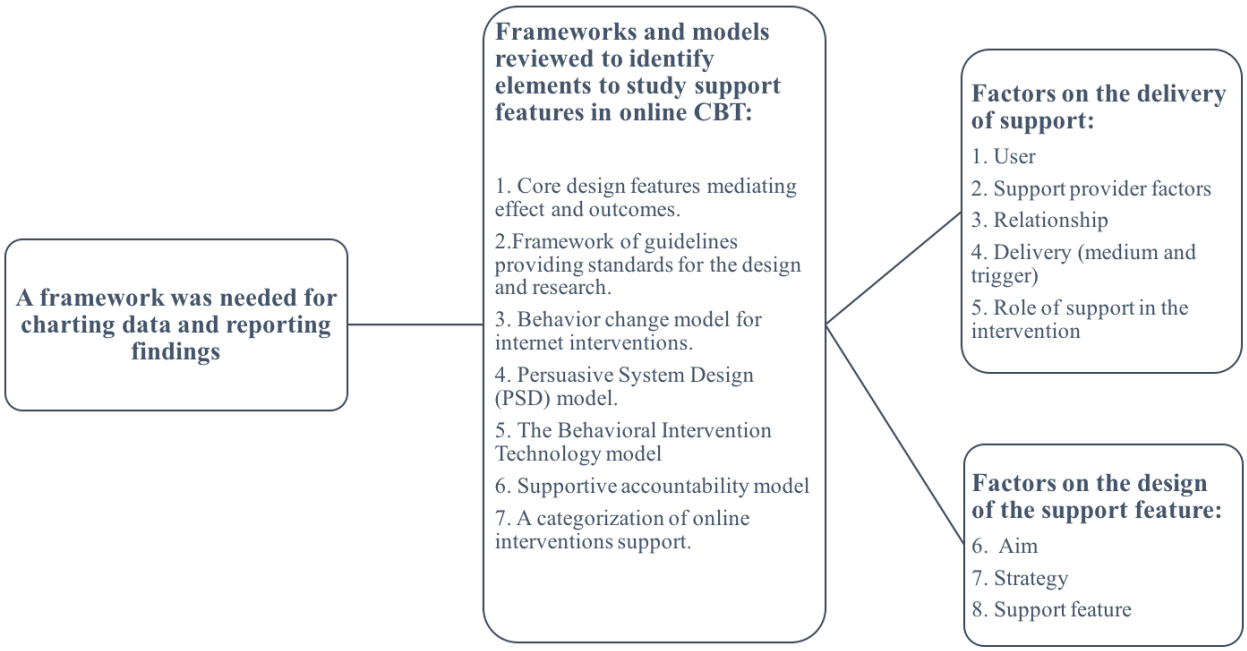

Figure 1: Framework design approach

4. Results and Discussion

As outlined in the methodology chapter, the results are presented in two parts. The first part presents general characteristics of the reviewed articles to offer context for the findings in the second part. The second part includes the results of the review in light of the framework factors and is also supplemented with findings from the key informant interviews.

4.1 Study Selection

The PRISMA flow diagram in Figure 2 outlines the process of the review of citations in these studies; identifying the number of citations identified, and the number of citations excluded, as well as the reasons for the exclusion (61).

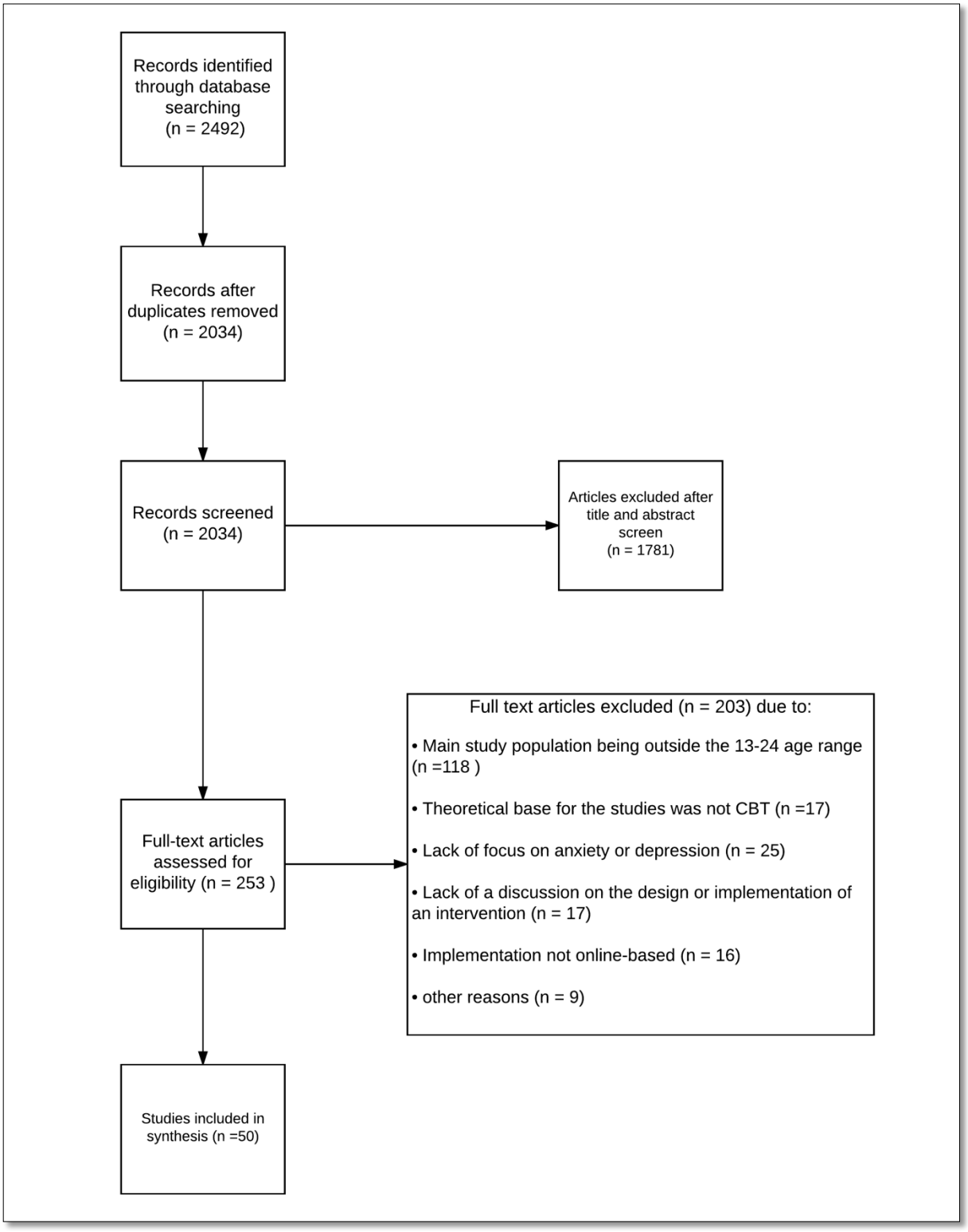

Figure 2: PRISMA flow diagram of citation review process. Modified from Moher et al. (61)

4.2 General Results Findings

The general characteristics identified in the final 50 papers included the countries the studies were conducted in, publication years, target population, target population, whether the aim was prevention or therapeutic, the methodologies, aims of the studies, outcome measures, and summaries of the outcomes. The following sections provide a summary of some of the main outcomes.

4.2.1 Countries

As outlined in Table 3 the studies included in this review were conducted in 10 different countries. Australia provided almost one third of the studies, followed by the United States of America (USA), the United Kingdom (UK), and New Zealand.

Table 3: Country distribution of reviewed studies

#	Country	References	Number of articles
1	Australia	(34, 55–69)	16
2	USA	(77–85)	9
3	New Zealand	(31, 79–83)	6
4	UK	(91–96)	6
5	Sweden	(97–99)	3
6	Ireland	(100–102)	3
7	Netherland	(103–105)	3
8	Canada	(106,107)	2
9	China (Hong Kong)	(108)	1
10	Norway	(109)	1

			Total 50

4.2.2 When were the studies completed

Figure 3 presents the number of studies conducted each year during the 2005-2016 range selected for this study. Please note that although 2005 was included in the study range, no studies were found for that year.

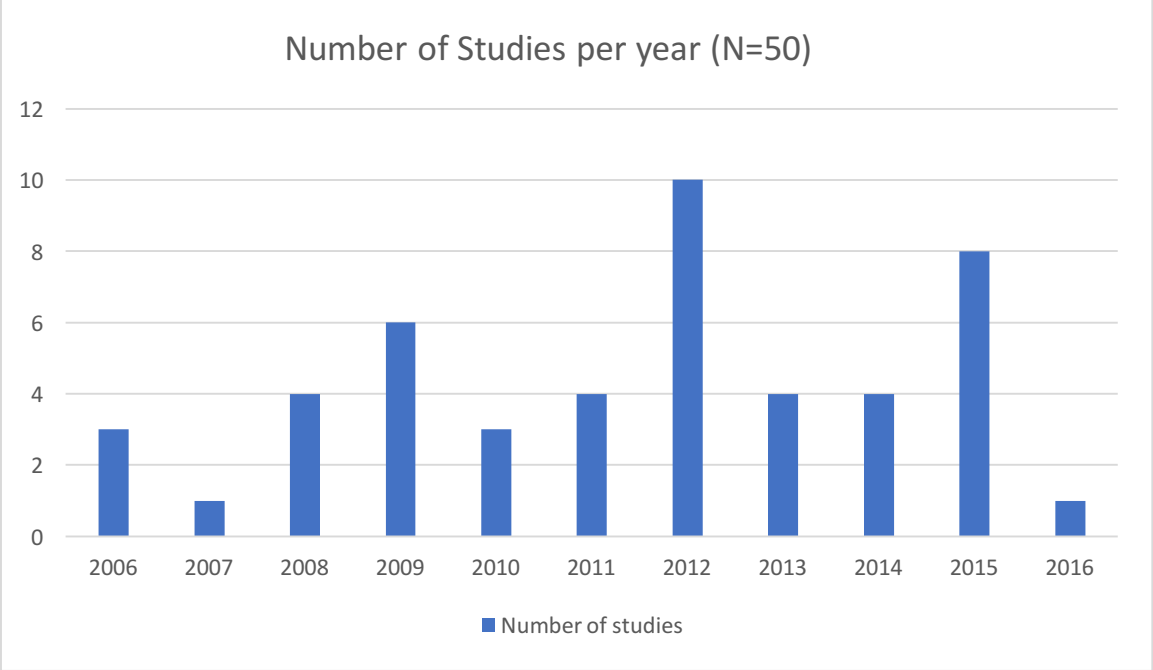

Figure 3: Number of reviewed studies per year (2006-2016)

4.2.3 Mental health problems addressed

Most of the included studies addressed depression and its related symptoms, and one fifth of the studies were designed to address both anxiety and depression symptoms. Table 4 provides a breakdown of the included studies by mental health problem addressed.

Table 4: Distribution of reviewed studies per addressed problem

Disorder Targeted	Number of articles
Anxiety (44,62–65,74–76,95,97–99)	12
Depression (41,66,68,73,74,77–83,86–90,93,94,96,100–105,108,109)	28
Combined (67,69–72,85,91,92,106,107)	10

4.2.4 Intervention aim

One group of studies involved interventions for participants with diagnoses of either anxiety or depression; these interventions were labeled as 'treatment interventions'. A second group of studies involved interventions to address symptoms of anxiety and depression with or without a clinical diagnosis (this comprised the largest group). A third group of studies had a more preventative and health promotion aim. A final group of studies assessed the diagnosis level but were oriented toward users who either satisfied the diagnosis or did not present a complaint of anxiety and depression symptoms. Table 5 summarizes the number of studies from each group.

Table 5: Distribution of the reviewed studies per intervention level

#	Intervention level	Number of articles
1	Treatment (44,62–65,71,72,74–76,85,91,96–99,102)	17
2	Symptom reduction (41,66–68,77–83,86–89,93–95,100,101,103–108)	26
3	Health Promotion/ Prevention (69,73,84,90)	4
4	Both (70,92,109)	3

4.2.5 Study designs

21 articles involved Randomized Controlled Trial (RCT) study designs, the most commonly reported design in the 50 included articles. The remaining 29 articles ranged from case studies to controlled trials.

4.3 Results and Discussion of the Framework Factors

The following sections present findings of the data charting steps from both the articles in the scoping review and from an analysis of the interview transcripts with the key informants. The information is presented in two parts; first, the more quantitative results (for example the proportion of interventions provided by a therapist as opposed to interventions provided by a non-therapist). Second, a discussion informed by both the details from within the relevant interventions and the insights provided by the key informant interviews. Note that articles that were part of a series of articles on the development of one intervention, or that detailed a distinct implementation of an intervention, were grouped together and the charting of the support factors was based on data obtained from the group of articles. Additionally, articles delivering *MoodGYM* and *Beating the Blues* interventions were charted separately as articles varied in their approach to support delivery. These distinct groups will be referenced throughout the discussion that follows and Appendix 1 provides a listing of these distinct groups, as well as a summary of the support provided in the related intervention/implementation. Additionally, Table 6 on the following page, provides a high level overview (using letter codes) to summarize how each of the interventions included in the study addressed the factors of the framework (please

note that the table does not include all factors as their description was not suitable for the letter-code format).

Table 6: Coding of Framework factors in the interventions

#	Intervention	Category*	User factors*	Provider factors*	Support medium*	Aim*	Strategy*
1	*Beating the Blues-1* (100–102)	MC	P	MP	I	Th	Fe
2	*Beating the Blues-2* (96)	SA	None	NT	FtF	RM	Fe
3	*Beating the Blues-3* (85)	SA	None	NT	I	Ad	R
4	*BRAVE-Online* (44,74–76)	MC	P	MP	I, In, Ph	Ad, Th	Fe, M
5	*CATCH-IT* (78–83,108)	PS	P	MP	FtF, Ph	Ad	Fe, Fa
6	*Cool Teens* (62–65)	PS	P	MP	Ph	Ad, Th	Fe, M
7	*Feeling Better* (106,107)	PS	P, T	NT	I, Ph	Ad	En, M, Fe
8	*Master Your Mood* (104,105)	TA	P	MP	I, Txt	Ad, Th	M, Pe
9	*MEMO* (90)	SA	T	Au	Txt	Ad	M, R
10	*MoodGYM-1* (84)	SA	None	Au	I	Ad	R
11	*MoodGYM-2* (73)	PS	None	NT	FtF	Ad	Fa
12	*MoodGYM-3*(109)	SA	T	Au	I	Ad	Fe, R
13	*MoodGYM-4* (69,70)	PS	None	NT	FtF	Ad	En, M, Pr
14	*MoodGYM-5* (71)	MC	P, T	MP	FtF	Ad	En, M, Pr
15	*MoodGYM-6* (72)	MC	P, T	MP	FtF	Ad	Fa, Pr
16	*Reframe it* (66)	PS	P, T	NT, MP	FtF, In	Ad, RM	Fa, Fe, M
17	*SPARX* (41,86–89,103)	SA	P	Au	In	Ad, RM	Ed, Fe, M
18	*StressBusters*(93,94)	SA	None	Au	In	Ad	Ed
19	*Think, Feel, Do* (91,92)	MC	P, T	NT	FtF	Ad	Ed, Fa, Pr
20	*The Mood Mechanic* (67)	PS	P, T	MP	I, Ph	Ad, Th	Ed, En, R, Pr
21	Anxiety and Insomnia	SA	None	Au	I, Txt	Ad	En, R

	intervention for University students (95)						
22	Pure self help Depression Intervention (Oregon, USA) (77)	SA	T	Au	In	Ad	En, Fe
23	*iTreAD* project (68)	PS	P	MP	In	Ad, RM	En, M, Fe, Pe
24	An ICBT for university students with social phobia and public speaking fears (97)	MC	T, P	MP	I	Ad	Ed, Fe, Pe, M
25	Individually tailored treatment for panic attacks (98)	MC	T	MP	I	Ad	Fe, M
25	Social anxiety treatment for high school students (99)	MC	P, T	MP	I, Ph	Ad	En R, Fe, M

* ***Categories****- SA: Self-administered; PS: predominantly self-help; MC: Minimal contact; TA: Therapist Administered/* ***User factors:*** *P: utilized personalization; T: utilized tailoring/* ***Provider factor-*** *MP: Mental health professional; NT: Non-therapist; Au: Automated/* ***Medium-*** *I: Internet; FtF: Face-to-face; In: built into the intervention; Txt: mobile phone text messages; Ph: Phone calls/* ***Aims-*** *Ad: Adherence; Th: delivery of therapeutic content; RM: Risk mitigation/* ***Strategies-*** *En: Encouragement; R:Reminders; Fe: Feedback; M:Monitoring; Fa: Facilitation; Ed: Education; Pr: Problem-solving; Pe: Peer support.*

4.3.1 The role of support in the online intervention

a. Data coding

Utilizing Newman's categorization (8) outlined in the data charting framework, each intervention was assigned to one of the four categories (see Table 7). Note that none of the interventions fully fitted the definition of the therapist administered category, since the inclusion criteria excluded telemedicine interventions. However, one of the interventions was a chat group with full involvement of a therapist so it was placed in this category.

Table 7: Distribution of Interventions assigned to categories

#	Intervention Category	Number of assigned interventions
1	Self-administered interventions	10 (38.4%)
2	Predominantly self-help	8 (30.7%)
3	Minimal contact interventions	7 (26.9%)
4	Therapist administered (chat group)	1 (4%)
		Total: 26

b. Discussion

1) Self-administered interventions

Utilizing Newman's definition of self-administered interventions, ten interventions (35.7%) fell under the classification of self-administered therapies. Although no support provider was actively involved with support of the interventions in this category, the different interventions provided support in various automated modes of delivery. The following paragraphs provide examples of how that automated support took shape.

The various deliveries of the *StressBusters* program included a step at the end of each session during which the users were provided with customized handouts, including mood monitoring sheets, activity diaries, and fact sheets, to be reviewed by the user (93,94). An intervention developed by Clarke et al. also utilized a print medium for support, namely through the utilization of reminder postcards (77). The postcards were mailed to the users periodically with content aimed at promoting the use of the intervention, and reminding the user of the different functionalities available.

SPARX utilized its video game format to create a character that acted as a virtual guide for users through the various levels of the game (the therapy modules) (41,86–89,103). The guide addressed the user in first person, at the beginning and the end of each module. The contact helped provide context to the game activities that the user could go through, providing education and real life examples. The virtual guide asked the users questions to gauge their mood, and provided challenges and activities for users to implement after the session. This is the equivalent to homework tasks in the traditional delivery of this therapy (88).

In supporting the delivery of a commercially available intervention, Morris et al. opted to utilize weekly emails to the students which contained standardized text to encourage use and remind them of which module was set to be completed during that specific week (95).

MEMO is another intervention with self-help delivery which was fully delivered via text messages (90). Although no coach or therapist was involved in the composition of the messages, they were automatically delivered at fixed intervals. This intervention utilized video messages by celebrities to provide further encouragement for users to complete their homework.

MoodGYM is one of the more widely available interventions that different teams implemented and supported in various formats. One of the implementations was in a study by Guille et al. of the impact of *MoodGYM* on the prevention of suicidal ideation (84). Support was limited to emails promoting user access to the *MoodGYM* website to complete the modules (84). *MoodGYM* was also delivered in a self-help format to high school students in Norway (109), but the students also received weekly email reminders to encourage uptake and use of the intervention.

Beating the Blues has been utilized by different teams who incorporated varying levels of support to complement the self-help format of the software. One such delivery was used by

Richards et al. as part of a larger study that compared it to an intervention with a delivery that had a level of support that can be categorized more as a minimal contact intervention (100). In the fully self-help intervention the voice-over used in the intervention was the only support guiding the user, and no additional support was utilized to deliver support or encourage adherence. A delivery that can also be considered self-help is the delivery of *Beating the Blues* to support college students in the United States. (85) Utilization of the intervention was supported by weekly emails to remind the students to access the website.

2) Predominantly self-help

Predominantly self-help interventions accounted for about 31% of the interventions reviewed. As described in the framework, a predominantly self-help intervention has some level of human support which does not exceed 1.5 hours in total, and the support is limited to check-ins, assisting with the use of the self-help modules, and an interaction at the onset of the intervention regarding its therapeutic rationale (8).

Interventions included in the review utilized the limited support provided in predominantly self-help interventions in a variety of ways. Additional support in the *Reframe it* intervention took the form of communication with a therapist through a built-in message board and face-to-face check-ins from wellness staff in the user's school (66). Although the students navigated through the material on their own, the wellness staff provider addressed technical issues, and conducted weekly screeners to monitor for suicidal risk. A clinical psychologist reviewed the message board on a daily basis, and sent back messages with replies to inquiries, and feedback on progress using a standardized template (66).

Another method that enabled the delivery of limited support and fell in the predominantly self-help category utilized a social network setting (68). The *iTreAD* project utilized a social

network platform. The social network was moderated by support staff who were on hand 12 hours a day to ensure appropriate use, encourage participation, and address any posts that might be associated with risk towards the user or towards other users.

To deliver weekly check-ins the *Mood Mechanic* intervention utilized a combination of communication media (67). A therapist conducted a weekly phone call that was limited to providing encouragement and supporting use, with no therapeutic content delivered. Weekly automated emails were also sent to users to provide a summary of the content of previous lessons and to serve as a reminder to access newly available modules. Users of the intervention were also given the option to receive text messages that were delivered three times a week to encourage use, and to practice skills. A choice of medium was also provided for users of the *Feeling Better* intervention, with users given the choice of receiving the weekly check-in by phone or email (107). Lasting up to 20 minutes, the phone calls were provided by student coaches and were limited to providing user support and encouraging uptake with no additional therapeutic content.

The *CATCH-IT* intervention involved a motivational interview with a primary care provider at its onset to engage the user by identifying internal motivators for utilizing the intervention (80).

While a teacher was on hand during an in-school implementation of *MoodGYM* reported by O'Kearney et al. (66), the teacher's involvement was limited so the content of the support would warrant it to be classified as a predominantly self-help intervention. This allowed the teacher to respond only to issues relating to the student's use of the intervention and did not provide any therapeutic input (73). Another school-based implementation by Neil et al. also had a similar role for the teacher and thus was classified as predominantly self-help (69).

In an implementation of the *Beating the Blues* intervention in a UK (United Kingdom) university, the students accessed the intervention on designated computers on campus. Support staff took a more administrative role in helping schedule the sessions, as well as introducing users to the program and addressing technical issues. Access to a counsellor was available if requested but was not part of the main delivery of *Beating the Blues* (96).

3) Minimal contact interventions

Minimal contact interventions include a more active involvement of a support provider, such as assisting the user with applying certain therapeutic techniques. This involves more time commitment and is more than the 1.5 hours committed in predominantly self-help interventions (8). *Think Feel Do* (91) is designed specifically to be facilitated by a professional such as a teacher or a nurse supporting the young person. Such a design requires closer involvement from the supporting professional. Although requiring more involvement from support providers, this added support did not include therapeutic content delivery, which resulted in *Think Feel Do* being classified as a minimal contact intervention. Although a clinical psychologist was available in the *MoodGYM* implementation described by Sethi(71), the involvement of the psychologist was considered to not include the delivery of support, and was limited to encouragement and supervision.

Tillfors et al.(97) delivered an intervention for university students with social phobia that involved support from a therapist via email. The users completed the therapy modules online and the therapist's role was to provide individualized feedback to the users' weekly homework submissions and inquiries. The therapist also notified the user of the availability of a new module to complete once the therapist ensured the successful completion of the preceding module. Johnston et al. (67) also utilized support through weekly emails, with a therapist providing

weekly feedback and responses to user inquiries, although the therapy delivery was mainly through the online component. The intervention by Johnston et al (67) also had an initial face-to-face interview that informed the tailoring of the modules that the user accessed throughout the intervention.

In evaluating the impact of therapist involvement in the delivery of *Beating the Blues*, Richards et al (93) opted for delivering the content via email messages sent out by the therapist, which was compared to self-help delivery discussed earlier (100). The therapist utilized a template to email the weekly content, but was also able to write additional text when responding to user inquiries in weekly email messages (100).

BRAVE-Online was delivered in a way that fits the criteria for minimal contact therapy (74). The intervention involved an initial introductory phone call with a coach (a therapist). Further contact was through weekly check-in emails, and a 15-minute phone call which was part of the delivery of one of the modules (74). The *Cool Teens* program was also a program that was designed with a defined role for the therapist, who contacted the user and their parents via check-in phone calls. These were reported in an RCT to be 3 hours of therapist time per family.(62)

4) Therapist administered

Master Your Mood fulfilled the inclusion criteria in this study because of its full online delivery, but because of it is unique format of an interactive online support chat, it did not fit with the previous three categories, and thus warrants a separate discussion.(105) Although a therapist is actively involved throughout the weekly chat sessions introducing the CBT module content and moderating a chat discussion, Newman's definition of a therapist-administered intervention is that of an intervention that is delivered in a traditional face-to-face format. Any online component is only an adjuvant supporting traditional therapy, which is not the case in

Master Your Mood (8,105). Text delivery of the content did not qualify *Master Your Mood* to be a traditional telemedicine session so it was not excluded from this review.

4.3.2 User factors

a. Data Charting

When reviewing user factors, the focus was on how the interventions delivered features or modifications to the content to serve the various characteristics of the users. As mentioned previously, the main categories of modifications in this framework are Personalization and Tailoring. Table 8 lists the number of interventions that provided or did not provide personalization and tailoring.

Table 8: Personalization or tailoring in the support feature

Presence of personalization or tailoring in the support feature	Number of intervention
Yes	18 (69.2%)
No	8 (30.8%)
	Total 26

b. Discussion

The first level of analysis was to identify intervention efforts that provided personalization and tailoring. Interventions with no tailoring and personalization included all interventions that fell under the pure self-help category, which is expected from interventions with no planned external support. Eight of the 26 identified interventions either did not involve

personalization or tailoring efforts, or the articles reporting on them did not include enough information to include them in these categories.

The 18 interventions that involved personalization and tailoring adopted various methods to do so, with the medium utilized to deliver the support influencing how personalization and tailoring were delivered. As would be expected, interventions with face-to-face support (62,66) and telephone support (67,69,83,91,96) were included in this group as they involved a direct conversation between the support provider and the user of the intervention, although not every article provided details of how the supportive interaction was delivered. Although some interventions were classified as pure self-help, any attempt to address the user directly can be seen as personalization. An example of such direct addressing is *SPARX* (41). Here, the user could create her/his own personalized avatar, and during the beginning and end of every level (module), a virtual guide addresses the user, asking questions and providing replies based on the user's choice from a multiple-choice reply. Even without a virtual guide, self-help interventions utilized automated personalized responses, or recommendations based on the user's input (77,109).

A few interventions allowed input from the user regarding preferences in the delivery of the support, or how they would be represented in the intervention. In the *iTreAD* project, which involved a social media component, the users set up their own profile, and were able to create their own posts to share with others in the network (68). Considerations of user choice also extended to the content of the intervention, as in the case of the intervention reported by Silfvernagel (98). In this intervention, the user participated in an interview at the onset of the intervention that provided an assessment of her/his current symptoms, and in the same interview they were presented with available CBT modules. After a discussion with the therapist a

decision was made about the modules to be used during the intervention. Some optional modules were tailored to the users' gender, such as the *Feeling better* intervention which provided an additional module for female participants (107). The *Feeling better* intervention (107) also provided users with a choice of communication medium for receiving support, while the *Mood Mechanic* intervention (67) also provided its users with a choice of the preferred medium for receiving reminders.

The last group of tailored and personalized interventions are interventions where content was modified to respond to the needs of a user or a group of users. Such modifications were either automatic, based on built-in criteria, or the support provider had the option to modify the message. In addition to the involvement of school staff in supporting the use of the *Reframe it* intervention,(66) users were able to send an unscheduled message to a clinician via an integrated message board. The clinician was able to send personalized feedback to user questions or concerns as they came up. Other personalization of the intervention was in a more structured format, as part of a weekly communication that included feedback to user progress in the intervention and homework submissions (74,97,98,100). Automated responses were involved in tailoring the message, based on user demographic characteristics and symptom changes (90,109). When the topic of user considerations was brought up in the interviews with key informants, the focus of the discussion was on issues related to the user's diagnosis and the severity of the mental health issue. It was important to keep in mind when designing the intervention that users of such interventions are along a spectrum regarding their need for information or therapy. This spectrum starts with individuals who are interested in learning more about their mental health, and trying to determine if they need some sort of assistance to address their mental health issues. This would put the interventions that they need in a health promotion category. Other tools

would be for clients who are already receiving in-person care, and the intervention would provide additional support. The final category is the one in which support is provided directly online. The severity of the user's anxiety or depression, and ethical responsibility of providing adequate care for such a user, would require closer involvement of a coach, who provides more personalized care for such users. The same key informant who mentioned the importance of a coach to provide check-ins, also emphasized that the decision regarding the extent and frequency of such check-ins should include input from the user.

4.3.3 Provider factors

In their framework of guidelines for Internet intervention research, Proudfoot et al. (56) identified two types of support providers as part of the major facets (necessary components) that are required for an Internet intervention. The framework also provided guidelines on how such facets should be reported. The first type of support is professional support; i.e. support provided by a health professional in the relevant field (56). This could include a clinical psychologist, psychiatrist, primary care provider, or counsellor. In addition to describing who is providing the support, the guidelines require a description of the type of assistance provided. Conversely "other support" is a facet that includes support provided by people other than health professionals, such as a teacher, technician or research assistant. In addition to identifying the support provider, the 'other support' facet's guidelines suggest identifying the level of the support provided; for example, one-on-one or group support, and the type of assistance provided. Guidelines included other elements regarding the timing and the medium in which support is provided.

Automated support such as automatically generated messages or virtual guides can be considered a third type of support provider, since the user interacts with them and some sort of relationship is generated. Table 9 shows how many interventions were supported by each of the three groups.

Table 9: Distribution of interventions per support provider type

Support provider type	Number of interventions
Support by a mental health professional	10
Support by a non-therapist supporter	8
Automated support (including virtual coach support)	9
	Total 27 (some interventions employed more than one type of support provider)

a. Mental health professional support

The nine interventions within this category had a therapist as the support provider, yet the role of the therapist varied between the interventions. For most of the interventions the role of the support provider was mainly to provide regular check-ins on a user. The purpose of these check-ins was to make sure the user was progressing well, and to provide motivation for continued use (62,67,74,97,98). In an intervention that included a homework element, the therapist also took on the role of providing feedback to the user's input (74).

In addition to a role in regular check-ins on progress, some interventions utilized more of the skill set of the therapist by having the therapist involved in an initial interview. For some, like the '*Mood Mechanic'* intervention, the interview was considered a diagnostic interview, and for others the interview was utilized to modify the intervention components to fit the user's needs (98). In interventions that involved interactions between users as the main mode of delivery or as a supportive component, the therapists acted as moderators and monitored any situations that that might present risk to the participants (68,105). Some interventions allowed therapists to provide therapeutic content in their interaction (67,100). The *BRAVE* intervention limited that to one session that was deemed to need therapist contact to support it. But in some interventions such as *Beating the Blues,* the content was delivered through email by the therapist (74).

b. Non-therapist support

The second group consists of support providers that are not considered therapists, and were not trained in CBT delivery. This includes professionals working in the health care field such as nurses and primary care physicians (not trained in CBT delivery), and non-health care workers such as trained support staff, and school teachers. As with interventions delivered by therapists the role of the support provider varied across the interventions. These interventions were specifically designed to be delivered by such support providers (91). Since these interventions were designed with their role in mind, the providers had a more structured role of discussing and elaborating on the content with the user, providing support and clarifications, and helping the user reflect on the material and apply it in their everyday life (91).

The *Reframe-it* intervention employed the support of both types of support providers (66). The bulk of the support was provided by a wellness staff member in the user's school. The

staff member was provided with a manual that outlined their role in the process. This included scheduling the users to user-designated computers for the study, providing technical support, and providing risk management by reviewing suicide screeners completed by the users. For issues that might arise during the intervention, the wellness staff were supported by a clinical psychologist who provided a second line of support.

The *CATCH-IT* intervention employed two support providers who had different roles in support delivery (78–83,108). The user's primary care provider conducted a motivational interview with the user at the onset of the intervention, to better understand the user's level of motivation in using the intervention, and provide additional encouragement and motivation to go through with the intervention. Later, the role of checking in and providing motivation was undertaken by social workers who conducted regularly scheduled phone calls. A few of the interventions utilized the support provider who was already available in the student's daily life, such as a teacher(66,70,73). The teacher's role was usually to supervise the user intervention in a school setting, and help with issues regarding the self-help intervention.

The *feeling better* intervention utilized student coaches to contact university student users on a weekly basis to provide encouragement for continued use (107); for other interventions the contacts were limited to providing users with emails reminding them to use the intervention (85).

c. No coach (automated) support

Of the interventions that had no human support, a few utilized a virtual therapist to deliver the support. For example, in the *SPARX* intervention the role of the virtual therapist was taken by a virtual coach to give the users context for the skills they learned while going through the game levels (CBT modules), suggest homework activities, and remind users of external resources in

cases they required additional help (41). Another variant was the *MEMO* intervention, in which celebrities delivered the messages (90).

d. Feedback from key informants

During the interviews, additional aspects were identified for support providers. One key informant identified the need to have a structure that outlines the support provision and interaction between the support providers. This key informant not only identified who would provide the support but also determined how the structure of the support was organized, and made plans of how and when to escalate issues to a second level support provider. An example of such a set-up is the *reframe it* intervention (66) which was dealing with suicide prevention. Here, a process was set up to refer the users to clinicians if the wellness staff, utilizing suicidal risk screeners, deemed that they required additional support.

Another consideration in the key informant interviews was addressing the practice requirements for the professional providers. An example is this quote by Key Informant 1:

> "How do you make sure you capture that? Number one in the record, and number two how do you make sure that remuneration, which is a big concern around physician time, is attended to as they respond to individuals digitally and electronically, so providers have been taking that on themselves without actually accounting for that time."

When discussing the roles of support providers, a key informant clarified a need to make a distinction in defining both therapeutic support roles and technical support roles. Assignment of the roles should take place early on and such sharing of the roles can result in having a

designated technical support team, or assigning the responsibilities of providing technical support to the team that is providing the therapeutic support.

The role a provider takes is also tied to the time they can schedule for it. Key Informant 2, a psychiatrist, noted that it is difficult for a psychiatrist to find time to provide direct support. Tasks such as regular check-ins and reminders were suggested for delegation to support staff. Another clinician, a clinical psychologist, also suggested that support staff should also take up the role of interacting with the user first to provide more timely answers, but still stated that it would be beneficial for the clinician to schedule daily time to interact with users of online interventions.

4.3.4 Relationship

The studies were reviewed for discussions that might be related to the therapeutic relationship using the themes outlined in the framework; these were mainly accountability and legitimacy factors. The following discussion is categorized into two sections. One section groups studies based on whether there was a support provider available for predominantly self-help and minimal contact interventions, and the other section includes the group of self-administered interventions. Each group would be expected to have a different support structure.

a. Predominantly self-help and minimal contact therapies

The *Think Feel Do* program supported the development of a therapeutic relationship between the therapist on one side, and the adolescent and her/his family on the other side, through an introduction (91). This included an introductory phone interview at the beginning of the therapy, and a page on the website that contained a picture of the therapist along with other information that provided credibility.

Some interventions fit the category of predominantly self-help and minimal contact therapy, based on the amount of support and the allocated time provided, but the therapeutic relationship can be seen as more relevant to predominantly therapist-delivered support since the support provider was available during the entire length of the session. In these settings, the provider was someone with whom the young person had regular interactions. For example, this could be a teacher or school counsellor, available in the same room where the user accessed the intervention (66,69,73). This setting could help to increase the accountability the user felt in accessing the intervention.

Having the transcripts of previous support available may have helped with the accountability the users felt towards the intervention, as the therapist and user referred to the transcripts during their next interaction. The use of the transcripts was utilized in the (solution integration intervention), as the therapist discussed user responses to the automated messages in the face-to-face therapy session that followed. In cases were a group setting was utilized to delivered support such as a chat group or a social network, a code of conduct was introduced to guide the relationship from the onset (105). An implementation of the *beating the blues* program in a higher education setting in the UK outlined some elements of what could be expected from the support process; for example, how users would be contacted if they missed a session (100).

b. Self-administered therapies

The *SPARX* program had an avatar acting as a guide for the user throughout the program, appearing consistently at the beginning and at the end of each module, and addressing the user in first person. The avatar responded to user answers and provided prompt feedback, as well as assigning tasks, and providing summaries about previous modules' content (41).

c. Feedback from the Key informants

Key Informant 2, a psychiatrist, viewed a single initial face-to-face meeting to be sufficient to establishing a therapeutic alliance, with regular and semi-regular contacts delivered through different media utilized to help solidify such an alliance. Establishing a therapeutic relationship is more important when providing credibility to motivate efforts and initial assessments than when someone is just conducting a triage with no continued involvement in the user's care. After establishing a relationship with a care provider, the credibility of the primary provider can be used to introduce other members of the care team. Such introductions, either in-person or virtual, would help extend team credibility, and thus establish a digital relationship.

Aside from efforts by the support providers to establish credibility, the intervention and its content also has a role in influencing its own credibility. Key Informant 1 believes this happens when the intervention becomes a 'go-to' resource for the user's mental health needs, and as a place that they access first, instead of heading to a search engine or another resource.

4.3.5 Support aims

The support aims identified in the reviewed articles corresponded with the two main categories identified in the BIT model, namely the support of, use, and delivery of therapeutic content. As outlined in Table 10, 23 of the interventions included a support feature that was designed to support use or increase adherence. Four support features had therapeutic delivery identified as one of the aims of that feature. Risk mitigation is a category of support that was identified in five of the depression and anxiety interventions, especially for risk of suicidal

behaviour and self-harm. Some interventions had more than one aim identified and thus the total of the interventions mentioned here exceeded 26.

Table 10: Distribution of interventions by support feature aim

Aim of the support feature	Number of Interventions
Improving Adherence	23
Delivering therapeutic content	4
Risk mitigation	5

Discussions in the articles did not elaborate much on decisions for choosing the support features, so most of the discussion that follows is focused on input from the key informants.

a. Improving adherence

Features aiming at increasing adherence to the intervention were seen as more than just reminders. Key Informant 1 felt that consideration of how relevant the content of the intervention is, and how up-to-date it is, should be considered first before thinking about using reminders to engage users and to support adherence. In addition to relevant content, users should be encouraged to transition from face-to-face interventions towards digital interventions. This includes marketing the intervention and motivating potential users to "want to use" instead of "having to use", by highlighting the benefits and adding some "flashiness" around digital interventions. "Presenting it to them more as product and less as a chore or a task to do". Adherence can also stem from supporting motivation through the use of the intervention, and success in helping patients to achieve therapy goals such as exercising or socializing.

b. Delivering therapeutic content

When the aim of the support is to expand the therapeutic content, Key Informant 2 emphasized a preference for more engaging media such as a phone call, or an in-person meeting.

c. Risk mitigation

Although not prominently presented in the interventions analyzed in the scoping review, key informants viewed risk mitigation as an important aim of providing support for users of online interventions. This is implemented by having a clear mechanism to support the users in case any crisis arises. Some key informants discussed the need for a daily check-in for some users to address issues relating to suicide prevention, including the capability to administer screening for self-harm, and to determine if the screening is positively triggering the initiation of some support interaction. Some key informants also mentioned the value of having a 'panic button,' which would be connected to the support provider, or other appropriate resources in cases when a patient is facing a crisis. The importance of setting up a clear strategy for crisis is seen as especially important in cases when youth are living in remote locations.

4.3.6 Support strategies

Strategies identified by charting the articles and from the key informant interviews are discussed separately in the following sections.

a. *Strategies identified in reviewed interventions*

Although some studies clearly articulated a support strategy, for most of the studies the strategy was identified from the context of the discussions or from key terms used in describing the intervention. Almost all interventions employed a blend of strategies in providing support.

Table 11 provides a summary of the strategies identified. The discussion that follows provides more details.

Table 11: Distribution of Intervention Support Strategies

Support Strategies	Number of Interventions Employing the Strategy
Encouragement	11
Reminders	6
Feedback	11
Monitoring	8
Facilitation	5
Education	5
Problem-solving	4
Peer support	3
	Total 26

The 11 interventions that discussed motivational use of rewards or encouragement were all coded under one group of strategies entitled *Encouragement*. In some cases, the encouragement to continue using the intervention was based upon the support provider providing positive feedback about progress in the intervention. An example is the phone calls provided during the *Mood Mechanic* intervention (67). Other interventions that did not provide

personalized feedback to users still provided messages of general encouragement through regular communications (77).

Providing users with *Reminders* to use the intervention was a strategy employed by 6 interventions. Such reminders were either scheduled at regular intervals to notify the users to access the intervention; or a new module for the week (84); or that a support provider has allowed the release of new module(s) (97).

Support functions that described the delivery of feedback regarding user progress, homework assignment or questions were entitled *Feedback*. This ranged from automated responses provided to user multiple choice answers to virtual guide questions, such as the *SPARX* intervention (86), to personalized feedback regarding the user's homework submissions (74).

A strategy related to feedback was *Monitoring*. This was mentioned in the design of 8 interventions either using the term monitoring itself, or the term supervision. Most of the interventions that involved monitoring needed the support provider available in person during the session (73). Others involved remote monitoring of the online utilization of the intervention, such as in *iTreAD,* where a support provider monitored interactions in a social network setting (68).

Although classified under a group of aims named 'support of use', some interventions discussed a strategy of helping a user to utilize specific features of the intervention or to respond to usage questions. Such strategies were grouped under a *Facilitation* strategy to distinguish them from 'support use'. Some of these interventions had a support provider, such a teacher, on hand while the young person used the intervention. These described the support that the teacher was providing as support of use, with clarifications regarding the use of the intervention but not

therapeutic content delivery (70). Similarly, such clarifications could be provided remotely such as via email or phone calls (107).

Five interventions identified *education* as one of the tasks assigned to the support provider. Education was mostly mentioned when describing delivery of information on CBT concepts, or regarding anxiety and depression. Such information was delivered either by a human support provider (97), or automated through a virtual guide (86), or through printed material (93).

A *problem-solving* strategy was utilized by interventions that had two usage aims: to respond to problems facing the user while utilizing the intervention, and in response to the user's application in her/his daily life.

Peer support was utilized as a strategy that utilized social network elements, or other modalities to allow a group interaction, such as a chat group message board.

b. Strategies identified by the key informants

Although the key informants did not touch upon all the strategies identified from the interventions, the interviews provided additional information and elaboration for the following strategies.

i. Reminders

When key informants discussed reminder strategies, a major consideration was the needs of the users

> "We did a recent application review with a youth group and one of the things they said is that they did not wanna get overwhelmed with the number of notifications that they were receiving because

> at times they are at a place where they can't receive so many things that they are supposed to be doing when realistically speaking they are not capable of doing that". (Key Informant 1)

They also clarified the need for reminders to be designed in a way that did not cause a reminder or alert overload that would alienate the user.

> "the notifications and the reminders tend to be more of the same, and when there's more of the same, you keep getting the same thing over and over again what you end up doing is you are alienating the user base and they'd end up saying, eh, I am tired of seeing this". (Key Informant 1)

User considerations also extend to planning the frequency and the medium of the reminders. Key Informant 2 discussed customization based on patient needs and preferences. Key Informant 2 envisioned that the frequency of the reminders would be discussed at the initial interview with the clinician, as well as few weeks into the therapy to make sure that the established reminder frequency is appropriate. A follow up discussion about the frequency of check-ins and reminders can happen later in the duration of the intervention over a text-based medium, and not necessarily face-to-face or by phone. Key Informant 3 emphasized a need for such reminders to be discrete and not too obvious, especially if they are sent as phone messages or app notifications, as the users may not be comfortable with people around them being aware of the content of the notification. When it comes to the preference for a medium for such notifications, a key informant who preferred face-to-face or voice-based support was more open to text-based media for reminders.

ii. Monitoring

The discussion of monitoring strategies with the key informants generated a list of different settings where monitoring can be applied. Monitoring can be seen first in the context of a support provider who is monitoring the user's utilization of the application to ensure that the appropriate level of care is provided. Second is monitoring if the user is accepting the online format of delivery in addition to receiving the appropriate level of care.

Monitoring has several aspects. The support provider who is monitoring tries to ensure that the appropriate level of care is provided, and if the users are adjusting successfully to the online format of delivery. Additionally, monitoring can focus on user safety and any risk factors that may arise, for which Key Informant 2 prefers a phone call or a face-to-face interaction. Monitoring is also seen as more focused towards progress through the CBT content, and adherence to the program. Monitoring was also used to review changes in the user's anxiety and depression symptoms.

iii. Motivation

Key Informant 1 considered motivation as a continuous process that is built into the intervention. This begins at the onset of the intervention where incentives should be provided and repercussions of the lack of adoption should be clarified. Catering to a specific user's motivation requires a level of personalization, and regular check-ins should occur every few weeks. The frequency of the check-in and the content of the check-in interaction can be automated, based on the severity of the case and its presentation.

iv. Goal-setting

Key Informant 2, a psychiatrist, indicated that the timing of goal setting should be at the first appointment, or an initial follow up, in a more face-to-face setting. In addition, key informants viewed goal-setting as a dynamic process beyond the initial goal-setting interaction.

An intervention that incorporates support for goal-setting should also allow the provider to review a user's updated goals, and communicate with the user about any updates to their goals. Goal setting with the user can be done by a therapist, mental health nurse or counsellor depending on their level of comfort with the patient and the use of CBT. The psychiatrist envisions a system in which the provider can review a user's updated goals, and communicate with the user about updates to these goals.

4.3.7 Support delivery (media and triggers):

a. The choice of medium in the interventions

Table 12 provides a summary of medium choices. The *Internet* (including email) was used by 13 interventions to deliver support. Most of the Internet interactions were through regular email contacts, but others included support through a chat group or a social network.

Face-to-face support was utilized by seven interventions. This was mostly for interventions in monitored settings, such as schools, during which a supporter, such as a teacher, was available on-hand to answer student questions.

For six interventions, the support was *built-in* to the website or the program itself. This included virtual guides such as avatars or voice-overs that guided the user through the program. Built in features also included journals, discussion groups, message boards, and chat functionalities.

Finally, *Mobile text messages* were used by 3 interventions for delivering reminder messages either on their own or in conjunction with other support functions. Some users used the messages interactively as they responded to automated or provider composed texts.

Table 12: Distribution of Intervention Mediums

Medium	Number of Interventions Utilizing the intervention
Internet (including email)	13
Face-to-face	7
Built-into the intervention	6
Mobile phone text messages	3
Phone	6

b. Triggers to initiate support in the interventions

Eleven of the interventions had a support structure that relied on the support provider to initiate the communication. Another nine interventions provided an opportunity that allowed either the users or the support providers to initiate contact. This grouping applies to the five interventions that had a support provider on hand during the delivery of the intervention. The remaining intervention contained only automated messages.

Most of the support delivery methods that were delivered by the support provider were check-in contacts, or reminders to motivate the user to use the intervention. The trigger for these contacts was to follow a predetermined contact schedule. But in some interventions that involved provider monitoring (e.g. the intervention that involved a social network setting), the trigger was the observation of a potential risky behaviour by the user, or in other cases changes in a user's assessment scores.

Automated contacts were also scheduled, mostly to remind users to use a weekly module, or complete a regular task. But some automated messages were generated by a computer program to provide feedback to a user's response or activity.

The only user initiated contact was in an intervention that allowed the user to post content to message boards or journals for sharing with support providers and other users.

c. Input from the key informants

The key informants identified the choice of a medium to deliver support as a major influencing factor related to the users and their needs. This includes considerations of where the user lives, especially if the user is in a more remote geographic location requiring a distant communication medium in place of face-to-face support. How the users employ a certain medium in their daily life was also identified as a factor to consider when choosing the medium. This involves considerations beyond just finding out if they have access to the medium or not. Key Informant 1 suggested that, even if a user has access to a medium, (e.g. SMS text messages), this might not be their medium of choice to support their mental health needs. The choice of medium must find a balance between addressing user needs and other more obvious delivery modes that can force the choice of a medium in a certain direction.

In deciding on user needs between session support, two patient choices have to be considered, as per Key Informant 4: The first is the patient's preference for the level of support; The second is the choice of asynchronous or synchronous mediums (e.g. email, as compared to voice).

Catering to user needs requires, from the perspective of Key Informant 1, having a user analysis for the most suitable medium for the target group, and involvement of the user base in the decision to make sure the decision caters to their needs. This support can be reinforced with

the use of a medium transition strategy, as described by Key Informant 1, which provides a process to graduate the user from one support delivery format to another instead of removing the traditional support delivery format without a replacement.

On the other side of the support process, provider-related considerations were brought up by the key informants as well when discussing the medium. Key Informant 2 suggested that some physicians might have reservations regarding texting or emailing using their own personal addresses.

> "Physicians avoid texting or emailing from their personal addresses in fear of being overwhelmed by the volume of the communication they receive. The task of communicating via text or email, would end up being delegated to nursing or reception staff. Also, the practice and the workflows are not set up for such types of support."

Sharing a preference as a psychiatrist interested in providing distant support, Key Informant 2 mentioned that, for a first session, face-to-face interaction is preferred. Although the psychiatrist stated a preference for continuation of face-to-face support or phone support throughout the intervention, he/she noted that this might not be possible based on feasibility, or patient preference, and thus other media could be employed. For communications that are more limited to reminding the client to use the intervention, the psychiatrist said that this could be done by text or email. However, it should be more integrated into the clinic's workflow, if the

patient is supported by a clinic, through integration with the EMR or the clinic's phone and scheduling system. Key Informant 3 noted that mental health providers found positive feedback regarding the use of texting to provide support.

Other considerations regarded the medium fulfilling legal and clinical requirements. Key Informant 5 noted that a major factor is ensuring that the medium is secure, and that user privacy is maintained. Key Informant 5 also stated a preference for a medium that allows for the observation of visual cues, as they are important for a clinical evaluation, and identification of risk factors that might be missed without a visual component. A support medium limited to the use of text needs to ensure that the provider is contacting the right client and not someone else who has obtained access to the user's phone.

When it comes to determining the frequency of contacts and triggers for the contacts, the key informants did not suggest a specific frequency or trigger. Key Informant 1 stated that, even if support was provided digitally and remotely, it should be set up similarly to when support is provided in a traditional care format. This includes giving the user the ability to contact the provider when needed, and providing a clear structure for scheduling appointments. Concerning the frequency of contacts with users, the key informants mentioned weekly contacts, but the frequency of the contacts was seen as something to be determined by user needs. All key informants reported that the support feature should allow the user to initiate contact when needed. This could be in the form of an 'emergency button' that can direct users to more immediate resources in case of crises, but also to contact the support provider. In addition to the support that involves back and forth communication between the support provider and the user,

the key informants saw a value for automated messages that are generated either to remind users to use the intervention, or are triggered based on user interaction with the intervention.

4.3.8 The support feature

The form that the support feature takes is influenced by a variety of interaction factors, among which are the factors identified in the framework discussed in this study. Informed by the findings from reviewing features in the study's published interventions, and the insights provided by the key informants, the following chapter presents the major forms of the support feature in a structure informed by those findings.

5. Discussion of Support Features

The various support features can be viewed as part of a tool kit that a team developing an intervention selects in order to include a feature that fits their intervention, but there is always the question of which feature(s) to choose?

This research does not claim to be able to create a model that explains how the support features interact with other elements of the interventions and the users. Neither does the methodology of this review evaluate the effectiveness of the various interventions in different settings. However, the sections that follow present potential support features for various situations. This presentation is informed by the experience and viewpoints presented by the reviewed literature and the key informant interviews. The structure is also based strictly on an understanding of these discussions, which have not been validated through experimental trials.

The following sections outline various considerations that influence the choice of a support feature and provide examples of support features that were observed in these settings.

5.1 Response to Constraints on Human Resources

Overcoming barriers that limit user access is one of the main advantages for online CBTs. But the barriers that constrain traditional delivery still exist in many CBT interventions. One of the main constraints is the availability of human support providers. The classification by Newman et al (8) that categorizes interventions based on the support provider's involvement can be seen as a response of the intervention design to such constraints. The designers of the interventions that were included in the scoping review utilized a range of features that corresponded with the availability of a support provider and the time commitment that the provider can afford. Although self-help features did not involve a human support provider, they

still incorporated a support element to complement the self-help approach. The following are the main categories and some examples of the support features for each category:

a. *Self-administered interventions*. This group of interventions did not have any human support provider allocated to support the users. Such interventions are designed to serve a large number of users, in cases for which the aim of the intervention is more promotional than providing therapy to a diagnosed group of patients. The support features utilized in this category included:

    i. Customized handouts that were printed out after each completion of a weekly module. The handouts provided information for the user regarding homework for the upcoming week, and feedback regarding responses from the user during the session.

    ii. Mailing postcards to the users reminding them to use the intervention; the postcards were also utilized to provide users with tips on using the intervention.

    iii. Mobile phone text messages were utilized to send out reminders to users to access a weekly module. The text in the interventions was standardized and not tailored for the different users.

    iv. Weekly email reminders. Like the text messages mentioned in this group the emails were standardized and not tailored to specific users.

    v. A virtual guide that is presented as an avatar or a voice-over guiding the user. In the *SPARX* intervention (86) the virtual guide addressed the user in first person using onscreen text, provided context to the intervention, asked the user multiple choice questions and provided user feedback. The

virtual guide also suggested homework tasks to be completed for the next module.

b. *Predominantly self-help*. With this group of interventions support provision involved a human support provider, although the time commitment per patient was rather limited (less than 1.5 hours per patient per intervention). The limited time commitment was reflected in the role assigned to the support providers, and the support feature they helped to implement. As the support role was limited, most of the interventions did not utilize a therapist or an individual with specialized CBT training. The following are some of the support provider features utilized by interventions in this category: provide check-ins on the users, assist the users in utilizing the self-help intervention, and interact with the users at the onset of the intervention to provide an introduction and orientation. To fulfill such roles this category of interventions utilized various communication features, such as the following:

   i. A message board; This allows interaction between user and support provider. The *Reframe it* intervention utilized this feature, with a clinical psychologist responding to user posts.
   ii. A social network setting; The *iTreAD* intervention was based on a social network (68), The social network was moderated by support providers who interacted with the users and monitored for any posts that would indicate a risk to a user composing the posting or to other users.
   iii. Weekly phone calls; to check in on the user, and respond to any technical inquires.

iv. Weekly summary and reminder emails

v. A motivational interview at the onset of the intervention; The team behind the *CATCH-IT* intervention conducted an RCT to compare the impact of brief advice to motivational interviews (78). Motivational interviewing was found to have a more positive effect and was chosen to engage the users at the onset of the intervention.

vi. School teachers, wellness staff and nurses supporting students while they utilized a self-help intervention in school.

c. Minimal contact therapy. This category of interventions involved more time commitment from the support provider; as such the roles were more expansive than predominantly self-help interventions. This group also included more interventions supported by therapists, resulting in an increased level of support provision. Features utilized included phone calls, emails, and face-to-face support.

d. Therapist administered. The *Master Your Mood* intervention did not use face-to-face sessions, but the support provider was available through a chat group that was attended by entire group of participants (104). The group chat format allowed for the inclusion of a larger number of young people in the same session, which made it a more affordable delivery format compared to one-on-one chat sessions.

5.2 Aims of the Intervention

The wider aim of the intervention in general (as opposed to the more focused aim of the support feature) can be seen as either providing a mental health promotion targeting a general

population that does not necessarily deal with a mental health disorder, or a more therapeutic role for a population dealing with either symptoms or diagnosis of anxiety and depression.

Support features incorporated with interventions that have mental health promotion and prevention aims involved limited or no human support. Such limited support is expected as such interventions are typically designed to serve a larger population compared to therapeutic intervention. Providing more human support in these situations can be unfeasible.

When targeting a population with an established diagnosis most interventions were supported by a therapist who provided regular check-ins and had a more involved role in customizing feedback for the homework assignments of the CBT modules.

5.3 Target Population Considerations

A recurring theme identified in the key informant consultation was the need to design the support feature in a way that is guided by the needs of the population being served. This includes designing for: the needs of the CBT for a specific diagnosis, the severity of the mental illness, and the sub-population of adolescents and young adults the intervention is serving. Although young people living with depression and anxiety are sometimes treated by trans-diagnostic interventions, the CBT module needs of each may require a different tool to support the delivery. For example, CBT for depression involves activity scheduling which adds a need for a strategy of monitoring to review the progress of the user with the specified activities (30). CBT for anxiety on the other hand includes an exposure hierarchy that requires a support design change to help ensure that it is delivered in an appropriate way (31). The designers of the *BRAVE-online* intervention opted to have the coach contact the user by phone during the week that the young person is receiving the exposure hierarchy module (75).

The severity of the diagnosis will also influence the level of support provided and the role of the support provider. For example, users with a diagnosis of depression and an increased risk of suicidal ideation and self-harm would need an additional aim for support delivery which is risk mitigation. This in turn would require strategies that involve monitoring, more frequent contacts, and (as a key informant noted) a medium such as video or even face-to-face interaction, to observe visual cues that would help in the assessment of the patient.

Adolescents and young adults are not a homogenous group, and the support features should reflect the needs of the sub-populations and the settings they exist in. An example is for school aged users where the monitored setting of the school can provide an opportunity to deliver the CBT intervention, along with a support feature available through a monitoring and facilitation strategy by the school staff.

5.4 Impacts of the Support Feature Aim on the Choice of Support Feature

Utilizing the BIT model (51) approach of identifying the aim, the strategies employed to achieve the aim, and the functionality employed to achieve the end results, resulted in the following observations.

a) Aiming at increasing adherence

Increasing adherence to the intervention was an aim that was either stated or inferred for most the support features in the reviewed interventions. For many interventions, this meant employing a strategy of providing reminders. The reminders were mostly timed on a weekly basis to encourage users to access a new module. Delivery of reminders was through various media such as email, mobile phone text messages, and even mailed post cards.

The strategy of monitoring was also employed in school implementations where students accessed the intervention in a setting monitored by a teacher or other support staff. The role

defined for the teachers included elements of strategies of motivation and facilitation, as the teachers were checking on student progress, addressing general enquiries, and helping them overcome technical challenges.

From the perspectives of key informants, the aim of increasing adherence required an effort wider than the development of a single support element. This included efforts to increase user motivation level to use the intervention, increasing the credibility of the intervention by making it a go to tool for that young person's mental health information, and 'marketing' the tool in a way that motivates the user to want to use it, as opposed to something they have to use. Additionally, some key informants had concerns about how useful reminders are in their traditional format on increasing adherence and if users might end up being overwhelmed by reminders.

b) Aiming to complement therapeutic content

For interventions with an aim of complementing the delivery of therapeutic content, different strategies such as feedback, education, goal setting, evaluation and monitoring have been employed.

Some of the strategies used were established as part of CBT intervention components, including education, goal setting and feedback. Delivering psychoeducation is usually the first module delivered in a CBT (110). Some interventions have opted to utilize interaction at the onset to deliver educational content. Homework is a key CBT component, and communication elements employed by the provider can give feedback to children about their homework submissions (111).

Monitoring as a strategy was seen to serve different purposes by the key informants. Monitoring can ensure that the user is receiving an appropriate level of care, that the young person is accepting the online format, that progress is being made through the CBT (the therapist acting as a gate-keeper for progress to other modules), and to monitor changes in symptoms.

Goal setting, another element necessary for CBT, is also a strategy that informs the development of the support elements. Key informants saw goal setting as a dynamic process that starts at the first appointment, and then depends on a back and forth process of monitoring and feedback between the support provider and the young person.

c) Aims to mitigate risk factors

Interventions that identified an aim of risk mitigation through the support feature provided the ability to the support provider to monitor the interaction of the users for any risky behaviours. Consultation with the key informants also identified a need for the support features to provide a sort of emergency button that a user could utilize to quickly connect to emergency services/ or other relevant services in case of a crisis such as high risk of suicidal behaviour. The key informants also identified a need for tracking and monitoring changes in user anxiety and depression scales that would trigger a contact by a support provider with a youth who displays signs of worsening control of anxiety or depression.

5.5 Responding to the Support Needs at Different Phases of the Intervention

Support is needed at different phases of the intervention, but the need varies as the intervention progresses. The initial interaction is a critical process in establishing a relationship between the user and the support provider. Interventions that provide support at onset utilized tools that required more support involvement than other phases of the intervention. This ranged from a motivational interview in the *CATCH-IT* intervention to an introductory phone call to the patient and their family in the *BRAVE* intervention. Key informants highlighted the importance of providing either face-to-face or phone call interaction at this step of the intervention, as it was seen to have a positive impact on creating a lasting relationship with the user and establishing credibility that extends to the intervention as a whole. As the intervention progresses, support can then become limited to check-in, with less utilization of therapist time.

6. Recommendations and Conclusions

6.1 Recommendations

This scoping review helped identify support features from interventions implemented in a variety of settings, and the framework that was used helped to provide a description of some of the factors at play in shaping those features. The tools that this methodology employed do not clearly establish cause and effect between different factors; neither do they validate the proposed interventions, which would require experimental trials. Nevertheless, based on the characteristics of the features, the input from the key informants who have experience working in the field, and the process of conducting this research, the following recommendations can be suggested.

1) Incorporating support features into OCBT design: Going beyond an all-or-none approach.

When it comes to support features it is tempting to view them as an additional feature that an implementation of the intervention can either afford to have or not have (especially if viewed as having a dedicated therapist guiding users and providing therapeutic input). But as the findings of this review showed, support features can come in a variety of forms that can serve different populations, and cater to varying levels of resources. Hence, it is important for teams designing OCBTs to dedicate effort and resources to find support features that create the right balance between needs and available resources.

2) Improving on reporting of support features: A need for an expanded framework and a clear model.

Given the growing attention to the impact of guidance in OCBT, the level of reporting on the support features seems to be insufficient in providing a clearer understanding of the role of support in delivery of OCBT. This study reported on 26 interventions, with findings that indicated support was inconsistent across the different interventions. This would make it difficult for researchers aiming to understand the role of specific elements in fulfilling the aims of improving adherence, for example. This lack of consistency may be due to a lack of a clear framework that outlines how reporting on support features should be conducted. Although this study created a framework to guide the coding of the data on support, the framework design was guided by a literature review of frameworks and models from different areas. The resulting finding is that a framework focused on support features in OCBT in general, and support features in OCBT for specific populations, such as adolescents and young adults, is needed.

3) Providing a support strategy: support is more than an individual feature

Based on the feedback of the key informants experienced in designing online interventions, and the complexity of some of the support features reviewed, it becomes clear that, for an online intervention to be effective, support must be more than just an automated reminder email added to an intervention. As mentioned in the earlier discussion, the need for different elements such as reminders, check-in phone calls, etc. varies throughout the duration of the intervention, and the division of the roles and tasks can vary between different support providers involved in the intervention. To manage these interactions efficiently a strategy needs to outline the uses assigned to each element, the roles fulfilled by the different

support providers and automated features, and how they evolve across the flow of the intervention.

4) Utilizing the support feature as a bridge from self-help towards community resources.

With a population such as adolescents that is less likely to seek out help, or to look for local resources and to be open to a self-help tool, a supported intervention can help bridge the gap between access to self-help resources and reaching out to community resources. This bridging can happen by tying OCBTs to supported local community services or even through brief directed messages. Otherwise, interventions can be provided in monitored settings, such as schools, which would provide opportunities to increase user comfort while accessing relevant content and other resources.

5) Utilizing a framework to help with data charting: feedback on experience with the scoping review methodology.

The scoping review methodology was of great value in this setting, as its flexibility allowed generating knowledge on a topic that has had a relatively limited amount of research and publication. But this flexibility also provides a challenge relating to organizing and directing the search for qualitative data elements to be charted. In cases such as support features in OCBT for adolescents and young adults, there are no readily available tools to guide the coding of the data and the development of a suitable framework. One suggestion would be to expand on the scoping review methodology presented by Arksey and O'Malley (17) and Levac et al.(18) by including a step that identifies or creates a framework to guide

the charting of the data, especially for relatively new fields that would benefit from this added structure.

6.2 Conclusions

This study explored how support is provided in OCBTs for anxiety and depression in adolescents and young adults, using a scoping review methodology as well as interviewing key informants. The scoping review resulted in identifying support features in 26 interventions that were discussed in articles in peer reviewed journals. Building upon the findings from the scoping review, five key informant interviews also provided considerations that are important from the perspectives of designers and providers of OCBT.

My review of literature identified a gap in the OCBT field regarding identifying and disseminating the types of support features for OCBTs for anxiety and depression. Studies of OCBT have been focused on identifying effectiveness, but only recently have there been efforts to identify the components of such interventions. The study was an effort to 'unpack' some of the features included in OCBTs, namely the support feature. Support was identified from different OCBTs that had a variety of aims and contexts. The framework that was designed for this thesis provided a further layer of description of the support features by identifying how they addressed different factors that were seen to make up or impact these features.

Adopting the methodology that was used in this study comes with its own limitations. A scoping review does not include a step of appraisal of quality as compared to systematic reviews or meta-analyses, and does not weigh the evidence between different interventions. The objective of this study was to present the available support features. The necessary next research step is to evaluate the evidence for each group of support features in order to provide designers with

recommendations for choosing the appropriate support features, taking into consideration the factors that shape the intervention.

Two of the main stakeholders of such interventions are IT professionals and frontline mental health providers. A small sample of these was consulted during this research effort. At the same time, a prominent group of stakeholders was not consulted; the young people who will utilize such tools. This exclusion was due to ethical considerations, as due to the limited resources available for this research a support plan and resources were not created should any of the participants become distressed because of the questions raised during the interview. A necessary step to provide additional validation or revisions of the findings is to conduct consultations with a representative sample of young end-users that are the subject of this research, while having a support structure in place. Another limitation for the consultation step is the limited number of key informants and the convenience sampling approach used to identify the participants. These limitations in the sample size and method do not allow for a conclusion that the findings from the key informant consultations necessarily extend to a consensus of the professional fields that they present. Rather, these consultations gathered the individual opinions of the participants based on their practical and educational experiences. It is recommended, for future research in this field, to consult with a larger sample of key informants and to adopt a more rigorous sampling methodology to ensure that the perspectives of all stakeholders are represented.

A validated framework based on more thorough consultations would provide a solid platform to move to a more advanced phase in research. Here, each factor or group of factors in the framework would be evaluated separately to evaluate its individual impact on the intervention in areas such effectiveness and adherence.

As a final thought, I would emphasize that this study was guided by the realization that receiving an online self-help intervention for anxiety and depression can be a difficult and isolating experience for an individual seeking help. This research should be seen as part of an approach to begin incorporating support in its various forms in online self-help interventions. This recognizes that the value of guidance and support provided can be established as an effective method in improving the effectiveness and uptake of online interventions. The findings of this study suggest that support can take many forms and that these can be utilized in various contexts such as different levels of resources and types of implementations. Future research is needed to evaluate these different types of support features, and to move towards utilizing more validated features that can have a positive impact on benefiting young users by making OCBT a more engaging experience.

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Appendix 1

Articles grouped into Intervention and Implementation groups.

	Intervention/ Implementation group	**Summary**
1-3	*Beating the Blues. Beating the Blues was utilized by a number of teams to deliver care to different populations, each with its own different approach to support delivery. The original intervention itself is an 8-session self-help treatment developed in the UK, and is approved by the UK's NICE for the treatment of mild to moderate depression. The sessions required 50-minutes to complete and included CBT strategies of cognitive restructuring, behavioural activation, exposure for anxiety, sleep management, problem solving, and concluded with action planning and relapse prevention strategies. The modules included animation, motivational voice-overs, interactive components, and video case studies.*	
1	*Beating the Blues-1* (100–102)	This group of articles studied two interventions. One of the interventions studied was a fully self-administered intervention with no outside support. The other was a CBT intervention delivered fully by email by therapists with experience delivering online interventions For the therapist delivered intervention, participants were able to reply to the therapist emails, and they were given the opportunity to write about what was of concern to them. The emails contained personalized responses to the users. Although the online group did not have a therapist, they were asked to

		consider the provider of the voice over as their therapist when evaluating the working alliance.
2	*Beating the Blues-2* (96)	Support was provided by administrative staff who scheduled the user's sessions, introducing the user to the program, and addressing technical issues. Counsellors were also available if a user needed to contact them, and the counsellors contacted students if results of their weekly symptom reports showed significant risk
3	*Beating the Blues-3* (85)	This intervention was supported by technicians who sent out weekly email reminders
4	*BRAVE-Online* (44,74–76)	Brave-Online is a universal anxiety treatment program developed in Australia. The program is made up of 10 weekly one-hour sessions. A therapist, referred to as a coach, provided support for both the young person and the parents. Support was through weekly contacts, as well as an additional session to support of the delivery of one session (exposure hierarchy)
5	*CATCH-IT* (78–83,108)	CATCH-IT is a USA developed depression prevention program designed to be delivered in the context of primary care. The program contains 14 modules and incorporates elements of CBT, Behavioural Activation (BA) and Interpersonal psychotherapy (IPT). The users are supported

		through a motivational interview with their general practitioner as well as motivational phone calls by support staff during the length of the intervention.
6	*Cool Teens* (62–65)	Cool Teens is an Australian developed intervention targeting anxiety disorders. The intervention is designed to be delivered in a 12-week period and consists of 8 30 to 60-minue modules. The users were supported by their parents, along with therapists who provided brief phone contact.
7	*Feeling Better* (106,107)	*Feeling better* is a Canadian developed 'transdiagnostic' online intervention addressing moderate anxiety, depression, and stress for university students. The intervention included 5 'core' modules and males were able to choose among 5 additional modules after the completion of the core modules, whereas female students had access to 6 optional modules. The optional modules provided help with social relationship, managing stress, helping with sleep, and the female additional module was about premenstrual syndrome (PMS) and mood. The users were supported with weekly phone calls or emails by student coach who did not provide therapeutic input, but provided encouragement to complete the program, and clarified information contained in the program.

8	*Master Your Mood* (104,105)	A website providing a chat room which was developed in the Netherlands. Users access the website at the same time on a weekly basis, and the chat group is led by a therapist.
9	*MEMO* (90)	*MEMO* is an intervention developed in New Zealand for depression prevention that delivered all the content of the intervention via mobile text messages. The messages elaborate on core cognitive Behavioural therapy messages. The messages were delivered in various formats that included animation, videos by teenagers and celebrities, as well reminders to practice the skills in real life.
10-15	***MoodGYM:*** *MoodGYM is an Internet depression intervention developed in Australia. The intervention is available online for free and can be accessed by users on their own pace without accountability to a supporter. Although studies in this review have used it for adolescents and young adults, the intervention has been designed and evaluated with the adult population. The intervention is made up of 5 modules each requiring between 30-60 minutes to complete. The modules covered cognitive restructuring, activity scheduling, and interpersonal problem solving. The content are a variety of educational information, demonstrations, exercises, and assessments about the user's depression and anxiety symptoms. Intreventions 10 to 15 each implemented MoodGYM in a distinct delivery format.*	
10	*MoodGYM-1* (84)	This study focused on medical interns. Support was only in the form of sending emails with links to the modules to be accessed, no other form of support was found in the emails.

11	*MoodGYM-2* (73)	The intervention was delivered in a school during a weekly tutorial session that had a tutor and 10-15 students. The students accessed the program using a designated computer that they were allowed to use on a weekly basis. The teacher supervising the tutorial group answer questions in the sessions that followed.
12	*MoodGYM-3*(109)	This intervention supplemented the delivery of *MoodGYM* by providing tailored reminders were based on risk of depression, self-efficacy, and self-esteem. The information for the criteria for tailoring was collected through a questionnaire at the onset of the intervention.
13	*MoodGYM-4* (69,70)	This intervention was administered in a school setting and was provided as a universal intervention for both symptomatic and asymptomatic students. The support provider was the students' teacher who provided encouragement and responded to general questions
14	*MoodGYM-5* (71)	The user utilized this intervention in a designated room at their university, and the psychologist was available in the same room as well, to encourage the users, supervise their progress, and answer any questions that come up.

15	*MoodGYM-6* (72)	A therapist was available on hand to provide an introduction during the first sessions, and respond to inquiries during the sessions that follow
16	*Reframe it* (66)	An Australian team developed *Reframe-it* specifically for young students with suicide related behaviour, and it was also designed for delivery in a school setting with the support of school wellbeing staff. The intervention is composed of eight modules that are delivered over a 10-week period with initial delivery of new modules in the school with the supervision of the school counsellor, after which the student can access the module at home. The modules had a focus on addressing suicidal thinking and behaviour and helped the student by presenting topics such as engagement and agenda setting, recognition of emotions and negative automatic thinking, cognitive restructuring, distress tolerance, behaviour activation, relaxation techniques, and problem solving. The structure of the modules included the presence of a host character delivering the therapy through voice-over, along with videos cases by young people, and weekly in session activities. The sessions also included a weekly homework. In addition to support from the school's wellbeing staff, the participants were able to interact with a clinical psychologist. A 'getting help' tab

		provided the user with resources to contact in case of a crisis.
17	*SPARX* (41,86–89,103)	SPARX is an online fantasy video game developed in New Zealand targeting depressive symptoms. Each CBT module is delivered as a game level presenting a challenge that the user's avatar completes. The user is supported by a virtual guide at the beginning and the end of each level who discussed the application of the skills observed in the game in real life.
18	*StressBusters*(93,94)	Stressbusters was developed for adolescents with mild to moderate depression and was developed by a team in the UK. The program consists of eight sessions of 30-45 minute duration, along with printed hand-outs and fact-sheets at printed at the end of each session. The intervention was delivered in a school setting, although the students had the options of completing the session after school.
19	*Think, Feel, Do* (91,92)	*Think, Feel, Do* is a CD-ROM based CBT intervention developed in the UK. It is designed to be facilitated by supporter who is not necessarily a trained therapist in CBT such as a teacher, a nurse, or an assistant psychologist. The intervention is made up of 6 modules, each requiring 45-

		minutes to complete. The modules cover CBT themes such as recognizing and addressing challenging emotions; linking thoughts feeling and behaviour; recognition and management of negative cognitions; and problem solving. The progress through the intervention was guided by cartoon characters, and the users were provided with psychoeducational components, viewed videos and animation, and interacted with quizzes and exercises.
20	*The Mood Mechanic* (67)	The *Mood Mechanic* is an Australian-developed course for anxiety and depression symptoms in young adults. The intervention is four modules long and is designed to be delivered over the course of five weeks. Each lesson included clinical vignettes that modeled the managing of the symptoms, and the modules were supplemented with home-work tasks to help participants apply the skills in their daily lives. Support was provided by weekly phone calls or text messages by a clinical psychologist.
21	Anxiety and Insomnia intervention for University students (95)	This UK designed study delivered commercially available anxiety and insomnia OCBTs to a university student population in the UK. The modules were 13 in total and were supported by reminder emails and text messages that were manually sent to participants each week; the messages were standardized with no tailoring or personalization.

22	Pure self help Depression Intervention (Oregon, USA) (77)	This USA developed intervention was delivered was delivered to a population of young adults with depression symptoms. The intervention contained sections providing self-assessment, education, and journaling, as well as other traditional CBT modules. Users progressed through the intervention at their own pace. The intervention provided automated tailored feedback regarding the association between the daily activities and the user's charted mood. Users were also sent out postcards at different intervals during the implementation to act as reminders and to elaborate on features in the intervention.
23	*iTreAD* project (68)	This intervention utilized support through a social network that is commercially available. The social network was moderate by a therapist to provide encouragement in participation and for risk mitigation.
24	An ICBT for university students with social phobia and public speaking fears (97)	This Swedish study was delivered to university students with social phobia and public speaking fears. The therapy consisted of 9 modules that were in a text format. A therapist provided support for this intervention through reviewing homework submissions by the users and providing feedback via email. Reminders were also sent to users who have not completed their weekly module, which were provided first

		via email, and followed by a phone call if no response is provided within two weeks.
25	Individually tailored treatment for panic attacks (98)	This intervention is an example of an individually tailored intervention based on the participant's symptoms. The therapist would help the participant choose the most suitable set of modules with the guidance of the symptom interview. The therapist then would take up a supportive role, reviewing the participants' homework assignments, and providing feedback. The therapist also would provide feedback to participants to complete the session and when ensuring that the session is completed the therapist would send out the material for the next session. All email communication was either initiated by the therapist, or the participant, and they were no automated messages involved.
26	Social anxiety treatment for high school students (99)	This 9-module intervention was delivered to Swedish high school students with social anxiety disorder. After completion of each module, users responded to questions at the end which constituted the homework assignment, the responses were emailed by the users. (not clear if there is a certain template). The therapist reviewed the emails and either informed the user that they could move on to the next intervention, or responded with feedback on what is needed

		to move on. The provider also sent reminder emails if the user did not send a homework assignments, and made a phone call if there was no response to the email (no clear details regarding the use of a tracking tool, or the content of the emails and the phone calls)