Internet-based interventions to support recovery in youth: A systematic review

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Abstract

Personal recovery represents a paradigm shift in how individuals are seen to benefit from mental health interventions, from a narrow view of symptom reduction to a holistic, multi-dimensional view of well-being, functional gains and rehabilitation. Although there is a large body of evidence supporting the use of recovery-oriented care in adults, research on personal recovery amongst youth with mental health concerns is an emerging area of research. Efforts to promote youth mental health have also focussed on the use of digital applications and platforms as a means of overcoming barriers related to factors including stigma and lack of available services. This systematic review aims to review the literature on existing internet-based, youth mental health interventions with regard to (a) identifying elements of the programs that align with the personal recovery and (b) outcome measures utilised in assessing personal recovery. Eleven papers were identified that met the inclusion criteria. Five of the programs reviewed from these eleven papers showed efficacy for recovery processes. The results offer preliminary support and guidance for the use of internet-based mental health interventions in the promotion of personal recovery amongst youth. Future research and practice are suggested to further develop understanding in this area.

Keywords

Personal recovery, recovery-oriented care, youth, child and adolescent mental health, digital health, general

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Introduction

Background

There are growing concerns for the future mental health of young people around the world.[1–4] Epidemiological studies highlight that increasing numbers of youth experience poor mental health.[4,5] Young people diagnosed with mental disorders show prevalence rates between 20% and 25% with around 50% of adult mental health disorders originating during adolescence.[6,7] The burden of mental health impacts is particularly pronounced amongst youth who are geographically and socially isolated and experience mental health problems in conjunction with multiple social vulnerabilities.[8] Concerns about the reach of mental health services for youth have led to innovations in interventions and service development as a way of engaging vulnerable youth and their families. Mental health interventions and services are increasingly looking to deliver services that move beyond symptom reduction and crisis management, to focus on de-stigmatisation, gains in general functioning and psychosocial rehabilitation.[9] Personal recovery (from here referred to as recovery) originates from the model of adult psychiatric rehabilitation and embodies a humanistic theme through the promotion of self-efficacy and maximising potential.[10] Recovery represents a paradigm shift in how individuals are seen to benefit from mental health interventions, from a narrow

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view of symptom reduction to a holistic, multi-dimensional view of well-being, functional gains and rehabilitation.[11]

Conceptualisations of recovery

Concepts of recovery in mental health were introduced by Deegan[12] who described it as a unique, non-linear journey which is shaped by an individual's attitude and approach towards the challenges of daily life. Anthony[11] expanded the concept further, defining recovery as a personal process of change to one's way of thinking, feeling and being, to develop meaning and purpose outside the constraints of mental ill-health. The view challenges the dominant assumptions of mental health informed by the medical model, to support individuals to lead satisfying and productive lives, with or without the presence of concerns related to mental health.[11] Recovery-oriented care represents a person-centred approach to promoting recovery through a focus on individual strengths and goals.[13] Recovery-oriented care also incorporates mental health lived experience inspiring self-efficacy and hope and purpose, whilst diminishing long-term dependency on services.[13,14]

In doing so, recovery seeks to de-stigmatise mental illness and integrate individuals into the community supporting satisfying and meaningful lives.[9,11] This multi-faceted approach has revolutionised mental health policy and service delivery around the world and has since become the best practice in adult mental health settings.[15,16] With recovery-oriented practice gaining momentum around the world, numerous theories have sought to conceptualise the recovery process. Leamy et al.[17] have proposed a framework of recovery in adults emphasising five categories of individual recovery processes outlined in the CHIME model: connectedness, hope and optimism, identity, meaning in life and empowerment (see Figure 1).[17] With a growing body of literature supporting the model amongst adults with mental health concerns,[17,18] emerging research has begun assessing the applicability of the model to younger persons.[19–21]

Mental health recovery in youth

Concepts of recovery are relevant to all youth and particularly important for vulnerable young people who have reduced capacity for self-management, who are less responsive to primary and secondary services, and who require more scaffolding to improve general functioning.[4,7] The literature suggests that therapeutic relationships, system communication, community interventions, the inclusion of parents, families and supports and psychoeducation are imperative to the recovery journeys of young people.[19] While such elements can also promote clinical recovery, recovery-orientated interventions focus on improvement in functioning and engagement in normative activities and relationships across settings, rather than just a reduction

of mental health symptoms.[13,15,19] Additionally, appropriate measures for youth recovery are still emerging and as yet there are no dedicated measures to assess recovery that have been conceptually validated for youth.[16]

Most recently, Naughton et al.[18] employed a scoping review to explore the literature on youth recovery in the context of mental health services. Eight papers met the criteria for inclusion, emphasising a significant lack of published literature in this area. Naughton et al.[18] noted that recovery for young people included themes consistent with the CHIME framework for adult recovery.[17] Additionally, Naughton et al.[18] noted the importance of including parents, families and support in recovery-orientated practice. Parents and systems play an imperative role in the recovery of youth, more so than in adulthood.[13,18] It is also vital for parents and families to receive support themselves to assist with the distress that may be experienced from having a child or family member with mental health issues. John et al.[16] noted the importance of evaluating both the young person's and the parent's perceptions of personal recovery.

Potential of internet interventions to promote recovery

There has been increased interest in delivering mental health interventions through internet-based platforms.[6,22,23] Several growing youth are turning to websites and social media platforms for social and emotional support and reports indicate that the medium of online interventions offers a key incentive for young users.[24,25] Digital mental health services and applications have been found to overcome several barriers to access, including geographical restrictions limiting access, high costs and concerns regarding stigma.[22,26] Numerous reviews indicate that digital interventions are feasible and acceptable for young people with mental health concerns, with promising signs of their efficacy.[27] The internet also provides a medium for direct delivery of interventions to a wide population of individuals, as well as a link to other online or face-to-face health services and resources and represents a unique opportunity to promote recovery and recovery-oriented care to youth.[23] However, relatively few applications have employed a recovery-oriented co-design and co-delivery methodology in the design and development of internet-based interventions.[27] Current online interventions are typically more clinical in orientation, focusing on problems and dysfunctions and placing the expertise with the professional.[28] The current review aims to understand the elements of existing internet-based applications that include recovery-oriented interventions and measures to identify recovery intervention efficacy.

Summary

Recovery interventions for youth provide an opportunity to reduce the burden of mental illness on young people while
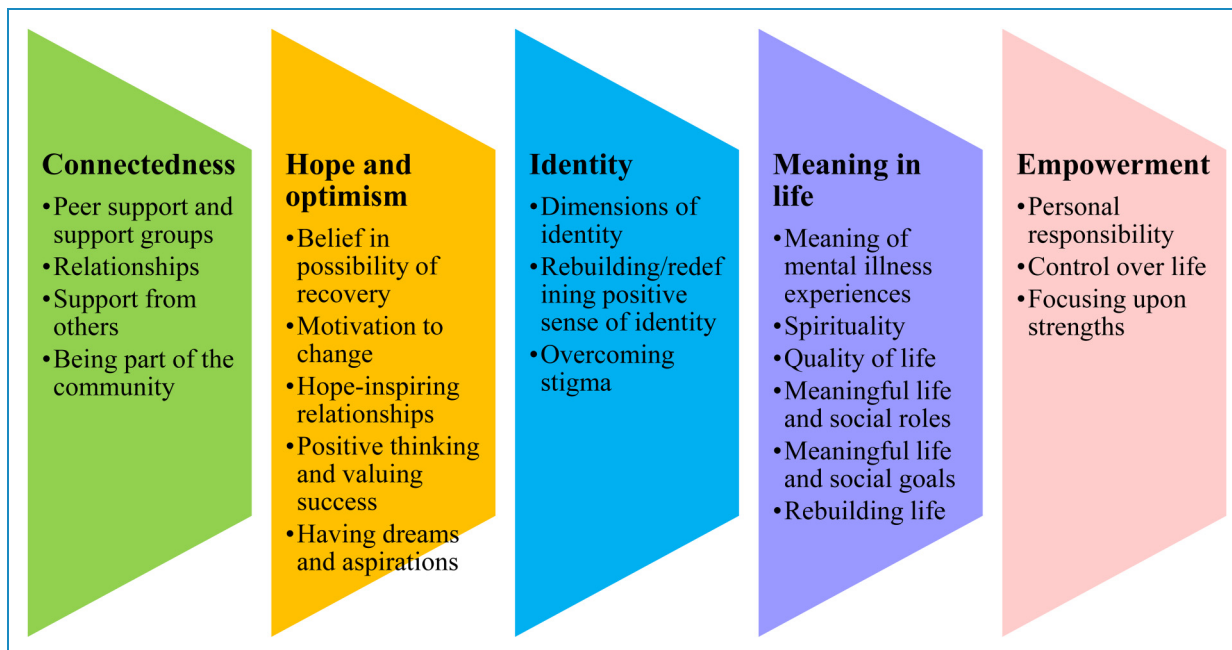
Figure 1. Processes of adult recovery (CHIME[17]).

also reducing the potential impact of mental illness into adulthood. Internet-based applications offer the potential to support recovery for youth, providing greater reach and engagement. This review is, to our knowledge, the first systematic attempt to synthesis the evidence on the effectiveness of internet-based interventions in promoting recovery for this population. Given the potential for internet-based interventions to enhance mental health services, it is worth noting that many existing internet interventions may also possess elements of recovery-oriented practice. Utilising the CHIME recovery framework,[17] this review examines recovery-oriented application in existing internet-based interventions for youth to answer the following question: What specific interventions and outcome measures have been utilised and what are the characteristics of internet-based interventions that promote recovery amongst youth aged 13 to 18 years with mental health concerns?

Methods

A systematic review attempts to collate all pertinent evidence that meets pre-determined eligibility criteria to answer a particular research question. It uses specific systematic methods to reduce bias in the identification, selection, synthesis and summary of previous findings. The key characteristics of a systematic review are defined objectives with reproducible methodology; identification of all studies meeting eligibility criteria; assessment of the validity of the findings of selected studies; systematic presentation and synthesis of the characteristics and findings of the included studies.[29]

Search strategy

The search was conducted between March and April 2020 with searches limited to publications between 2006 and 2020. The initial search strategy included the term (Recovery OR Personal Recovery) and resulted in only one article. The search was revised with the intent to increase the number of search items. The revised search strategy included (Adolescen') AND (mental health OR mental illness' OR mental disorder' OR mental disease' OR mental problem) AND (online OR internet OR computer' OR web') AND (intervention OR program OR therapy OR treatment OR psychoeducation) and combinations of these search criteria. The search was run on six databases (EBSCOhost, PsycINFO, Ovid, Scopus, JSTOR and JMIR), and a limited keyword search was performed on Google Scholar and Semantic Scholar search platforms. Additional searches included hand-searching of population-specific clinical journals and citation tracking of relevant literature. Reference lists of sourced literature were hand-searched for additional publications.

Study selection

The review follows the guidelines set out by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2009 checklist. Eligible studies included an internet-based platform for intervention, included at least one outcome related to a process of the CHIME model, and focussed on reducing mental health issues in participants aged 13 to 18 years. This age range was selected to support the focus of a larger research

project that encompasses this review. Experimental study designs included randomised control trials (RCT) or pre-post designs without a control comparison. Only literature published in English was included to avoid translation and publications prior to 2006 were excluded as the majority of searched literature commenced in 2006.

A total of 2199 publications were assessed through two phases detailed in Figure 2. Exclusion criteria were: (a) age groups outside the population under review, (b) not written in English, (c) not published in a peer-reviewed journal, (d) internet-based interventions that are not self-directed, (e) studies that do not include measures corresponding in some way to the five CHIME processes, (f) studies that were not experimental quantitative designs or (g) research before 2006.

Data extraction and synthesis

A narrative synthesis was employed to accommodate the diversity of the publications reviewed and deemed more appropriate than thematic analysis in exploring the recovery-related outcomes of these studies that were designed to observe and report on symptomatic outcomes. The initial selection was compiled by one researcher and full-text publications were reviewed by both first and second authors to ensure relevant criteria were met within included articles. Any discrepancies in meeting criteria were resolved with the removal of related article/s.

A quality assessment of each of the final articles was completed using the Effective Public Health Practice Project Quality Assessment tool for Quantitative Studies. This assessment tool was developed for use in public health and can be applied to articles on any public health topic area.[30,31] It includes the following criteria in the assessment of the quality of quantitative research: (a) selection bias, (b) study design, (c) confounders, (d) blinding, (e) data collection methods and (f) withdrawals and dropouts. Table 1 details the quality assessment results for the publications evaluated within this review.

Results

A total of 11 publications meeting the criteria were included in the systematic review. Results from these publications are presented in the below tables. All included studies incorporated measures that could be applied to the CHIME model.

Intervention characteristics and how they aligned to recovery processes

Study characteristics, designs, effect size and effectiveness outcomes of the interventions are detailed in Table 2.

Table 3 details the specific intervention characteristics and how they align with the CHIME recovery processes.[17]

Not all processes were assessable or shown to be efficacious using the measures employed in these studies. Seven of the eight interventions embodied characteristics associated with the process of connectedness. Providing resources was the common intervention characteristic that aligned with the recovery process of connectedness and was found in three of the eight interventions. Other characteristics included the support of professionals and parents while accessing the intervention and education on relationship building and coping strategies.

Study characteristics

Intervention characteristics, a relationship of the interventions to recovery, and facilitators and barriers to the interventions are detailed in Table 4.

How personal recovery was operationalised

Outcome measures were analysed for items that encapsulated characteristics aligning with the CHIME framework. None of the studies included outcomes that were relevant to all processes within the CHIME framework. Outcomes for each process are discussed in the acronym order.

Connectedness. Six studies included measures identifying connectedness such as the Children's Global Assessment Scale (CGAS[44]) and Warwick–Edinburgh Mental Well-being Scale (WEMWBS[33,37,45]). The CGAS assesses overall levels of social functioning while the WEMWBS includes items "I've been interested in other people," "I've been feeling close to other people" and "I've been feeling loved."[45] Dickter et al.,[34] Voorhees et al.[41] and Smith et al.[39] compiled items to develop their own social isolation and belonging scales (Table 1).

Hope and optimism. Eight of the studies reviewed included measures assessing hope or included items that aligned with the hope process defined by the CHIME framework.[33–37,39,41,43] Smith et al.[39] included items assessing life well-being and satisfaction which has been linked to hope in numerous studies[46,47] (Table 1). Dickter et al.[34] compiled items to form a hopelessness scale. Studies by Calear et al.[33] and Manicavasagar et al.[37] both assessed outcomes using the WEMWBS which contains items "I've been feeling optimistic about the future," "I've been feeling useful," "I've been dealing with problems well" and I've been feeling cheerful."[45]

The Beck hopelessness scale (BHS) was used by Hetrick et al.[35] and Robinson et al.[43] to assess outcomes. The general self-efficacy scale (GSE) used by Lillevoll et al.,[36] and Voorhees et al.'s[41] self-efficacy scale were also aligned with hope and optimism as self-efficacy is associated with increased levels of hope.[48]
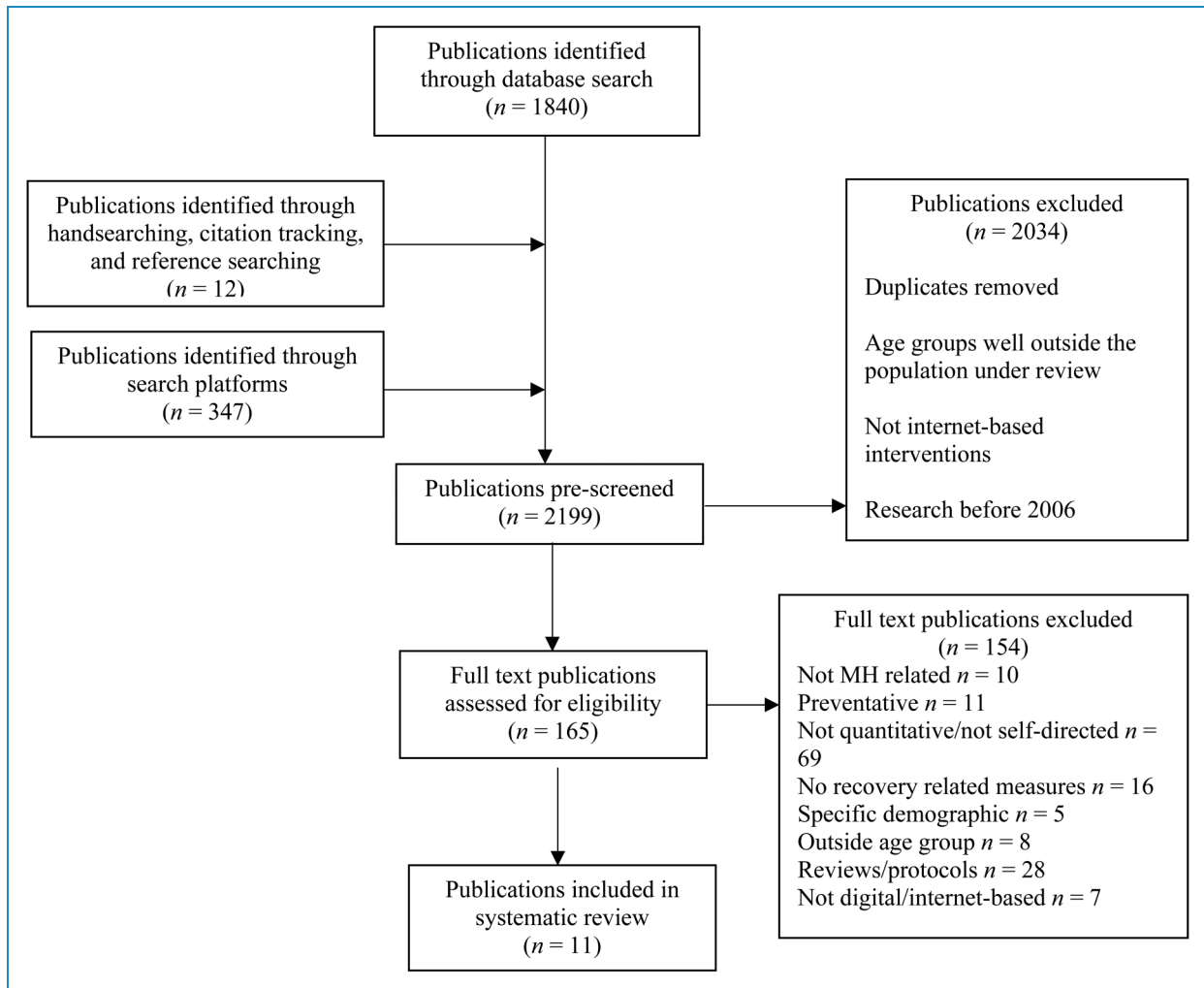
Figure 2. PRISMA flow diagram for the study selection process.

Identity. According to the CHIME personal recovery framework, the identity process includes the following characteristics: dimensions of identity, rebuilding/redefining a positive sense of identity and overcoming stigma.[17] None of the studies in this review included outcomes aligned with this process.

Meaning and purpose. Bannink et al.[32] included outcomes associated with quality of life. This study utilised four items from the Child Health Questionnaire-Child Form (CHQ-CF-GH4). While they did not detail which four items they included in the outcome measure they did report these items were associated with general health perceptions which can be associated with the meaning of mental illness experiences.

Empowerment. Six of the studies reviewed included outcome measures that were associated with the process of empowerment.[24,33,34,36,37,41] These measures assessed outcomes for self-efficacy and self-esteem and while they were different constructs of empowerment, both were considered elements of empowerment.[49,50] Dickter et al. assessed outcomes using a self-developed self-esteem scale[34] and Voorhees et al. assessed outcomes using a self-developed self-efficacy scale.[41] Calear et al.[33] and Manicavasagar et al.[37] both assessed outcomes using the WEMWBS that contains items associated with empowerment such as "I've been feeling good about myself," "I've been feeling confident" and "I've been able to make up my own mind about things."[45] Lillevoll et al.[36] utilised both the GSE and the Rosenberg self-esteem scale (RSES) to assess outcomes, while O'Kearney et al.[24] also used the RSES.

Discussion

The ongoing burden of mental health concerns for youth is of prominent interest in the provision of services that are looking to reduce ongoing reliance on resources and promote well-being in this population. Particularly for

Table 1. Quality assessment results.

Publication	Selection Bias	Study Design	Confounders	Blinding	Data Collection	Attrition	Global Assessment
Bannink et al.[32]	2	1	3	3	1	2	Moderate
Calear et al.[33]	1	1	3	3	1	3	Weak
Dickter et al.[34]	2	3	1	1	3	1	Weak
Hetrick et al.[35]	1	1	1	1	1	1	Strong
Lillevoll et al.[36]	2	1	3	1	1	1	Moderate
Manicavasagar et al.[37]	2	1	1	1	1	2	Moderate
O'Kearney et al.[24]	2	3	1	3	1	2	Weak
Robinson et al.[38]	2	2	3	2	1	1	Moderate
Smith et al.[39]	1	1	1	2	1	1	Strong
Spence et al.[40]	1	1	1	2	1	1	Strong
Van Voorhees et al.[41]	2	1	1	1	3	1	Moderate

Note. 1 = Strong; 2 = Moderate, 3 = Weak. Inclusion of >1 weak criterion = weak global assessment; inclusion of 1 weak criterion = moderate global assessment; no weak criteria = strong global assessment.

youth with more severe mental health concerns, the goal of symptom cure is not always a realistic one and research has shown that quality of life is not dependent on being symptom-free. Recovery for youth is an emerging construct and research on interventions and recovery-orientated practice for this period of development is still in its infancy. This review provides the first overview of research pertaining to internet-based interventions designed to support mental health in youth and those that may indirectly support recovery in this population. It is worth noting that there are currently no internet-based interventions specifically designed to promote recovery in young people and that the interventions discussed in this review have a primary objective of symptom and behaviour reduction. The lack of evidence-based efficacious internet interventions for youth recovery may be directly related to the early stages of research in this area.[13,19] It may also be related to controversies around the application of recovery to youth with some reporting that the concept of recovery is developmentally inappropriate for young people.[13] However, this review has shown that while some internet interventions are not designed to target recovery, they do indirectly promote it.

The studies identified in this review comprised measured outcomes that could theoretically support at least one of the CHIME recovery processes outlined by Leamy et al.[17] It was found that while each of these interventions held different objectives related to either behaviour change or symptom reduction, each could be aligned in theory with

the concept of recovery. Of interest were the common intervention characteristics that supported recovery outcomes. These were psychoeducation, linking to external supports, sharing the experience with family or professionals, skill-building activities, peer narratives and teaching problem-solving skills. It was also noted that most of the various outcome measures employed could be aligned with at least one of the CHIME processes.[17] This demonstrated that while there are currently no internet interventions solely dedicated to youth recovery, there is efficacy in the use of existing internet interventions in support of recovery. Further research exploring the efficacy and characteristics of these interventions offers the opportunity to provide additional support to these findings. Additionally, this review highlighted the need for dedicated personal recovery measures for youth and that some existing youth mental health measures offer a potentially effective assessment of individual personal recovery processes.

Support for the use of internet interventions to promote recovery in youth

Interventions were assessed according to how their characteristics aligned with the CHIME model.[17] Of the eight interventions reviewed through 11 publications, the Bite Back and Reframe-IT interventions held characteristics that aligned with all five of the CHIME processes.[35,37,38]

Table 2. Study characteristics.

Author	Mental Health Focus	Age and Gender	Name	N	Inclusion and Exclusion Criteria	Intervention Duration	Groups	RCT	Effect Size*	Recovery Orientated Outcome Measures	Relationship of Outcomes to Recovery	Effectiveness of Intervention Using Recovery Measure
Dickter et al.[34]	Depression	14–21 years 56.2% female	CATCH-IT	83	I: depressive symptoms; E: major or minor depression; suicide ideation or intent.	No timeframe (14 modules)	Intervention	No	Medium	Hopelessness, self-esteem, social isolation scale	Connectedness (social isolation), hope (hopelessness), and empowerment (self-esteem)	No sig. changes in hopelessness or social isolation from baseline to post-intervention. Sig. increases in self-esteem from baseline to post-intervention.
Manicavasagar et al.[37]	Depression, anxiety and stress	12–18 years (M = 15.4) 67.5% female	Bite Back	154	I: Australian; E: nil	5 weeks (five modules)	Intervention; control	No	Large	SWEMWBS	Connectedness, hope and empowerment (WB)	Sig. higher scores for SWEMWBS in intervention group
Calear et al.[33]	Anxiety and worry	12–18 years (M = 14.83) 62.8% female	e-couch Anxiety and Worry program	1767	I: schools near Headspace centres; year 9–12; E: absenteeism	6 weeks (six modules)	e-GAD school, e-GAD health service, WLC.	Yes	Large	WEMWBS	Connectedness, hope and empowerment (WB)	Sig. reduced well-being at post-intervention in the e-GAD school group and 6-months than the WLC. Sig. reduced well-being e-GAD health service sig. at 6 months
Smith et al.[39]	Emotional WB	11–14 years 50% female	Theories of emotion	1645	I: Middle school grades 6–8; E: incomplete demographics questionnaire	10 weeks (two sessions)	Intervention; control	Yes	Large	Belonging: ("I feel like I belong at my school"). Life WB ("I tend to feel a lot of negative emotions" and "I tend to feel a lot of positive emotions"); LS ("I am satisfied with my life").	Connectedness (belonging) and hope (WB and LS)	Sig. increases in WB in school for intervention group. No sig. effects for life WB, or LS.
Van Voorhees et al.[41]	Depression	14–21 years	CATCH-IT	84	I: dep. Symp.; E: major or minor dep.; suicide ideation or intent; other disorders, substance abuse.	4–8 weeks (14 modules)	Motivational Interview Intervention; brief advice intervention.	Yes	Medium	Self-efficacy; social support	Connectedness (family and social relationships) and hope (self-efficacy)	No sig. change general self-efficacy or family social support in either group. Sig. improvements in social support from peers.
Lillevoll et al.[36]	Depression and self-esteem	15–20 years (M = 16.78) 56.8% male	MoodGYM	1337	I: student; E: nil reported	5 weeks (five modules)	Intervention; Intervention + reminders; intervention + tailored reminders; Control	Yes	Large	GSE; RSES	Empowerment (self-esteem; self-efficacy) and hope (self-efficacy)	Sig. reduced self-esteem for intervention compared to the survey-only group. No sig. differences between groups for self-esteem. No sig. difference in self-efficacy scores.
Spence et al.[40]	Anxiety	12–18 years (M = 13.98) 59% female	BRAVE	115	I: anxiety; English E: other diagnoses; ≥ 6 on ADIS-CP; substance abuse; suicide ideation; current self-harm.	10 weeks (10 sessions)	Internet-based treatment (INT); clinic-based treatment (CLIN); WLC.	Yes	Medium	CGAS	Connectedness (meaningful relationships)	Sig. increases in CGAS scores for INT and CLIN compared to WLC. No sig. effect for CGAS in treatment condition
Robinson et al.[38]	Suicide, depression and hopelessness	14–18 years (M = 15.6)	Reframe IT	21	I: recent suicide ideation; E: intellectual disability; psychotic symptoms; no English.	8 weeks (eight modules)	Intervention	No	Medium	BHS	Hope	Sig. reduced hopelessness, small effect size (0.46).

(continued)

Table 2. Continued.

Author	Mental Health Focus	Age and Gender	Intervention								Relationship of Outcomes to Recovery	Effectiveness of Intervention Using Recovery Measure
			Name	N	Inclusion and Exclusion Criteria	Duration	Groups	RCT	Effect Size*	Recovery Orientated Outcome Measures		
		81% female										
Hetrick et al.[35]	Suicide related behaviours	13–19 years (M = 14.7) 82% female	Reframe IT	50	I: recent suicide ideation; E: intellectual disability; psychotic symptoms; no English.	10 weeks (eight modules)	Intervention; Control	Yes	Small	BHS	Hope	Sig. decreased in hopelessness compared with the control from baseline to 10 weeks, and from baseline to 22 weeks.
Bannink et al.[32]	General well-being /improving health behaviours	15–16 years (M = 15.9) 57% male	E-health4Uth	1256	I: secondary student; E: refused consent, absenteeism	4-month follow-up - no specific duration	Self-directed intervention; self-directed intervention and consultation; control	Yes	Small	Health-related QOL - four items of the general health perceptions scale of the CHQ-CF-GH4.	Meaning (QOL)	Sig. increased health-related QOL in the E-health4Uth group compared to control.
O'Kearney et al.[24]	Depression and Stigma	15–16 years 100% male	MoodGYM	78	I: 15-16 years; student E: nil reported	5 weeks (five modules)	intervention; Control	Yes	Large	RSES	Empowerment (self-esteem)	No sig. difference between-group comparison.

Note. I = inclusion; E = exclusion; WLC = wait-list control condition; RCT - random controlled trials; * Alpha = .05; CGAS = Children's Global Assessment Scale; BHS = Beck Hopelessness Scale; QOL = quality of life; CHQ-CF-GH4 = Child Health Questionnaire–Child Form; Sig. = significant.

Table 3. How intervention characteristics aligned with recovery according to CHIME.[17]

	Connectedness	Hope	Identity	Meaning	Empowerment
Bite Back	Resources**	Skill development**	Character strengths	Skill development and interactive exercises	Character strengths and skill development**
BRAVE	Shared experience with parents and professional support**	Peer modelling and skill-building	–	Real-life examples and peer modelling	Self-reinforcement, real-life experiences and skill-building
CATCH-IT	Active social networks and relationship-building skills**	Skill-building exercises*	–	Adolescent stories	Skill building and problem-solving**
e-Couch	Professional support and shared student experience*	Skill building*	–	–	Skill building*
E-Health4U	Referral options	–	Tailored messages	Tailored messages**	Advice for changing behaviour
TOE	–*	Normalising difficulties*	–	–	Regulation strategies and capacity for change education
MoodGym	Coping with relationships education	Skill-building*	–	–	Skill building, self-esteem training and problem-solving*
Reframe-IT	External help resources	Skill-building**	Personalised webpage	Activity diary	Skill building and problem-solving

Note. ToE = Theories of Emotion; * = measured; ** = measured and showed significant benefit pertaining to this process.

Both interventions also showed efficacy for recovery through measures aligned with these processes.

For the interventions BRAVE, CATCH-IT and eHealth 4U, each held characteristics that aligned with four of the CHIME processes.[32,34,40,41] All other interventions held characteristics that aligned with three or fewer of the CHIME processes. Except for the MoodGYM intervention, all interventions showed efficacy for recovery processes through measures aligned to recovery processes. Of those interventions that showed efficacy, the Reframe-IT, BRAVE and CATCH-IT interventions included participants with mental health symptomology.[34,35,38,40,41] These findings suggest that while existing interventions largely had the primary objective of symptom reduction, they also demonstrated the ability to support recovery for young people. Characteristics identified offer a platform for future recovery targeted inventions.

Youth recovery outcomes in internet interventions

All interventions except for Bite Back had at least one study utilising an RCT in this review. Publications for the CATCH-IT and Reframe-IT interventions included an RCT and a pre–post method of design. While the Reframe-IT studies employed the same measures and reported consistent results across both research methodologies, the CATCH-IT studies reported inconsistent results across both methodologies. This may have been a result of the different study designs used and may have limited the validity and reliability of the measures used within the CATCH-IT research as relevant to recovery. Measures from both studies aligned with connectedness, hope and optimism processes and intervention characteristics aligned with four of the five CHIME processes. Both CATCH-IT studies failed to demonstrate any benefits to hope and optimism; one CATCH-IT study showed some benefit to connectedness,[41] while the other was linked to empowerment.[34] Both studies utilised ratings from standard assessments of importance to assess research questions. The research question proposed by Dickter et al.[34] aimed to examine the effectiveness of the CATCH-IT program on suicide risk factors and therefore outcomes were assessed using different compilations of the data to represent relevant risk factors. This may have been attributed to the variance in results between the studies.

Table 4. Intervention characteristics and relationship to recovery.

Intervention	Intervention Characteristics	Relationship to Recovery	Facilitators and Barriers
Bite Back	• Interactive exercises; psychoeducation on positive psychology (PP) domains: gratitude, optimism, flow, meaning, hope, mindfulness, character strengths, healthy lifestyle and positive relationships. • Provides information about the benefits of increasing well-being, methods for skill development in each of the PP domains, links to resources and online discussion. • Site is pre-moderated for comments.	The Bite Back PP framework links with the CHIME framework and supports all processes. Promoted connectedness through the provision of external resources, fostered hope through skill building, supported identity by exploring character strengths, provided meaning through skill development and interactive exercises, and fostered empowerment through skill building and exploration of character strengths. Supported recovery mechanisms by providing information, promoted working for alliance through providing external resources and increased choice and opportunity through design and access of information.	Challenges identified with both frequency and duration of use. Majority of participants engaged for < 40 minutes at a time and visited the site < three times per week. Participants reported time, technical issues and disengaging content as a sig..factors in use of site.
BRAVE	• 10 weekly 60-minute sessions focusing on CBT anxiety management strategies including real-life examples and peer modelling – psychoeducation, relaxation training, symptom recognition, coping self-talk, cognitive restructuring, graded exposure, problem-solving and self-reinforcement; homework. • Parents receive five 60-minute sessions including CBT techniques and parenting strategies. • Participants received a 15-minute phone call following session 5 to provide advice and support regarding exposure hierarchies. • Each family is also assigned a BRAVE trainer to provide feedback from each session.	Promoted connectedness through shared experience with parents and professional support, fostered hope through peer modelling and skill building, provided meaning through real-life examples and peer modelling, and nurtured empowerment through skill building and self-reinforcement. Supported recovery mechanisms by providing information, promoted working alliance with parents and professionals, provided role modelling through peer modelling and increased choice and opportunity through skill building.	A significant proportion of youth in both the internet and clinic conditions had not completed all 10 therapy sessions by 12-week assessment. Internet participants tended to work more slowly through their sessions and were less likely to have completed all 10 sessions by final assessment time point, potentially due to the self-directed nature of the intervention.
CATCH-IT	• 14 internet-based modules developed from CBT, behaviour activation and IPT. • Each module included learning goals, review, core concept explanation, adolescent stories, skill-building exercises, summarising and reflective exercises. • Modules are grouped into six sections: Introduction, How Do You Act, How Do You Think, How Do You Socialize, How Resilient Are You and Wrap Up. Each section contains 1–4 modules.	Promoted connectedness through active social networks and relationship-building skills, fostered hope through skill building, provided meaning through adolescent stories, and nurtured empowerment through skill building and the teaching of problem-solving skills. Supported recovery mechanisms by providing information, providing role modelling through adolescent stories, and increased choice and opportunity	Low cost; easily disseminated; high rates of attrition (71.1% for Dickter et al.[34]) without professional guidance or facilitation.

Table 4. Continued.

Intervention	Intervention Characteristics	Relationship to Recovery	Facilitators and Barriers
	• Each module approx. 20 slides long and designed to be completed in approx. 15–20 minutes*. • Parental workbook to support parents to build resiliency in their children, understand the impact of symptoms on family and foster family resilience.	through skill building and by teaching problem-solving skills.	
e-couch Anxiety and Worry (e-GAD) program	• Six 30–40-minute sessions are delivered in either a classroom setting or with a Headspace professional. • First two sessions consisted of psychoeducation on signs and symptoms of anxiety, risk factors, consequences and treatments available. • Followed by three evidence-based toolkit sessions including CBT, relaxation and physical activity. • All sessions were delivered consecutively and included practice and homework.	Promoted connectedness through professional support and shared experience with other students, fostered hope and nurtured empowerment through skill building. Supported recovery mechanisms by providing information and promoting a working alliance with professionals.	Attrition due to school absenteeism and difficulty allocating time and follow-up for the program. Self-report measures may have been influenced by situational factors or biases and the inability to collect complete data due to absence or school relocation. Allocating time in school or with Headspace to complete modules may have influenced completion rates as students may not have been willing to complete the modules in their own time.
E-health4Uth	• Participants completed 45-minute internet questionnaire assessing topics: alcohol consumption, drug use, smoking, sexual behaviour, bullying, mental health status, suicide and unpleasant sexual experiences. • Tailored messages developed by Dept. of Health Promotion and Health Education of the University of Maastricht. • Messages were immediately presented on the screen reflecting the participant's current behaviour or well-being in relation to the norms. • Participants offered advice to change unhealthy behaviours and/or to talk to a person of trust • The messages were displayed in red (unhealthy behaviour), orange (behaviour just below the norm), or green (behaviour meeting the Dutch health norm). • Topics on well-being were displayed in blue. • Additionally, participants could check a box for self-referral to the school nurse or could send an email. • After 1-month, young people received a reminder of messages by email.	The application is connected to other services such as the school nurse. Tailored messages supportive of individual identity and provided a more meaningful experience for participants. The provision of advice to change behaviour supported empowerment. Intervention characteristics are in line with the recovery processes of connectedness identity, meaning and empowerment. Supported recovery mechanisms by providing information, promoting working alliance through providing online resources and increased choice through design and access of information.	This study was conducted with Dutch youth aged 15–16 years in a preventive care setting; therefore, generalization to other countries, age groups and settings should be used with caution. Self-report measures provided more accurate information on mental health status. Communication between participants within the school context may have contributed to the outcomes of study or participant use of the intervention. Attrition ranged from 23%–30% for groups.

(continued)

Table 4. Continued.

Intervention	Intervention Characteristics	Relationship to Recovery	Facilitators and Barriers
Theories of emotion	• Participants logged in and completed measure and demographics questionnaire. • Participants completed two 45-minute interactive sessions. • Session 1 information on emotions, how they form, recognising emotions and normalising difficulties with emotion regulation. • 1–4 weeks later participants completed session 2 providing theories and strategies for modifying emotional experiences, changing emotions and regulations strategies including reappraisal. • Sessions required participants to provide short responses to content. • Two to six weeks later participants logged in and completed the measures again.	Program aimed to normalise difficulties and foster hope. Implicit theories of emotion supported individual capacity for change and ability to control responses to emotional challenges and promoting empowerment. Supported the recovery processes of hope and empowerment. Supported recovery mechanisms by providing information and increased choice through supporting the capacity for change.	The online direct-to-student method of delivery and limited number of sessions was cost-effective. Participants were able to access the intervention at their convenience within the allocated timeframe.
MoodGYM	• Five self-paced interactive internet-based modules including personal workbook. • 30–60 minutes per module. • CBT-supported modules providing information, demonstrations, questionnaires and practice exercises including relaxation, problem-solving, cognitive restructuring, assertiveness, self-esteem training and coping with relationships. • Participants worked at their pace and resumed at previous finish point.	The self-paced nature of this program supported a recovery-orientated intervention permitting users to work at a pace and access content they deem appropriate to their individual needs. Content included self-esteem training encouraging a sense of empowerment and coping with relationships fostered connectedness. Supported recovery mechanisms by providing information and increased choice and opportunity by teaching problem-solving skills.	Program was originally designed for adults and content may need revision for youth. Only 40% of participants completed ≥ 50% of the program and participants with more positive beliefs about depression were more likely to complete more modules.[24] Lillevoll et al.[36] found that a school setting reduced the impact of time constraints, but the self-paced nature led to increased attrition.
Reframe IT	• Eight modules, 15–20 minutes, delivered weekly • Participants provided personalised webpage • Completed with a researcher in schools who provided technical support and response checking. • Participants also accessed site at home. • CBT focussed on using agenda setting, emotional recognition and distress tolerance, identification of negative automatic thinking, behavioural activation, help-seeking and activity scheduling, relaxation techniques, problem-solving, detecting and challenging problematic thinking and cognitive restructuring. • Content is delivered through an adult host	Program name aligns with recovery framework supporting reframing the illness experience. Promoted connectedness through provision of external resources, fostered hope through skill building, supported individual identity with personalised webpages, provided meaning through activity diaries, and fostered empowerment through skill building and teaching of problem-solving skills. Supported recovery mechanisms by providing information, promoting a working alliance through providing external support and resources, provided role modelling	Large attrition rates (22% for Hetrick et al.[35]; 38% for Robinson et al.[43]).

Several outcome measures were used in the studies examined. None of the measures used within the studies provided outcomes for all five recovery processes. In fact, none of the measures examined in this review aligned with the process of identity. The majority of measures aligned with CHIME processes connectedness, hope and optimism and empowerment, respectively. This may reflect the fact that most of these measures were designed to assess well-being, hopelessness and/or self-efficacy. Only one measure could be aligned to the process of meaning and purpose (CHQ-CF) and this relationship could be deemed as weak because the study using the measure provided no detail regarding the items used within the quality-of-life scale assessed. Other measures, such as the WEMWBS, GSE, RSES and BHS, have stronger theoretical alignment to the processes of connectedness, hope and optimism and empowerment and therefore provided more reliable outcomes for recovery. No measures specifically designed to assess recovery for youth were used within any of the studies for reasons previously mentioned.

Five of the eight interventions examined showed beneficial outcomes for recovery-aligned processes. The Bite Back program assessed well-being using the WEMWBS and found benefits of this program to all three CHIME processes aligned to well-being (connectedness, hope and optimism and empowerment). The BRAVE program showed promise for increased levels of connectedness (CGAS) and intervention characteristics aligned with four of the five processes. The Reframe-IT program showed improvements in hope (RSES) and intervention characteristics aligned with all five processes. The eHealth4U program induced a greater sense of meaning for health-related quality of life (CHQ-CF) and held intervention characteristics aligned with four of the five CHIME processes. As previously discussed, the CATCH-IT studies showed inconsistent but efficacious results for connectedness and empowerment.

The e-Couch anxiety and worry (WEMWBS), theories of emotion (self-developed measures related to connectedness and hope), and MoodGYM (GSE; RSES) interventions showed no benefits to recovery-aligned outcomes. All of these interventions aligned to a lesser extent with CHIME processes. While some programs did not show efficacy in those measures aligned to recovery, this did not mean they did not show efficacy in symptom reduction.

Limitations

It is difficult to be conclusive regarding internet recovery-orientated interventions for youth when there were so few studies available for review. Further research is required to determine the effectiveness of the characteristics and length of these online interventions, and appropriate outcome measures supporting recovery are needed. Due

Table 4. Continued.

Intervention	Intervention Characteristics	Relationship to Recovery	Facilitators and Barriers
	character that delivers therapy, video stories, activities, message board, factsheets, MP3's, external help resources and activity diary.	through video stories, and increased choice and opportunity by teaching problem-solving skills.	

Note. * = see Gladstone et al.[42] for further detail on intervention structure and content; CHIME = connectedness, hope, identity, meaning and empowerment; CBT = cognitive behaviour therapy; IPT = interpersonal psychotherapy; WEMWBS = Warwick-Edinburgh mental well-being scale; CHIME = connectedness, hope, identity, meaning and empowerment; CBT = cognitive behaviour therapy; WEMWBS = Warwick-Edinburgh mental well-being scale; CBT = cognitive behaviour therapy.

to the variability among the interventions, it was not possible to assess specific strategies and methods that supported recovery outcomes through this review.

Ethnicity of the populations explored within this review was varied with three publications based in the US, one from Norway, one from The Netherlands, one with mixed Westernised representation and five based on Australian youth. While this may increase the generalisability of these results for Western and euro-centric populations this review is limited in its representation of a more global perspective.

A systematic search of grey literature was not included, nor were studies that were written in languages other than English. The possibility of publication bias should also be considered as there may have been other research available through unpublished studies that have not shown positive outcomes for support of youth recovery. Additionally, the data reviewed from these publications were summarised and analysed using a narrative synthesis and not statistically combined, limiting the strength of the derived conclusions.

Future research

Further research exploring the efficacy of these interventions and their characteristics offers the opportunity to provide additional support to these findings. The construct of youth recovery is still in its infancy and this research highlights several research gaps in this area including the use of online interventions to support young people during recovery. There is a particular need for further research to identify the key internet-based program elements required to support youth recovery. While this research has found several common intervention characteristics consistent with recovery for young people, further research should focus on other recovery-aligned characteristics and their efficacy within new and existing online interventions supporting youth recovery. Additional research is also needed to explore other existing measures that align with recovery processes and their efficacy for measuring these processes for this population. Furthermore, there is also a capacity for the development and validation of a youth recovery measure that assesses all five recovery processes according to the CHIME framework.

Conclusion

Although there are currently no dedicated internet-based interventions supporting recovery for youth, this review has shown efficacy in supporting recovery within existing internet-based interventions for this population. While these results should be interpreted with caution, they hold promise for the benefit of further research in this area. Youth mental illness is a growing concern for the well-being and future of our younger generation and leads to an increased burden on families and health services. Recovery for young people is a relatively new construct and research is still emerging to support the efficacy of recovery-orientated interventions and recovery-orientated digital interventions for youth. This review has demonstrated that while research dedicated to online recovery-orientated interventions and measures of recovery for youth are largely non-existent, the benefits of existing internet-based mental health interventions and youth measures hold hope for future success in this area.

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