What science has shown can help young people with anxiety and depression

Identifying and reviewing the 'active ingredients' of effective interventions: Part 1

Contents

— Foreword

Active ingredients are those aspects of an intervention that make the difference. This report presents the state of the science relating to what works in preventing or treating youth anxiety and depression across a range of topics and disciplines. It is not an exhaustive list of all possible active ingredients – rather, we hope it will serve as a catalyst to bring researchers onto the same page, and to spark conversations and collaborations.

Mental health is one of three urgent health challenges Wellcome is taking on for the next 20 to 30 years. Our goal is to find and fund the most cutting-edge science, and to channel this into the development of effective interventions. This involves:

- Research to discover how brain, body, and environment interact in mental health problems. Ongoing curiosity-driven fundamental science is core to generating new tools and unanticipated insights (forward translation)

- Looking at interventions that are known to work for people, in order to unpick exactly what is responsible for positive outcomes and to use that knowledge to create more effective interventions (backward translation)

- Combining all of this research so that it will become possible to say with confidence what recipe of interventions will work for a particular individual.

The 'active ingredients' work in this report is relevant to all the above strands of our work. Much of the evidence reviewed has resulted from decades of curiosity-driven research, while refining and improving available interventions has required (and will continue to require) a backward translation approach. There are also doubtless active ingredients yet to be discovered which will rely on novel discovery research in the decades ahead.

Any mental health intervention is based on a tangle of biological, psychological, and social factors. It is unlikely we can understand any of these factors in isolation from the rest. That's why it's imperative that research into interventions targeting different parts of the tangle can be understood, evaluated, and used by researchers from different backgrounds. This report helps to illuminate both what we know and what we do not currently know about a range of active ingredients that researchers have proposed as potentially key to preventing or treating youth anxiety or depression.

Our goal is an inclusive, integrated field of mental health science that is informed by people's real-life experiences of mental health problems and treatments. A mental health science that applies biology, psychology, social science, and more – all as part of the same dream team – will allow us to understand what causes and cures mental health problems. A mental health science that advances understanding and creates options people trust will help them to manage their mental health and lead the life they want.

And that's how we'll get to a world in which no one is held back by mental health problems.

Dr Catherine Sebastian
Head of Evidence, Mental Health

Professor Miranda Wolpert
Director, Mental Health

Introduction

Mental health problems are a growing public health concern, with anxiety and depression among the leading causes of illness and disability[1], affecting millions globally each year and causing significant social and economic impacts[2]. These problems typically emerge during adolescence and early adulthood, with the median age of onset reported to be at around 17 for anxiety and 31 years for mood disorders such as depression[3], reflecting a period of both vulnerability and opportunity for prevention and intervention.

Although there is an ever-growing range of treatments and prevention initiatives, there have been limited improvements in outcomes over the past few decades. So we urgently need to find better approaches that can help more young people globally. That is why, at Wellcome, we are developing a mental health programme to fund research that will help inform new and more personalised interventions for young people, to create a world where 'no one is held back by mental health problems'.

Currently, we know too little about what helps prevent or treat youth anxiety and depression, and why. In particular, little consensus exists in the field of mental health on what constitutes 'active ingredients'. By active ingredients, we mean those aspects of an intervention that drive clinical effect, are conceptually well defined, and link to specific hypothesised mechanisms of action.

It is these active ingredients that Wellcome has been searching for during the past 18 months.

Since 2020, Wellcome has been commissioning research teams from across the world to review the evidence for different active ingredients deemed to help prevent, treat, and manage anxiety and depression in 14 to 24-year-olds globally.

Use of the metaphor of 'ingredients' acknowledges that there are multiple routes to positive outcomes, and that, in time, research should aim to learn how these ingredients work together.

So far, over 50 research teams have been commissioned to review 46 active ingredients, with 19 of these still in progress. These active ingredients can be broadly categorised by their focus of change into six groups: (i) behaviours and activities; (ii) beliefs and knowledge; (iii) brain/body functions; (iv) cognitive and attentional skills; (v) human connections; and (vi) socioeconomic factors (see Table 1).

> ## Who is this report for?
> This report is aimed at mental health science researchers. By mental health science we are referring to any discipline that uses evidence in rigorous and transparent ways, whether based on observation or experimentation, that can help us find answers to the best way of creating a world in which no one is held back by mental health problems.

About this report

In this report, we summarise the key insights gained from the first 30 teams we commissioned in 2020, to review the evidence underpinning 27 active ingredients of effective interventions. Details of the active ingredients reviewed are included in Table 1 and encompass a broad range, spanning all six categories, from the cellular to the societal. Wellcome selected these active ingredients based on the quality of the submitted proposals, the teams' expertise, and the need to ensure that a diverse range of ingredients were considered.

Endnotes

1 GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet, 2018; 392(10159): 1789-1858. http://www.thelancet.com/retrieve/pii/S0140673618322797

2 Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, Charlson FJ, Norman RE, Flaxman AD, Johns N, Burstein R, Murray CJL & Vos T. Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. Lancet, 2013; 382(9904): 1575⎯1586. https://doi.org/10.1016/S0140-6736(13)61611-6

3 Solmi M, Radua J, Olivola M, Croce E, Soardo L, Salazar de Pablo G, Shin J, Kirkbride JB, Jones P, Kim JH, Kim JY, Carvalho AF, Seeman MV, Correll CU & Fusar-Poli P. Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. Molecular Psychiatry, 2021. https://doi.org/10.1038/s41380-021-01161-7

We asked teams to use an appropriate review methodology to best understand:

- whether existing evidence shows that their active ingredient is effective among 14 to 24-year-olds
- whether there are subgroups or contexts in which their ingredient is particularly effective or ineffective
- the mechanisms of action underpinning the efficacy of their active ingredient

In short, we asked them to address the question: 'What works, for whom, in what contexts, and why?'

In addition, teams were asked to involve young people, ideally with lived experience of anxiety and/or depression, as part of their review process. This ensured that reviews were grounded in and informed by the priorities of those most affected by mental health problems. As can be seen in the summaries in the next section, this expertise is woven throughout and complements the findings of the literature reviews. More details on the different ways in which teams chose to involve young people in their reviews can be found in Appendix 1.

While they do not represent an exhaustive list of all possible active ingredients, the commissioned reviews have allowed us to take a bird's-eye view on aspects of the state of the science. Our aim is to provide the field with an overview, bringing together insights across a large and cross-disciplinary literature, and to signpost the way for future research. We see this report as the start of a journey towards a better understanding of both individual active ingredients and how they interact. We are pleased to be able to share these findings with the mental health science community and look forward to continuing the conversation as we work towards a world in which no one is held back by mental health problems.

What would we like you to take from this report?

We hope that this report will allow mental health scientists to know more about the state of the current evidence, and encourage them to contribute to building the evidence base further.

We need interdisciplinary collaborations to examine the interaction between the biological, psychological, and social mechanisms which underpin active ingredients. This includes considering factors that range from the cellular within the body to the structural within society. Wellcome is committed to finding ways to fund research to take this agenda forward. We hope to release details of a funding call by Spring 2022. Please keep an eye on our website: https://wellcome.org/what-we-do/mental-health

Table 1:
Active ingredients to prevent or treat youth anxiety and depression reviewed by Wellcome-funded teams (2020-21)

Behaviours and activities	Beliefs and knowledges	Brain/body functions
Behavioural activation*: increasing engagement with positive activities **Collaborative goal setting and tracking** **Engagement with the arts*** **Exposure:** facing one's fears in a planned manner* **Physical activity:** more bodily movement* **Problem solving*** **Relaxation techniques:** better stress response via relaxation* **Remote measurement technologies:** use of remote technologies to monitor changes in biology, behaviour, and environment relevant to the problems **Self-disclosure:** sharing information with others about personal experiences and characteristics	**Agency:** developing a sense of agency through social action **Cultural connection:** connection with one's own culture **Mental health literacy** **Sense of mattering*** **Sense of purpose** **Self-evaluation:** improved view of self* **Spiritual and religious beliefs**	**Circadian rhythms:** better sleep-wake cycles* **Gut microbiome:** improving gut microbial function* **Hippocampal neurogenesis:** growth of new neurons in the hippocampal region of the brain **Omega-3 supplements** **Reduced levels of inflammation in the body*** **Selective serotonin reuptake inhibitors:** use of antidepressants*
Cognitive and attentional skills	Human connections	Socioeconomic factors
Affective awareness: knowing how one feels* **Decentring:** better able to shift perspective* **Emotional controllability:** beliefs about the extent to which emotions are controllable **Emotional granularity:** improved ability to characterise emotional experiences **Emotion regulation:** improved management of emotions* **Grief reduction:** use of strategies to target feelings of grief **Helpful attentional and interpretational thinking patterns*** **Hopefulness:** learning to be more hopeful* **Mental imagery:** helpful use of emotional mental imagery* **Perfectionism reduction*** **Repetitive negative thinking reduction*** **Self-compassion***	**Communication in families** **Digital quality social connection*** **Family support** **Loneliness reduction*** **Neighbourhood cohesion:** increased neighbourhood social connection* **Peer support:** support from a peer who has experienced anxiety and/or depression **School connectedness:** sense of connection to school life **Social inclusion:** improved inclusion for those who are minoritized on the basis of their identity (e.g., sexual and gender) **Social relationships:** facilitating improvements in social relationships* **Working alliance:** a functional and collaborative relationship with a helper	**Economic transfers:** increased financial resources via cash transfers* **Urban access to green space***

*Active ingredients reviewed in 2020

Note: This is not a comprehensive list of all possible active ingredients. Wellcome selected these ingredients based on the quality of the submitted proposals, the teams' expertise, and to ensure a diverse range of ingredients were considered. Categories used are imperfect and merely for ease of navigation.

Reviewing the evidence for 27 active ingredients:

What do we know about what works, for whom, in what contexts, and why?

This section of the report brings together key learnings from the 30 reviews we commissioned in 2020, examining the evidence for 27 active ingredients of effective interventions for youth anxiety and depression.

The summaries below are presented in alphabetical order, according to the six categories shown in Table 1, starting with behaviours and activities, and ending with socioeconomic factors. For each summary we link to the full report, preprint, or publication arising from the commissioned work. Full references for the original evidence identified by the research teams can be found there.

The Team Lead for each project has been underlined in the author list at the start of each summary, to make it easier for readers to connect specific summaries with content elsewhere. For further details on author affiliations, please see Appendix 2.

Each team has also suggested specific measures to assess their active ingredient, as well as up to three references for further reading, which can be found in Appendix 3 and 4, respectively.

For further updates on this and other active ingredients work, see: https://wellcome.org/what-we-do/our-work/anxiety-depression-young-people-finding-next-generation-treatments.

Behaviours and Activities

01

Behavioural activation: increasing engagement with positive activities

Focus: Prevention and treatment of anxiety and depression

Behavioural activation (BA) helps break behavioural patterns of avoidance and withdrawal, through planned participation in enjoyable and personally meaningful activities.

There is emerging evidence suggesting that BA is an effective intervention for preventing and treating depression in adults. Evidence for its effectiveness with anxiety is less established but gradually increasing. BA involves systematically increasing an individual's participation in pleasurable activities, with the intention to increase positive reinforcement for their adaptive behaviour and decrease withdrawn or avoidant behaviours, which underpin anxiety and depression. Due to its focus on behaviour rather than more complex cognitive or emotional skills, BA is a suitable approach for addressing anxiety and depression in young people. Further, its cost-effectiveness, cultural sensitivity, and delivery by non-specialist providers mean that BA has the potential to be a readily scalable intervention that is effective in multiple settings.

Authors

Kanika Malik, Maliha Ibrahim, Adam Bernstein, Rahul KV, Tara Rai, Bruce Chorpita & Vikram Patel

Aim

The research team considered the evidence in relation to the following key questions:

- How effective is BA in the prevention and treatment of young people (aged 14-24) with anxiety and/or depression?
- How widely is BA used as a standalone intervention, as a component of cognitive behavioural therapy (CBT), or as part of coping strategies that young people find effective in alleviating anxiety and/or depression?
- How acceptable is BA as an intervention for young people?

Methodology

Using a pre-existing database of youth-focused interventions, the team performed a quantitative literature review, assessing studies where BA had been used as a standalone intervention or as a non-optional component of CBT. In the final analysis, 23 randomised controlled trials (RCTs) (involving 3,149 participants) were included. The team also performed a systematic review of qualitative/mixed-methods studies exploring young people's coping strategies, whether these were aligned with BA, and their experiences of BA interventions. In total, 37 studies were selected for review – 34 examined active coping strategies and three explored young people's experience with BA interventions.

Finally, the research team consulted with a group of young people (n=10, aged 15-24) from India with lived experience of anxiety and depression, to understand their views on the acceptability of BA and their research priorities.

Limitations included:

Key findings:
What works, for whom, in what contexts and why?

What works?

- There is evidence to suggest that BA is effective for depression in comparison to waitlist or no-treatment control groups. Comparisons to active controls indicated non-significant differences between BA and other complex psychological treatments.

- There is insufficient evidence to assess the effectiveness of BA for anxiety.

- Many strategies habitually employed by young people to cope with anxiety and depression (such as scheduling activities, engaging in pleasurable activities, and seeking spiritual guidance) are similar to those used in BA interventions.

For whom?

- The research team did not find much evidence on the efficacy of BA for specific populations.

- However, as a preventative method, there is preliminary evidence to suggest better outcomes for those who are at risk of developing depression than for those with clinical depression.

In what contexts?

- Preliminary evidence suggests more favourable outcomes when BA is delivered in a group format.

- There is evidence to suggest that BA works as both a standalone intervention and as part of CBT.

How and why?

BA's role as an active ingredient was difficult to establish in these interventions, particularly given the absence of focal assessment of activation in most studies. Understanding the underlying mechanisms of BA was therefore highlighted as a future research priority.

- all studies (except one) included in the two analyses took place in high-income settings, and the authors noted that the risk of bias was high, especially for older studies.

- as the database used for the study was still under development, the validated list of variables was not available for the RCTs targeting young people aged 20-24.

- none of the 23 RCTs included anxiety as a primary target problem, and only three studies examined BA as a standalone intervention.

- studies included greater representation of adolescents (14-19 years) than young adults (20-24 years), and females were over-represented in most studies (46 of the 60 studies had more than 50% female participants), although it is worth noting that females represent over 50% of those diagnosed with anxiety and depression.

- there was a high degree of heterogeneity across studies, involving different study designs, BA elements, and outcome measures used.

Insights from young people

- Young people engaged with BA as an intervention and concluded that scheduling and engaging in activities improved their mood and functioning.

- Positive factors, as indicated by the literature and the youth advisory group, included: the intervention can be customised to a person's needs, it can help a young person feel more in control, as well as improve self-confidence and provide satisfaction.

- Limiting factors, as indicated by the literature and the youth advisory group, included: the focus on individual responsibility for 'feeling better' or a person 'fixing themselves', and challenges associated with sustaining positive behaviour change in the long term. The youth advisory group also mentioned that a lack of attention to societal and contextual factors in BA (e.g., systemic structures or institutions that cause psychological distress, accessibility of positive activities) can be a barrier to bringing about behavioural changes.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

There is evidence for the acceptability of BA in young people, although more formal research is required. However, issues around sustainability and the focus on the individual's responsibility to 'feel better' were raised as limitations of this approach. Family and peer support is also important, for instance in providing positive reinforcement and access to meaningful activities. As it can be personalised and delivered through digital or group formats, BA can potentially be scaled globally. Issues around safety and accessibility were not discussed.

Recommendations

For practice

- BA is a potential active ingredient in multicomponent interventions for depression.

- When delivering BA as an intervention, short- and long-term engagement in behavioural changes is likely to be influenced by intensity of symptoms, levels of readiness, personal preferences for activities, and social-contextual elements.

- To scale delivery, group and/or digital forms of BA should be considered.

- BA could be improved by spreading out sessions over a longer period and providing booster sessions to help with sustainability.

For future research

- Conduct research into the effectiveness of different formats (e.g., group, digital), the mechanisms underpinning BA, and the sequencing of events (e.g., BA and associated elements such as problem solving).

- Given that the BA interventions reviewed consisted of multiple behavioural elements arranged in varying sequences across treatment protocols, dismantling studies should be conducted to identify which components of BA are more likely to be active ingredients.

- Undertake RCTs examining how BA could be applied to males, gender minorities (e.g., individuals belonging to LGBTQ+ communities), and young adults (aged 20-24 years), as well as in low-resource settings.

- Further explore the acceptability of BA to young people, including ways of improving the intervention.

02

Engagement with the arts

Focus: Prevention and treatment of anxiety and depression

Arts-based interventions involve using an art medium or discipline to improve a process or situation. They can be delivered in a range of settings and can involve various types of art activities, such as composing music, dancing, painting, acting, and journaling.

Evidence indicates that arts involvement can result in significant improvements in communication, social skills, and interpersonal relationships. By encouraging social participation and allowing individuals to give voice to their experiences, arts-based interventions can help those with anxiety and depression. While there is evidence for the effectiveness of arts-based interventions, detailed synthesis of evidence in youth is lacking.

Authors

Kamala Easwaran, Lakshmi Narasimhan, Anussha Murali, Deepika Easwaran, Tasneem Raja & Yog Varun Japee

Aim

The research team considered the evidence in relation to the following key questions:

- What does the available evidence tell us about arts-based interventions aimed at influencing the mental health of 14 to 24-year-olds experiencing depression and anxiety?
- What are youth perspectives on the role of arts-based interventions in mental health?

Methodology

The team conducted a scoping review of the existing literature on the effects of arts engagement for young people with anxiety and/or depression. They identified 546 papers for screening and included 36 published studies in their review. Alongside this, the team engaged with 18 young people from India (aged 18-24) with lived experience of anxiety and/or depression. The youth were engaged through participation in a tri-weekly, two-month multimodal arts workshop (60 hours), and in follow-up interviews (n=10) which sought to gain insight into the experience of anxiety and depression, and the role art can play in improving mental health outcomes.

Of the 36 studies reviewed, 25 were experimental (11 of which were RCTs), 9 were qualitative, and 2 were mixed-methods studies. Most studies explored multimodal interventions (n=11), followed by music (n=9) and visual art (n=7). Intervention length ranged from single sessions to more than 30 sessions, over two to six months.

Limitations included:

- the final analysis comprised many more studies from the Global North (n=27, 75%) than the Global South (n=9, 25%).
- the review did not cover passive arts-based interventions (e.g., cultural visits, reading, passive music listening).
- the overall quality of studies was poor – studies were underpowered, with medium to high risk of bias, and there was a lack of uniformity among interventions, study populations, research methods, and outcome measures used.
- few studies contained reasonably detailed descriptions of the tested interventions.
- most studies recruited participants without a formal diagnosis of anxiety and/or depression (n=25, 69%).
- only one study used a six-month follow-up, so little is known about the long-term effects of these interventions.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Current evidence indicates that arts-based interventions can feasibly be used across settings and populations as a treatment and prevention strategy for youth anxiety and depression, with positive gains.

- Among the studies using an experimental design, a significant decrease in symptoms was reported in 12 of the 16 studies using standardised measures of anxiety and depression.

- Reviewed studies indicate that there are nine essential elements of effective arts-based interventions to tackle youth anxiety and depression, including: multi-expressive (enabling self-expression in diverse ways), safe spaces (non-judgemental and compassionate sharing of experiences), self-reflective meaning-making (developing personal vocabularies), improvisational (enhancing imagination), dynamic (responsive to participant needs), participatory (driven by participant voices and actions), public performance (interactive learning spurring societal engagement), activism (art for social change), and peer engagement.

- While existing evidence cannot determine the relative importance and effectiveness of each element, interventions found to significantly reduce symptoms of anxiety and depression were characterised by the presence of significant peer engagement and youth participation mechanisms.

For whom?

- Evidence to date has mainly examined arts interventions for young people with mild to moderate anxiety and depression. We therefore do not know if these interventions are effective for youth with severe mental illness.

- Arts-based interventions appear to have strong positive outcomes for young people with experiences of trauma. For these people, art can be used to safely express, revisit, and make sense of their experiences.

In what contexts?

- Group-based interventions, encouraging social participation and self-expression, can be particularly helpful for young people.

- Arts-based interventions delivered in school settings are an effective treatment option, but are not appropriate for anxiety, depression, or post-traumatic stress disorder (PTSD) among young people in areas of active conflict.

How and why?

The potential mechanisms underpinning arts-based interventions were not discussed in detail as part of this review. However, drawing on emerging evidence, the authors propose that engagement with the arts enhances self-expression and increases self-awareness, self-efficacy, and self-esteem. Over time, this builds resilience, improves problem-solving, and enhances prosocial behaviour. It also provides a safe space for self-expression and encourages non-verbal mechanisms for sharing, which can be particularly helpful while working with vulnerable populations or youth with experiences of trauma.

Insights from young people

The young people were largely supportive of the review findings and:

- advocated strongly for early intervention and the inclusion of arts-based mental health practices in educational settings, starting as early as primary school.

- identified art as an expressive form and space free from oppressive societal expectations, where hopeful thinking was possible and one's thoughts and feelings could be expressed freely in a safe, non-judgemental space.

- envisaged arts-based interventions as part of core mental health services, packaged in a user-centric way.

- viewed art as a tool for activism and social change.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Very few studies reported attendance rates, implementation constraints, or feedback from participants. However, the reviewed evidence suggests that these interventions can be a readily available, culturally resonant, and cost-effective form of mental healthcare. Interventions must be delivered in a safe, non-judgemental, and collective space, so that young people can freely explore and express themselves among their peers. Specifically, delivering these interventions in non-clinical settings (e.g., schools) may be destigmatising and more accessible to young people.

Recommendations

For practice

- Arts engagement has significant potential as a mental health prevention, promotion, and advocacy tool for young people with depression and anxiety.

- Arts interventions should be considered for helping prevent and promote mental health. They should be integrated into educational systems for sustained engagement and the development of protective factors.

- Greater intersectoral collaboration between service users, art practitioners, and mental health professionals is needed, for a more seamless integration of arts practices into mental health services, to supplement pharmacological and psychological therapies.

- Art should be used as a catalyst for mental health advocacy and to spur youth participation in the creation of responsive, user-centric mental health services.

For future research

More robust research is needed to:

- examine the long-term effectiveness of arts-based interventions, particularly for young people with severe mental illness.

- consider whether mechanisms aimed at treating mental health issues are the same as those that should be targeted to prevent them.

03

Exposure: facing one's fears in a planned manner

Focus: Prevention and treatment of anxiety

Exposure is a form of therapy which seeks to help individuals confront their fears in a planned and often graded manner, and to stop them avoiding the things they fear.

Although exposure is considered a core component of evidence-based treatment for anxiety, it is not typically offered: a recent survey suggests that it is only used in around 15% of cases of anxiety in young people. Also, since the effectiveness of exposure has mainly been established in the adult literature, very little is currently known about its efficacy among young people aged 14-24.

Authors

Alessandra Teunisse, Lorna Pembroke, Maddison O'Gradey-Lee, Ronald Rapee, Viviana Wuthrich, Cathy Creswell & Jennifer Hudson

For information

For further information on this review, please contact the Team Lead, Jennifer Hudson: jennie.hudson@blackdog.org.au

Aim

The research team considered the evidence in relation to the following key questions:

- Does exposure work to prevent and treat anxiety disorders in young people aged 14-24?

- In which ways and in which contexts does exposure therapy work? When does it not work? Why?

- What are the barriers to delivering exposure therapy?

Methodology

The team conducted a scoping review of the literature on exposure therapy, focusing on studies that would inform the prevention and treatment of anxiety disorders among young people. They identified 3,508 papers for screening and included 64 papers in their review. In addition, the research team consulted with groups of clinicians (n=8), youth with lived experience of anxiety disorders (n=7), and parents/carers (n=5), gathering their feedback throughout the course of the project. These groups had representation from Australia, Brazil, Germany, India, Japan, Netherlands, Thailand, UK, and USA. A scientific advisory group (n=8) was also asked to provide feedback on the search strategy and the interpretation of results.

Of the 64 papers included, most were experimental and quasi-experimental studies (42%), followed by case reports and case series (28%), RCTs (17%), and cohort studies (13%). The types of anxiety disorders covered included specific phobias (30%), obsessive-compulsive disorder (OCD) (23%), PTSD (20%), performance anxiety (14%), and social anxiety (6%). Most therapeutic sessions in the studies were conducted on an individual basis (91%), and exposure was typically carried out through 'live' confrontation or via the participant's imagination, gradually increasing the level of difficulty.

Limitations included:

- few of the RCTs (n=11) directly examined the effectiveness of exposure among 14 to 24-year-olds.

- most of the reviewed studies were conducted in Western cultures and high-income contexts (91%).

- none of the reviewed studies explored exposure in the context of generalised anxiety disorder (GAD).

- exposure was typically administered alongside other strategies (e.g., relaxation, breathing exercises, psychoeducation, cognitive strategies), preventing the team from determining the exact effect of exposure.

- limited consideration of the mechanisms of change.

- few robust conclusions can be drawn given the lack of replicated research and the considerable variation in the aims and methodology (e.g., control groups, delivery of exposure) of existing studies.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Although few RCTs have examined the effectiveness of exposure among 14 to 24-year-olds, there is some evidence to suggest that exposure-based treatments work as well as, or better than, alternative treatments for youth anxiety. An RCT targeting social anxiety, for example, reported that group exposure therapy significantly reduced symptoms compared to a psychoeducation control.

- Evidence from experimental studies, case reports, and case series also supported the effectiveness of exposure in treating specific phobias, social or performance-related anxiety, OCD, and PTSD.

- In some cases, improvements in symptoms were maintained at three and six months post-treatment.

- It is not yet clear whether exposure is helpful in *preventing* anxiety disorders among young people at risk, as no papers were identified that systematically addressed this question.

- There is emerging evidence for the use of virtual reality and computer-based programmes in conducting exposure therapy, but more research is needed.

For whom?

The review did not address who benefits most from exposure therapy.

In what contexts?

Preliminary findings suggest that exposure works best when:

- fears are faced in multiple contexts (e.g., home, school, and clinic).

- exposure is made more challenging.

- individuals focus on distinctive rather than generic features of fearful memories.

- exposure-based homework is assigned and completed.

- parents/carers are involved and help the young person by continuing with exposure outside therapy, providing rewards, and modelling behaviour in fearful situations.

Preliminary evidence suggests that exposure may not work when:

- what is learnt is not practised outside of therapy

- therapy is not personalised or tailored to the young person's needs.

How and why?

Exposure therapy was originally developed from the principles of extinction learning, where exposure allows the person to habituate to the emotion of fear. However, more recently, the inhibitory learning theory model has proposed that exposure is successful because it establishes new memories about the feared object that compete with old memories. Unfortunately, most empirical evaluation of these predictions has occurred in adults, and the research team did not find any literature focusing on the mechanisms of exposure in youth.

Insights from young people

Young people provided their perspective on the factors that make exposure helpful. This included circumstances where they were motivated to face their fears; felt that they had autonomy; a solid understanding of the rationale behind exposure; a good relationship with their therapist; and a parent or carer with a clearly defined role, who knew exactly how to support them. To ensure that the young person and their caregiver are fully informed, the therapist must clearly explain the 'what', 'how', and 'why' of exposure.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?
Exposure therapy appears to be an effective treatment for young people with anxiety disorders. However, clinicians have expressed reluctance in using exposure and have raised some barriers to delivery, including their own anxiety and concern about the young person's distress, level of engagement, and reluctance to engage with feared stimuli. Contrary to suggestions that exposure may be anxiety-provoking and unacceptable to youth, a recent meta-analysis on young people (aged <17 years) with OCD found that attrition from exposure therapy was generally lower than for other therapies.

Recommendations

For practice

Evidence so far suggests that exposure-based therapies are likely to be effective in treating anxiety conditions among young people aged 14-24 years, but that barriers preventing its delivery need to be addressed.

For future research

Although the existing evidence for exposure is promising, the review team identified several fundamental gaps. They believe that a systematic programme of research is needed to examine:

- how exposure works and how this may vary across the lifespan.
- how exposure should be delivered to young people with different anxiety disorders.
- if exposure is effective in preventing anxiety problems.
- if exposure works better when combined with other strategies (e.g., breathing, cognitive strategies).
- cultural differences in how to best conduct exposure therapy, especially in collectivist cultures.

04

Physical activity: more bodily movement

Focus: Treatment of anxiety and depression

Bodily movement is a broad term that encompasses everything from activities of daily living through to exercise regimes that aim to maintain or improve physical fitness by increasing energy expenditure above rest.

Young people who experience mental ill-health tend to be less physically active than those who don't. Although there is emerging evidence that physical activity improves symptoms of depression and anxiety in adults, less is known about its effectiveness in youth. If effective, physical activity interventions may be an accessible and acceptable strategy.

Authors

Alan Bailey, Rebekah Street, Shaira Baptista, Alexandra Parker & Rosemary Purcell

For information

For further information on this review, please contact the Team Lead, Alan Bailey:
alan.bailey@orygen.org.au

Aim

The research team considered the evidence in relation to the following key questions:

- Can physical activity interventions improve symptoms in young people experiencing depression or anxiety?

- Who might these interventions work best for, and what elements of these interventions are important?

- Are physical activity interventions safe and acceptable to young people?

- How might these interventions work?

Methodology

The team conducted a systematic review and meta-analysis. They identified 1,241 papers for screening and included 36 research trials (35 of which were RCTs) in their review. The types of activities trialled were variable and included walking, running, cycling, stretching, resistance training, swimming, yoga, tai chi, dance, and talking to a mental health clinician about getting more active. Activities were completed either individually or in groups, with or without an instructor, and at a range of intensities. Average intervention length was eight weeks (range=2-14), with three sessions per week (range=1-6) lasting around 47.5 minutes (range=10-90).

In addition, the team consulted with four lived experience experts (aged 17-24) and two subject-matter experts throughout the project's conceptualisation, interpretation, and dissemination phases.

Limitations included:

- the certainty of evidence for the meta-analysis findings was rated as low for depression and very low for anxiety, mostly due to imprecision and methodological limitations of most included trials (small sample sizes, confidence intervals including both likely clinical benefit and no clinical benefit).

- all reviewed trials were conducted in high-income (n=26, 72%) or middle-income (n=10, 28%) countries.

- the average sample size for each trial was small: n=60 (range=11-176).

- trials included more females than males, with ten female-only vs three male-only trials, and with females making up 68% of the remaining trials (although females do represent over 50% of those diagnosed with anxiety and depression).

Insights from young people

Lived experience experts placed high importance on preference, choice, and flexibility in terms of the type, context, and amount of activity they did. They also suggested that not everyone would be suited to, or interested in, physical activity interventions: for some, being prescribed exercise may be perceived as unachievable or unenjoyable, and could lead to disengagement.

Key findings:
What works, for whom, in what contexts and why?

What works?

- For young people with depression, physical activity may provide a large and clinically meaningful reduction in symptoms.

  - While there is not yet enough evidence to determine if standalone physical activity works as well as established treatments for depression, evidence from one trial involving 46 participants and comparing physical activity to CBT showed similar improvements in symptoms for both treatment groups relative to control.

  - Evidence from four trials involving 297 participants also identified a small effect in favour of physical activity when combined with established treatments, compared to established treatments alone; however, it is unclear whether this is clinically meaningful.

- For young people with anxiety, evidence from six trials involving 215 participants identified a small to moderate effect, but it is unclear whether this is clinically meaningful.

For whom?

- For depression, interventions appear to perform similarly across age, gender, and symptom severity. However, inactive youth may benefit more from physical activity than active youth, who may encounter ceiling effects.

- Subgroup analyses were not conducted for anxiety given the lack of trials in this area.

In what contexts?

Any form of activity performed at any level of intensity is likely to be beneficial, although there is some evidence that higher-intensity exercises might be better. Current evidence does not support a minimum dose of activity, but some is likely better than none and more may be better than less.

How and why?

There are several mechanisms through which physical activity may positively impact on anxiety and depression, including psychological (e.g., distraction, self-efficacy, behavioural activation), neurocognitive (e.g., improved cognition, reward-processing), and biological (e.g., improved cardio-respiratory fitness and sleep, reduced cortisol, endorphin release) processes. Most likely, a combination of processes is at play.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Overall, physical activity interventions appear to be safe, scalable, and acceptable to a range of young people. Dropout rates (10-30%) were comparable to established treatments for depression and anxiety, like CBT and antidepressant treatments (20-40%). However, young people with eating disorders and physical health conditions, for example, may be at higher risk of serious adverse outcomes associated with physical activity, so safety and acceptability cannot be assumed.

Recommendations

For practice

Suitable help-seeking young people experiencing depression and/or anxiety should be offered the opportunity to engage in physical activity interventions. It is crucial to support a young person's preference for what they do, how much they do, and the contexts they do it in. Enabling autonomy is likely to lead to increased engagement, as it facilitates a perception that the physical activity is manageable, achievable, and enjoyable.

For future research

Large, high-quality studies are needed to answer the following key questions:

- What are the biological, cognitive, and social mechanisms by which physical activity improves mental health?

- Do standalone physical activity interventions work as well as, or better than established treatments?

- Does incorporating physical activity interventions alongside treatment as usual for anxiety and depression produce better outcomes than typical treatments alone?

- Are these interventions effective for anxiety, in low-income settings, and for males or non-binary youth?

Problem solving

Problem solving is the process of trying to resolve or cope with problems, both big and small, and which may be one-off events (e.g., stressful exam) or longer-term issues (e.g., bullying). Typically, problem solving involves a series of steps, including problem identification, problem definition, and the development, evaluation, selection, and implementation of solutions to problems.

Problem-solving therapy or problem-solving skills training (PST) can be offered as a standalone intervention or in combination with other approaches. In fact, PST has been identified as a core component of many evidence-based programmes for the prevention and treatment of youth anxiety and depression. Despite its widespread use, existing evidence syntheses of PST as a therapeutic approach for young people are relatively limited in their scope and conclusions. Understanding how and why this core component works could enhance the efficiency and effectiveness of prevention and treatment for young people

Wellcome commissioned three different teams to review problem solving as an active ingredient; each team took a slightly different approach to reviewing the evidence.

A. Problem solving

Focus: Prevention and treatment of depression and anxiety

Authors

Daniel Michelson, Eleanor Hodgson,
Adam Bernstein, Bruce Chorpita & Vikram Patel

Aim

The research team considered the evidence in relation to the following key questions:

- In what ways does problem solving work?
- For whom does problem solving work?
- In which contexts does problem solving work?
- Why does problem solving work?

Methodology

The team conducted an integrative narrative synthesis, involving (i) a systematic review of RCTs assessing problem solving for 14 to 24-year-olds with elevated symptoms or a diagnosis of depression, anxiety, or both; (ii) a thematic meta-synthesis of qualitative evidence on the utility and acceptability of problem solving; and (iii) consultation with an international youth advisory group. The advisory group consisted of 12 young people (aged 17-25) with lived experience of depression and/or anxiety, recruited from established groups in India and the UK.

Of the 48 RCTs identified for the systematic review, five examined PST as a standalone intervention and 43 investigated multicomponent interventions with a problem-solving element. Six qualitative studies were identified and included in the meta-synthesis of qualitative studies.

Limitations included:

- only 2 of the 48 included trials were conducted outside of high-income countries.
- a notable lack of studies measuring functional outcomes, moderators, and mediators.
- relatively scarce qualitative data on the perspectives of intervention participants and providers.

Insights from young people

The youth advisory group indicated that a key strength of PST is learning a systematic approach that can be applied to multiple situations, thus enhancing resilience to future challenges. The group also emphasised the importance of personalisation and flexibility in the delivery of treatment. In particular, youth advisors suggested that problem solving may be more suitable in the early stages of depression and anxiety, and that more severe and persistent problems are likely to require additional treatment.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The current strength of trial evidence supports the use of problem solving as a sole intervention for depression, and in combination with other approaches for anxiety. The practical focus on solving current life problems appeared to be particularly helpful in achieving positive outcomes.

- For depression, studies with PST as a standalone intervention showed a pooled controlled effect size that was moderate but did not reach significance ($g=0.51$, $SD=0.30$, $p=0.09$). In contrast, studies with PST delivered as part of a multicomponent intervention reported a pooled controlled effect size that was moderate and statistically significant ($g=0.4$, $SD=0.08$, $p<0.01$).

- For anxiety, evidence from multicomponent intervention studies showed a pooled controlled effect size that was moderate and statistically significant ($g=0.42$, $SD=0.21$, $p=0.04$).

For whom?

Based on the quantitative evidence reviewed, problem-solving interventions achieve similar outcomes regardless of the participants' ages and the severity of their symptoms.

In what contexts?

- Although problem solving has mostly been studied in high-income countries, positive results were obtained from two trials conducted in middle-income countries (India and Turkey).

- Evidence suggests that PST can be delivered effectively using a range of formats, including face-to-face therapy, computer-delivered chat therapy, and self-help booklets.

- The motivation to use problem solving – and therefore its benefits – may be strengthened by support from a warm and collaborative therapist.

How and why?

Problem-solving approaches teach skills to solve problems step by step. Beyond their impact on targeted problems, there are indications that successful problem solving can boost confidence in the ability to cope with difficult situations more generally. In turn, this could make people less avoidant and more active, leading to improved mental health.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Improved problem solving appears to be an effective active ingredient for depression, and can potentially be adapted to a wide range of stressful problems. It also has the potential to be adapted across contexts; however, problem solving may be more restricted in contexts marked by structural inequalities, where stressful social problems may be difficult to overcome by personal actions alone. The youth advisory group felt that problem solving could be usefully integrated into the school curriculum, although some advisors noted that schools (particularly in India) are not always promotive of good mental health and that a culture shift would first be required.

Recommendations

For practice

- PST may be particularly useful within a multicomponent (or modular) intervention framework, where it could be applied to achieve 'quick wins' and build motivation prior to the selection of other modules.

- The qualitative studies reviewed and the youth advisory group both highlighted the importance of having an empathetic, encouraging, and collaborative therapist as a facilitator of PST.

For future research

- Use consistent measures of problem orientation (how people see problems) and embed process evaluations within trials.

- Conduct studies with a dismantling design, to enable comparison of discrete practice elements (including problem solving) against multicomponent protocols, with the goal of identifying which components are most likely to drive effectiveness.

O5B

B. Problem solving

Focus: Prevention and treatment of depression

Authors

Jane Lewis, Jade Mitchell, Sangita Chakraborty, Bryce McLeod, Kristina Metz, Ludvig Bjørndal, Robyn Mildon & Aron Shlonsky

Aim

The research team considered the evidence in relation to the following key questions:

- Is PST, including interventions that contain PST, effective in decreasing symptoms of depression for young people?
- In which ways, in which contexts, and for whom does PST appear to work, and why?
- In which ways, in which contexts, and for whom does PST appear not to work, and why?

Methodology

The team conducted a systematic review of the evidence exploring the effectiveness and implementation of PST for the prevention and treatment of depression among 13 to 25-year-olds. They identified 902 effectiveness studies and 480 implementation studies; of these, they included 18 effectiveness studies and one implementation study in their review.

To contextualise the review, the team consulted with 14 young people (aged 15-30) and 10 practitioners providing mental health and psychosocial support to young people in Lebanon, Mexico, Myanmar, Singapore, Ukraine, the UK, USA, and Zambia.

Limitations included:

- 6 of the 18 studies reviewed (33%) did not include sample populations where depression was known to be present.
- there was substantive variability in study quality and in the intervention's dosage and fidelity monitoring.
- studies with small sample sizes (mean=173, range=26-686).
- short follow-up periods: of the 18 studies, 11 had follow-up periods of three months or less, and only 5 had periods of more than six months.
- there was little evidence addressing the fit, feasibility, or acceptability of PST interventions, reflecting a limited focus on implementation.

Insights from young people

The majority of young people consulted had not sought professional counselling, and so reported various coping mechanisms such as distraction (e.g., 'keeping busy'), high-energy activities (e.g., working out), or engaging in enjoyable activities (e.g., music). Young people felt that depression was poorly understood by their peers and society, reporting stigma as a barrier to treatment. The interviews with young people and practitioners also point to a bidirectional and possibly complex relationship between problem solving and depression.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Results were mixed in terms of reducing depression and suicidality.
- When compared with no treatment, PST was sometimes effective, even in highly controlled studies with adolescents and young adults. Yet, when compared with an active control group among adolescents and young adults with at least mild depression, PST was often no more effective than other approaches.
- As a preventative effort, the effect of PST appears limited when depression is not present.

For whom?

Based on the evidence reviewed, the authors suggest that PST may be less effective for people who have other serious mental health difficulties, or if the problems they are facing cannot easily be solved.

In what contexts?

The studies reviewed varied in terms of where they were conducted (e.g., low-, middle-, and high-income contexts), as well as the modality (e.g., online or in-person, individual or group delivery), dosage, and setting of the intervention (e.g., delivered at school, university, or youth mental health services setting). A broad conclusion might therefore be that PST can be delivered effectively in a range of different ways and contexts; however, more research is needed to validate this conclusion.

How and why?

Problem-solving approaches teach skills to solve problems step by step. The high level of heterogeneity in the studies reviewed makes it hard to discern clear patterns regarding mechanisms of action. For example, it remains unclear whether problem-solving orientation or problem-solving skills and performance are most relevant to successful symptom reduction.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Some of the studies reviewed indicated that attrition can sometimes be a challenge associated with PST interventions. Despite this, the conversations with adolescents and young adults based globally, and the reviewed studies, suggest that PST is acceptable to a range of populations and can be tailored to address different types of problems – making it a potentially accessible and scalable approach for treating depression. Young people also consistently mentioned needing to address 'the problems' causing the symptoms, including both stressors and beliefs informed by previous experiences (e.g., traumatic events). The practitioners consulted believed that teaching problem solving can help reduce stress, increase skills, and shift problem-solving orientation and self-efficacy beliefs, but that it does not meet the needs of all young people with depression, noting the need to address comorbid symptoms (i.e., trauma, anxiety) as well as underlying cognitive processes.

Recommendations

For practice

Both practitioners and young people noted the importance of individualised pathways to the development and presentation of depression.

For future research

The research team identified several shortcomings in the existing evidence exploring PST, including study design, methodology, and reporting. Future research should include:

- larger sample sizes.
- longer follow-up times.
- methods that allow for the specific effects of PST to be measured.
- appropriate reporting of the studies, to include the frequency, dosage, and timing of PST, so that we can better examine what is most effective, for whom, and in what contexts.

C. Problem solving

Focus: Treatment of depression

Authors

Karolin Krause, Darren Courtney, Benjamin Chan, Sarah Bonato, Jacqueline Relihan, Matthew Prebeg, Karleigh Darnay, Madison Aitken, Lisa Hawke, Priya Watson & Peter Szatmari

Publication

Aim

The research team considered the evidence in relation to the following key questions:

- What is the state of the conceptual and empirical literature on problem solving as an active ingredient of treatment for youth depression?
- What are young people's experiences with and perspectives on problem solving as a treatment for depression?

Methodology

The team conducted a mixed-methods scoping review to provide an overview of the available evidence relating to problem solving as an active ingredient for depression in 14 to 24-year-olds. The review integrated five types of literature: (i) theoretical studies providing definitions or conceptual discussions; (ii) qualitative studies reporting on youth experiences with PST; (iii) empirical studies examining PST-related concepts as moderators, mediators, or predictors of treatment response; (iv) controlled clinical trials testing the efficacy of standalone PST; and (v) clinical practice guidelines for youth depression. The team included 12 theoretical and 8 empirical studies in their review, as well as 23 clinical practice guidelines. An exploratory meta-analysis examined the overall effectiveness of standalone PST.

In addition, two youth partners acted as co-investigators in this review and led an informal consultation with 12 youth research advisors with lived experience of depression, to inform the review process and to help contextualise the results.

Limitations included:

- There was heterogeneity in intervention settings, age groups, and delivery formats across the four RCTs of standalone PST, and due to the small number of eligible studies, it was not possible to identify the factors driving treatment effectiveness via meta-regression.
- The overall quality of the evidence concerning standalone PST was very low. Limitations included risk of bias, imprecision due to small samples, and indirectness (i.e., only one PST trial focused on youth with a major depressive disorder (MDD) diagnosis rather than youth with mixed mental health challenges; the only high-quality trial did not administer a dedicated depression symptom measure but only a brief subscale of emotional symptoms).
- Exploratory secondary analyses of PST-related concepts as predictors, moderators, or mediators of treatment response within broader depression therapy trials were limited by design and sample size constraints.
- The evidence focused on results directly following acute treatment, so the long-term effectiveness of PST or the conditions under which long-term benefits are likely to be realised could not be examined.

Insights from young people

Youth advisors noted that young people might feel patronised if therapists define their behaviours as problematic, without appreciating their wider function in the person's life. They also commented that PST can sometimes be overly generic and schematic, focusing on superficial problems without analysing the root cause of those problems. Consequently, youth advisors suggested that PST should be youth-driven, strengths-based, comprehensive, and personalised.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The authors found tentative evidence that PST may mediate the effectiveness of CBT and may be effective alongside other components of treatment, but this came from trials that were not specifically designed or powered for this type of secondary analysis.
- A review of four RCTs found no strong evidence to support the use of standalone PST for treating depressive symptoms.

For whom?

Given limited evidence, only tentative suggestions can be made in relation to who problem solving is effective for.

- Good problem-solving ability requires a constructive and confident attitude towards problems (i.e., positive problem orientation) and the ability to approach problem solving rationally and systematically (i.e., rational problem-solving style).
- PST may be beneficial for young people who face stress from challenging events or daily hassles, and who struggle with adopting a positive problem orientation and/or with applying a rational problem-solving style, but whose mental health difficulties are relatively mild.

- Young people with significant depressive symptoms or whose depression interferes with their problem solving may need more comprehensive therapy packages, such as CBT or interpersonal psychotherapy (IPT) with PST as an adjunct therapy.

In what contexts?

Exploratory evidence suggests that PST may enhance treatment effectiveness if delivered alongside other skills training sessions in CBT.

How and why?

Comprehensive PST has two components:

- First, it helps young people develop a positive problem orientation by teaching them that challenges are an inevitable feature of life, which can often be overcome.
- Second, it teaches a sequence of four rational problem-solving steps: (i) defining and formulating the problem (this may involve breaking it down into smaller parts); (ii) brainstorming possible solutions; (iii) appraising each solution and selecting the most promising one; and (iv) implementing the preferred solution and reflecting on the outcome. Youth are encouraged to internalise this sequence to solve problems more effectively outside of therapy.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

The review did not address the safety profile of this type of intervention, however the scoping review and consultation with young people did provide some indication of its acceptability. Dropout from PST was high (41-73%) in two out of four trials of standalone PST. Youth research advisors suggested that deficit-focused language can act as a barrier to acceptability, as it can result in young people themselves feeling labelled as problematic. Instead, youth advisors suggested that strengths-based terminology might be more acceptable, although they acknowledged that there is no one-size-fits-all approach, and that problem solving may appeal to certain personalities more than others.

Recommendations

For practice

Since its development for adults in the 1970s, PST has been applied with children, adolescents, and young adults, but dedicated manuals for different developmental stages are not readily available. The authors suggest that therapy manuals should be designed and updated in consultation with young people, and that promoting strengths-based language is imperative.

For future research

- High-quality trials are needed, specifically to assess the effectiveness of PST as a standalone treatment for young people with mild, moderate, and severe depression, and to explore factors such as treatment length and module content as mediators of effectiveness.
- Dismantling studies are needed to assess the role of PST alongside other ingredients in driving the effectiveness of CBT, family therapy, or IPT.

Relaxation techniques: better stress response via relaxation

Focus: Treatment of anxiety and depression

Relaxation techniques involve somatic, cognitive, and behavioural strategies that can be used to improve our physiological response to stress. Some examples of these techniques include deep breathing, meditation, progressive muscle relaxation, imagery, and graded exposure.

Relaxation techniques such as meditation, yoga, and breathing exercises have been used to improve adolescent mental health and wellbeing globally. However, the evidence on the effectiveness of relaxation techniques in reducing distress, anxiety, and depression in adolescents is unclear. If effective, relaxation techniques may be a globally accessible and acceptable strategy for helping to treat adolescent anxiety and depression.

Authors

Syed Usman Hamdani, Zill-e-Huma,
Syed Wajeeha Zafar, Ahmed Waqas & Atif Rahman

Review submitted to Wellcome

Aim

The research team considered the evidence in relation to the following key questions:

- How do relaxation techniques work?
- How effective are they at reducing distress, anxiety, and depression?
- What experiences do adolescents have with using relaxation techniques as a treatment?

Methodology

The team conducted a systematic review and meta-analysis to evaluate the scientific literature on the effectiveness of relaxation techniques in treating adolescent distress, anxiety, and depression globally. They identified 16,816 papers and included 58 RCTs (involving 8,009 participants) in the systematic review and meta-analysis. Across these trials, relaxation techniques were mostly delivered in group formats (66%), and focused mostly on somatic (e.g., progressive muscle relaxation, breathing, walking, stretching, exercising) and cognitive techniques (e.g., imagery, meditation), which tended to be implemented as an integral component of CBT or other therapies (79%).

To explore adolescents' experiences of receiving relaxation therapy as a treatment, the research team also conducted a qualitative narrative review.

Limitations included:

- most studies were conducted in high-income countries (84%).
- most studies were delivered in an educational setting (62%) such as a school or university, and therefore little is known about how relaxation techniques may (or may not) work in other settings.
- the certainty of trial outcomes was assessed as low, mainly due to risk of bias among the included studies and the substantial heterogeneity in study design and reporting outcomes.

Insights from young people

Based on the research studies reviewed, qualitative accounts of adolescents who received relaxation training for the treatment of anxiety and depression revealed that they found relaxation techniques easy to understand, learn, and use. Some challenges were frequently reported, such as the difficulty in finding time to practise relaxation, as well as the experience of heightened sensory sensitivity, perceptual, and

Key findings:
What works, for whom, in what contexts and why?

What works?

- The evidence indicates that relaxation techniques are highly effective in treating anxiety (pooled effect size=-0.54), moderately effective in reducing distress (-0.48), and only have a weak effect on improving depression in adolescents (-0.28) aged 14-24 years.

- Somatic relaxation techniques were identified as the most effective for reducing distress and anxiety. However, the combination of somatic relaxation techniques and behavioural relaxation training yielded a slightly better (but non-significant) improvement in depression, post-intervention.

For whom?

There is little evidence on the efficacy of relaxation-based interventions for specific populations. The research team was therefore unable to specifically identify who these interventions do and do not work for.

In what contexts?

- Relaxation techniques delivered face to face yielded higher effects (-0.47) than when delivered digitally (-0.22).

- Combining relaxation training with other strategies, such as CBT and psychoeducation, resulted in a slightly greater improvement for anxiety and distress, as compared to when these techniques were delivered alone.

How and why?

Drawing on existing evidence, the team propose that relaxation techniques reduce stress by altering the somatic (physiological), cognitive (psychological), and behavioural (observable actions) responses to stressful stimuli. The relaxation response is categorised as an integrated set of physiological changes, including decrease in oxygen consumption, heart rate, arterial blood pressure, and respiratory rate, that helps individuals to deal effectively with the negative effects of stressors. It is hypothesised that this relaxation response works by activating the parasympathetic division of the autonomic nervous system to decrease physiological arousal.

physical changes when using these techniques.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

There is evidence for the feasibility and acceptability of relaxation-based interventions for adolescents. We also know that relaxation techniques can be implemented universally, and therefore have the potential to be accessible and scalable worldwide. An advantage of using relaxation techniques such as yoga, meditation, and breathing exercises is that they are widely accepted for the promotion of our mental health and wellbeing, and do not pose the risk of stigmatisation because of seeking care for mental health problems.

Recommendations

For practice

- The research team proposes that relaxation techniques should be implemented in educational settings such as schools and universities, as effectiveness has been

demonstrated in these settings.

- The average duration of an effective relaxation programme, resulting in decreased anxiety and distress as well as improved depressive symptoms, was found to be 9 (±3.37) weeks, with 3 (±1.3) sessions per week of 47.5 (±11.7) minutes each. This schedule could therefore serve as guidance for effective treatment plans.

For future research

- Investigate the effectiveness of relaxation techniques outside of educational settings and in low- and middle-income contexts.

- Design future RCTs with a relaxation technique as the standalone intervention, to isolate the true effects of this technique and improve the certainty of outcomes.

- Explore the perspectives of end users regarding the usefulness of relaxation techniques when delivered as part of multicomponent interventions.

Beliefs and knowledge

07

Sense of mattering

Focus: Prevention and treatment of anxiety and depression

Mattering is conceptualised as the extent to which we make a difference to the world we live in. It consists of three key components: (i) attention – people are aware of our presence and our unique qualities; (ii) importance – people are interested in and concerned about us; and (iii) reliance – people turn to us for help and make us feel needed.

The development of a strong sense of mattering, especially among young people, is thought to be grounded in the formation of supportive interpersonal relationships. Evidence suggests that caring for and feeling important to others can significantly boost our mental wellbeing and reduce symptoms of anxiety and depression. The social implications of the Covid-19 pandemic, involving social distancing and remote working, have also helped to emphasise the importance of mattering for our health and wellbeing. Still, very little research has been done exploring the association between mattering and the cognitive vulnerabilities underlying youth anxiety and depression.

Authors

Geckhong Yeo, Alexandria Remus, Qiao Ying Leong, Lauren Koh, Olivia Ong, Theodore Kee, Matt Oon & Dean Ho

Aim

The research team considered the evidence in relation to the following key question:

- What evidence exists on the relationship between mattering – specifically the three underlying theoretical factors (attention, importance, and reliance) – and the lived experiences of youth with anxiety and depression.

Methodology

The team conducted a scoping review to explore how a sense of mattering can help young people experiencing anxiety and depression. They identified 8,808 papers for screening and included 135 studies in their review. These were primarily quantitative cross-sectional and longitudinal studies, but included some qualitative and mixed-methods studies. In addition, the research team consulted with a group of 6 young Singaporean females (aged 19-25) with lived experience of anxiety and depression. Their feedback was collected through one-to-one virtual interviews and their perspectives were incorporated in the review.

Limitations included:

- the studies were mostly cross-sectional in design, limiting causal inferences.

- a lack of longitudinal studies that elucidate whether and how the development of the three facets of lived experience (irrational thoughts and fear, insignificance, and lack of control) relate to the emergence (or amelioration) of young people's psychological symptom.

- limited understanding on the mechanisms of change linking mattering, selfhood, and the lived experiences of young people with anxiety and depression.

Insights from young people

Young people identified with the concept of mattering, and their insights were congruent with the review findings. Specifically, they recognised the importance of peer relationships as a route to mitigating their fears and irrational thoughts. They also emphasised how developing a relationship with their environment (e.g., through fundraising and advocacy work) was a potential way to gain control over one's own life, reduce feelings of insignificance, and cultivate self-esteem. The research team also learnt that a key part of the recovery journey for depression is to establish beliefs and thoughts centred around positivity and confidence, but that this starts from recognising what self-esteem is and how it is related to one's outlook and worldview.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The research team did not find any interventions specifically targeting a sense of mattering. However, they did find evidence to suggest that mattering can be a protective factor, which reduces psychological symptoms and promotes general wellbeing.
- 14 studies found that mattering plays a key role in youth anxiety, depression, and psychological wellbeing, with a greater sense of mattering associated with less intense symptoms of anxiety and depression. What remains largely unknown, however, is whether there is a longitudinal association between mattering and these symptoms.
- Studies have demonstrated that a sense of mattering can mitigate irrational thoughts, feelings of fear, insignificance, and a lack of control – all of which are central to the lived experience of youth anxiety and depression.

For whom?

- The review found that individuals who did not develop a strong sense of self, compounded with frequent experiences of irrational thoughts, feelings of fear, a sense of insignificance, and a lack of control in their lives, benefit most from strategies seeking to increase their sense of mattering.
- In addition, the review reported:
  - significant gender differences, with mattering found to significantly predict psychological wellness in females but not in males, and females perceiving a higher overall sense of mattering

- significant age differences, with young adults feeling that they matter more to their fathers than their mothers and friends, but adolescents instead feeling that they matter more to their friends than their fathers.

In what contexts?

The review did not address what works best in different contexts

How and why?

There is only limited research examining the mechanisms linking mattering to youth mental wellbeing.

- Although related, mattering is distinct from selfhood, which is comprised of the awareness of our strengths and unique characteristics (self-knowledge), our relationships with others (interpersonal self), and the ability to have agency over our choices (self as agent).
- Both mattering and selfhood appear to predict mental wellbeing among adolescents and young adults.
- Based on their review and consultations with young people, the research team have developed a conceptual model which provides a basis for building the therapeutic potential of mattering. In their view, cultivating mattering and selfhood is important for preventing youth anxiety and depression, and can be achieved by developing meaningful and intimate relationships through peer support and engagement – targeting young people's experience of fear, lack of control, and insignificance.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

The research team did not identify any interventions specifically targeting one's sense of mattering, so it is unclear what the real-life application of this active ingredient might look like.

Recommendations

For practice

- Mattering can be harnessed as a therapeutic intervention to help alleviate irrational thoughts and fears, feelings of insignificance, and lack of control. A key part of this involves increasing opportunities for peer support.
- The research team believe that there is therapeutic potential to be drawn from the power of community

and technology. They recommend that clinicians, funders, and policymakers work together to increase the availability of mental health support (e.g., via digital infrastructure) and deepen the authenticity of peer support that leverages the lived experience of the community.

For future research

- More RCTs are needed to test the efficacy of interventions targeting mattering and selfhood as active ingredients that impact on young people's psychological symptoms.
- Moreover, given that both mattering and selfhood can influence a young person's wellbeing, it is important to understand their joint influence on anxiety and depression.

08

Self-evaluation: improved view of self

Focus: Treatment of depression

Self-evaluation involves the perceptions and beliefs that a person holds about themselves, specifically their qualities, characteristics, and traits – positive or negative. It also involves the person's judgement of the value of these attributes.

A negative self-evaluation (e.g., feelings of worthlessness) is commonly associated with depression in young people. Improving how a young person views themselves could therefore be an important factor in recovery, with self-evaluations often improving with treatment. However, further research is required to assess the effectiveness of targeted interventions to improve self-evaluation.

Authors

Faith Orchard, Juliette Westbrook, Brioney Gee, Tim Clarke, Sophie Allan & Laura Pass

Aim

The research team considered the evidence in relation to the following key questions:

- What does self-evaluation look like in adolescent depression and where does it come from?
- Is improved self-evaluation an active ingredient for the treatment of adolescent depression?

Methodology

The team conducted a systematic literature search, which included quantitative and qualitative studies on self-evaluation. Inclusion criteria included participants aged between 11 and 24 with elevated symptoms or a diagnosis of depression. They identified 7,148 papers for screening and included 46 studies in their final review. In addition, the team consulted with expert advisory groups of young people with lived experience of depression (n=25, aged 11-24), clinicians (n=30), and youth mental health researchers (n=9).

Limitations included:

- there are a limited number of published studies available on this topic.
- correlational and experimental designs were not included in the analysis of this review.
- only studies involving people with elevated symptoms or a diagnosis of depression were included in this review, which limits what can be said about self-evaluation among individuals with mild to moderate depression.
- the review did not assess publication bias or study quality.

Insights from young people

Young people suggested that treatments should place more emphasis on 'view of self'. The need for a safe, non-judgemental, and trusting relationship with health professionals was also highlighted. The group suggested that online modes of delivery might be an easier and more accessible option for working on self-evaluation, as this could provide a less pressured environment. Finally, the group highlighted the need for reliable measures of self-evaluation. While questionnaires were viewed as a useful tool, young people reflected on how easy it is to be dishonest when answering the questions, something that they thought would be picked up more easily in a face-to-face interaction.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The way in which depressed young people view themselves can be improved, however current treatments rarely target this directly. Despite this, all psychological intervention studies reviewed reported improvements in self-evaluation. Pharmacological studies were varied and reported mixed findings.
- The literature suggests a bidirectional relationship, where poor self-concept is influenced by a history of elevated depression symptoms, and poor self-concept increases the future risk of depression.

For whom?

Based on existing evidence, we do not yet know what works best for whom. However, we do know that:

- Younger participants (aged 12-18) show greater improvements in self-concept than older participants (aged 19-24), suggesting that it may be harder to shift self-evaluations among older individuals who have a more stable self-concept. Although self-concept and self-evaluation are overlapping constructs, self-concept is a constructed view of oneself, which is developed through experiences and evaluations adopted from others.
- Chronic or co-occurring health conditions, like borderline personality disorder, can worsen the extent of negative self-evaluation.

In what contexts?

The review did not address what works best in different contexts, but the team did find evidence to suggest that:

- Self-evaluation is complex. In addition to feelings of worthlessness, reports of negative perceptions of physical appearance are common, while other prosocial positive attributes can remain intact (e.g., kindness, helpfulness). Not only is the content important, but also the value placed on traits and the frequency of evaluation. Given this complexity, it is important to treat each person as an individual and customise treatment accordingly.
- Self-evaluation is influenced by the wider social environment. Not only do young people compare themselves to others, but they also reflect on how others view them, which influences their perception of self. Peer relationships therefore appear to be particularly important.
- Gender stereotypes and mental health stigma can also feed into negative self-evaluation (e.g., descriptions of people with depression as 'lazy', or perceived judgement by family members).

How and why?

Young people discussed how self-evaluation can be influenced by cognitive negative cycles (e.g., lack of motivation, overthinking) and negative perceptions exacerbated by self-neglect.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Young people felt that self-evaluation was important and that treatment approaches could be improved. Treatment should be targeted to the needs of the individual and take place in a safe, non-hostile environment. Barriers to delivery include the need for sufficient time to explore the 'self' and that correct treatment regimens are too short-term. Self-evaluation is currently not treated as a priority. Scalability could be improved by using online formats, although the efficacy of this would need to be assessed in a controlled study. Accessibility was not directly reported by the team.

Recommendations

For practice

- Given the complexity of self-evaluation, an individualised approach to treatment is essential and it should be performed in a safe, trusting environment, in collaboration with the young person.
- Novel delivery approaches for self-expression include creative writing and drawing.

For future research

- The causal relationship between self-evaluation and depression is currently unknown and requires investigation.
- There is little evidence on the underlying mechanisms of self-evaluation, and future studies should prioritise exploring this.
- Standardisation of self-evaluation measures would be beneficial.
- Further research should explore how self-evaluation changes during different therapeutic approaches, and determine if direct intervention is required.

Brain/body functions

09

Circadian rhythms: better sleep-wake cycles

Focus: Prevention and treatment of depression

Circadian rhythms are internally generated (near 24-hour) oscillations which influence and regulate the timing of almost all human behaviour and physiology. The sleep-wake cycle is one of these rhythms.

Disturbances or abnormalities in circadian rhythms, including the 24-hour sleep-wake cycle, are common in people with mood disorders. As the onset of depression typically occurs during adolescence and early adulthood, when circadian systems are still maturing, it is possible that circadian rhythm disturbances during these periods may play a role in the development of depression, at least for some individuals. Targeting this system through circadian-based therapies could therefore offer an early intervention strategy for the prevention or treatment of youth depression.

Authors

Jacob Crouse, Joanne Carpenter, Yun Ju Christine Song, Samuel Hockey, Sharon Naismith, Ronald Grunstein, Elizabeth Scott, Kathleen Merikangas, Jan Scott & Ian Hickie

Publication

Aim

The research team considered the evidence in relation to the following key questions:

- Is there a link between depression and circadian rhythm disturbances?
- What is the developmental pathway from sleep-wake disturbances to depression and mood disorders?
- Does this pathway offer clinical utility for preventing or treating depression through circadian-targeted therapies?

Methodology

The team conducted a selective narrative review of the literature, detailing the (i) basic biology of circadian systems and disturbances; (ii) changes that occur during adolescence; (iii) community and clinical studies linking sleep-wake disturbances with depression; and (iv) clinical trials of different environmental and pharmacological interventions which explicitly target the circadian system. The environmental interventions explored involved light exposure and phototherapy, sleep-wake cycles, circadian preferences, and motor activity. The pharmacological interventions reviewed were melatonin and melatonergic agonists and analogues, psychostimulants and wakefulness-promoting agents, orexin antagonists, lithium, and ketamine.

As a component of the review process, the team held a workshop with a group of 11 young people (aged 18-30) with lived experience of mental ill-health, and embedded their quotes throughout the review.

99 papers (including reviews, animal studies, and community/clinical studies) were referenced in the review, including around 30 studies which related specifically to sleep-wake cycles and mental health in young people (aged 12-30).

Limitations included:

- a lack of research involving young people aged 14-24 years, with only 13 community/clinical studies including participants within this age range.
- the clinical observational and experimental studies in young people had small sample sizes (average sample size≈150, range=24-802).

Key findings:
What works, for whom, in what contexts and why?

What works?

- Evidence indicates that several strategies can help maintain a strong sleep-wake cycle and good mood, including exposure to bright light in the morning and throughout the day, minimising light exposure in the evening, being physically active throughout the day, and keeping to a regular and predictable sleep schedule.

- Circadian-based strategies have shown some evidence of efficacy in reducing depressive symptoms in trials, but more research is needed relating to specific medications that act on the biology of the circadian system.

- Light therapy has shown superiority over placebo treatments in reducing the severity of depressive symptoms.

- A small study (n=24) on an intervention that included a course of antidepressants (agomelatine) reported reduction in symptom severity, increased sleep time, as well as earlier and longer sleep times.

For whom?

There may be subgroups of patients for whom circadian-based therapies are particularly effective. Cluster analysis has shown that those presenting with delayed sleep-wake cycle disturbances (meaning they go to sleep later and wake up later than is considered normal) are most likely to benefit from these interventions.

In what contexts?

The review did not address what works best in different contexts.

How and why?

Interventions targeting the circadian system aim to produce a phase advance in circadian rhythms to counteract the phase delay commonly observed in depression. This means moving bedtime and wake-up times to earlier in the day. The authors also propose that regulation in sleep patterns could be one of the mechanisms that underpins the link between increased motor activity and improved symptoms of depression.

Insights from young people

One of the individuals consulted with noted that they had never spoken about sleep with a professional; they felt there was an opportunity to educate and empower people about what sleep might mean for them and their mental health. Another individual noted that interrupted sleep was the factor that drove them to seek help for their mental health difficulties. The young people also highlighted that sleep interventions would have to be tailored to the individual's personal circumstances and routine, to yield the desired impact of reduced depressive symptoms.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

The maintenance of sleep-wake cycles can be challenging for some young people, due to social and environmental factors such as school, work, and other responsibilities. For some, this may represent a barrier to engaging with this type of intervention.

Recommendations

For practice

- Public health approaches are needed to educate young people and their parents about the importance of circadian rhythms for mental health.

- Improved assessments of adolescents at risk of developing sleep-wake circadian disturbances, or with the propensity for being 'night owls' (i.e., 'evening-type' chronotypes), are needed in specialist settings, to assess if it is useful to deliver interventions that reduce environmental disruptions to their sleep-wake cycles.

- Policymakers should begin to consider changes to school start times, as there is some evidence that this may improve both mental health and school outcomes.

For future research

- Use longitudinal studies to assess whether, for some people, circadian rhythm disturbances may precede depression.

- Conduct studies modelling the interrelationship between circadian rhythms, mental health, light exposure, physical activity, and energy expenditure.

- Explore the contexts in which these interventions are effective, and determine more precisely who they do and don't work for.

10

Gut microbiome: improving gut microbial function

Focus: Treatment of anxiety

The gut microbiome refers to the composition and abundance of bacteria in the gut, and specifically the genes and genomes of the microbiota, as well as the products of the microbiota and the host environment. It is influenced by factors such as diet and stress, and communicates with the brain via the gut-brain axis.

Research has shown that aberrant functioning of different microorganisms in the gut (dysbiosis) may lead to psychological abnormalities that are associated with anxiety. Both animal and human research also suggest that adolescence is a sensitive period when the gut-brain axis is being fine-tuned. Dietary interventions that change the gut microbiome during this period may therefore have profound consequences for mental health. Nutrition-based interventions involving, for example, prebiotics and probiotics may represent an affordable and accessible mental health-promoting option.

Authors

Kathrin Cohen Kadosh, Melissa Basso, Paul Knytl, Nicola Johnstone, Jennifer Lau & Glenn Gibson

Aim

The research team considered the evidence in relation to the following key question:

- Can dietary interventions involving prebiotics and/or probiotics reduce anxiety in young people?

Methodology

The team conducted a systematic review and meta-analysis of the effects of dietary interventions (e.g., psychobiotics) on youth anxiety. They identified 5,416 studies, of which 14 were eligible for inclusion in the systematic review. Of these 14, 10 studies (comprising a total of 324 experimental subjects and 293 controls) were included in a meta-analysis. Finally, the team also conducted an online questionnaire of open-ended questions, which was completed by 46 young people with lived experience of anxiety (mean age=18.3 years, SD=2.6 years; 4 males), and they conducted a focus group discussion with a subset of 5 young people (aged 14-17 years, 1 male).

Limitations included:

- the age range of study participants was 10-24 years, making it difficult to compare effects across specific age groups.
- heterogeneous study designs with, for example, different intervention lengths, dosages, and types of bacteria given.

Insights from young people

Young people welcomed being asked about their diet and described being ready to embrace new guidance. They spoke about how they had changed their diet to try and modulate their anxiety, and highlighted the ease of implementation (i.e., an intervention that can be done at your kitchen table) with little stigma attached. However, it was also noted that commercially available probiotics are confusing, and that guidance on specific bacterial strains would be welcome. They suggested that future research should look at the 'bigger picture' and consider an individual's personal characteristics and circumstances, including factors such as sleep and exercise. Furthermore, young people cautioned against collecting data on nutritional intake, as this could risk triggering disordered eating.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Existing animal research suggests that psychobiotics (e.g., probiotics for brain function) have psychotropic effects. For example, studies on mice have shown that psychobiotics can reduce anxiety-related behaviour and stress-induced corticosterone levels.

- However, there is currently limited evidence for the use of psychobiotics to treat stress and anxiety in young people. The researchers found mixed evidence for the efficacy of prebiotics and probiotics, likely due to a high risk of bias present in all but one of the studies included.

For whom?

Few studies have investigated demographic differences, so little is known about what works best for whom. The vast majority of studies have focused on adult clinical samples. However, based on existing (limited) evidence, it is speculated that the strongest effects may be found in individuals with highly anxious traits or in those with a compromised gut microbiome.

In what contexts?

The review did not address what works best in different contexts.

How and why?

- The gut and brain are connected via an axis, which involves bidirectional communication through neural, endocrine, and immune pathways.

- Probiotics are live bacteria that, depending on the strain, can release neuroactive substances such as GABA, serotonin, and acetylcholine. It is hypothesised that this is the source of their psychotropic effects in animal studies, as these neurotransmitters are known to modulate mood.

- Prebiotics are non-digestible food ingredients that selectively feed beneficial gut bacteria, stimulating their growth and activities such as the release of anti-inflammatory cytokines. Given that high levels of inflammation are correlated with anxiety, anti-inflammatory cytokine activity is a potential mechanism by which anxiety can be reduced; however, further evidence is needed to confirm this.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Aside from the mixed evidence for the efficacy of psychobiotics, researchers identified sporadic reports of adverse effects in 2 of the 14 reviewed studies, with participants reporting an increase in anxiety/ stress symptoms after the intervention. Young people were interested in this area of research, but discouraged a prescriptive approach that would require a change in diet irrespective of their personal circumstances and preferences. Despite this, an advantage of this type of intervention is the existing cross-cultural prevalence of fermented psychobiotic-rich foods (e.g., kimchi, bao, kefir), which make this an affordable and accessible option – provided efficacy is identified through further investigation.

Recommendations

For practice

Young people have said they do not want unrealistic advice on what to eat, but could benefit from understanding the evidence that underpins how specific strains of psychobiotics might influence anxiety.

For future research

Research needs to focus on translating animal findings into human studies, using rigorous methodology that considers the complex interplay of genetic, environmental, and brain maturational factors that shape psychological functioning. Future studies should:

- involve subclinically and clinically anxious populations.

- use validated anxiety instruments, and include microbiome sequencing to assess the direct impact of the intervention on the gut microbiome.

- explore the key outstanding question of who is most or least likely to benefit from this type of intervention.

- determine long-term effects of prebiotic and probiotic use, as well as the most efficacious forms.

11

Reduced levels of inflammation in the body

Focus: Prevention and treatment of depression

Inflammation is the immune system's defensive response to injury and infection, signalling to the body that it must heal and repair damaged tissue as well as defend itself against foreign threats such as viruses and bacteria.

Emerging evidence suggests that depression can affect our physical health, and that inflammation may play an important role. For example, adults with depression tend to have higher inflammatory markers than those without; depression has a high comorbidity with inflammatory conditions (e.g., rheumatoid arthritis, obesity, inflammatory bowel disease, chronic pain); and individuals receiving immunotherapy for HIV, hepatitis C, or cancer often develop depressive symptoms. Despite this, little is currently known about inflammation in young people with depression, even though adolescence represents a period in which the immune system undergoes major change.

Authors

Yara Toenders, Liliana Laskaris, Christopher Davey, Michael Berk, Yuri Milaneschi, Femke Lamers, Brenda Penninx & Lianne Schmaal

Aim

The research team considered the evidence in relation to the following key questions:

- Is there an association between inflammation and depression in young people?
- What are the mechanisms by which this association is influenced by the adolescent and pubertal context?

Methodology

The team conducted a systematic review of the literature examining the association between inflammation and depression in youth. They also proposed potential biological mechanisms to explain this association. 1,639 papers were identified and 109 studies covering a range of methodologies were included:

- 30 case-control studies examining differences between young people with MDD and healthy controls.
- 21 studies exploring associations between dimensional measures of depression and inflammation.
- 56 longitudinal studies, including naturalistic (n=27), intervention (n=16), and biological induction studies (n=15).

The findings of the review were discussed with two young people with lived experience of depression (aged 15-25), who advised the team on what to focus on.

Limitations included:

- the heterogeneity of the included studies, which varied in terms of study design, sample population, and inflammatory markers assessed, limiting the ability to draw conclusions about specific inflammatory cytokines.

Insights from young people

Young people were particularly interested in the fact that anti-inflammatory treatment might only work for some young people with depression, such as those who show signs of inflammatory depression.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

The literature assessing the effect of treatment on inflammation and depression in youth is very limited, so the review did not address the real-life application of targeting inflammation.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The 16 intervention studies included in this review – aiming to assess the effects of CBT (n=5), antidepressants (n=6), anti-inflammatory medication (n=2), exercise (n=2), and meditation (n=1) on inflammatory markers and depressive symptoms – were highly inconsistent.
- While all studies showed that selective serotonin reuptake inhibitors (SSRIs) reduced depressive symptoms for some participants and influenced the levels of at least one cytokine, both increases and decreases in cytokine levels were observed, which did not always align with the anti-inflammatory nature of each cytokine. Adult studies have shown more consistent anti-inflammatory effects of antidepressants. The inconsistent findings in young people may be due to variability in the type, dose, and duration of use of the SSRI, as well as the type of cytokine measured.
- Overall, some treatments (e.g., antidepressants, CBT) affected both mood and inflammation, while others (e.g., anti-inflammatory medication, mindfulness, diet, exercise) have not yet been sufficiently studied to draw firm conclusions.

For whom?

- The review did not address who benefits most from strategies seeking to reduce inflammation.
- While not all young people with depression show signs of inflammation, the team found that some individuals appear to be more vulnerable to inflammation than others. Risk factors include being female, leading an unhealthy lifestyle (e.g., smoking, poor diet, physical inactivity), experiencing high levels of stress or early life adversity, experiencing more severe depression, reporting certain depressive symptoms (e.g., fatigue, sleep disturbances, changes in appetite and weight), and possessing specific genetic risk profiles.
- What remains unclear is whether high-risk individuals would be those most helped by interventions targeting inflammation.

In what contexts?

The review did not address what works best in different contexts.

How and why?

The research team did not discuss the mechanisms by which reducing inflammation works to prevent or treat youth depression. Instead, they focused on the mechanisms by which inflammation may contribute to this problem. The team hypothesise that there are multiple inflammatory pathways at play, with different pathways contributing to distinct symptom profiles. Their proposed pathways are preliminary and mostly based on adult literature; they include long-term stress or trauma, resulting in hypothalamic-pituitary-adrenal (HPA) axis dysregulation and increases in pro-inflammatory cytokines, contributing to a metabolic dysregulation. Acute stress stimulates the HPA axis, which results in cortisol binding to the glucocorticoid receptor on cells involved in the immune pathway, and this temporarily suppresses inflammatory cytokine release. However, under long-term stress, the glucocorticoid receptors become resistant to cortisol binding and can no longer suppress inflammatory cytokine release.

Recommendations

For practice

There appears to be evidence for a bidirectional association between inflammation and depression in youth, however the association is subtle, and the results are inconsistent. This may be because of differences between the reviewed studies, or because only *some* young people with depression show inflammation. In future, targeting inflammation may be a promising add-on treatment for young people with depression who also show signs of inflammation.

- Young people with depression could be screened for inflammation using, for example, a blood test.
- If inflammation is detected, the cause of the inflammation should then be investigated.
- Assuming the inflammation was not caused by an underlying infection or autoimmune disease, anti-inflammatory treatment should be considered in addition to the treatment for depression.

For future research

Future studies are needed to:

- explore the dynamic nature of cytokines, including their interaction and variation throughout development
- characterise inflammatory pathways and their relationship to specific symptom profiles in youth depression
- evaluate the validity of the hypothesised inflammatory pathways and the suggested interventions targeting specific aspects of these pathways
- test the efficacy of anti-inflammatory treatments, including anti-inflammatory medication, antidepressants, and lifestyle interventions (e.g., exercise, diet, mindfulness) in large samples of young people with depression, expanding beyond the examination of individual cytokine levels.

12

Selective serotonin reuptake inhibitors: use of antidepressants

Focus: Treatment of anxiety and depression

Selective serotonin reuptake inhibitors (SSRIs) are a widely used type of antidepressant, and the only type currently licensed in the UK and US for the treatment of depression in young people.

Despite guidelines limiting antidepressant use in young people, prescription rates have been rising in the US, UK, and other European countries since the early 2000s. In the UK alone, SSRI prescriptions for 12 to 17-year-olds more than doubled between 2005 and 2017, with females particularly affected. As adolescence is a time of substantial brain and behavioural change, it is important to understand the effects of SSRIs in youth, so informed decisions can be made.

Authors

Susannah Murphy, Liliana Capitão, Sophie Giles, Philip Cowen, Argyris Stringaris & Catherine Harmer

Aim

The research team considered the evidence in relation to the following key questions:

- Are SSRIs an effective treatment for depression and anxiety in young people?
- What are the risks of SSRI treatment in young people?
- What are the potential mechanisms of SSRI action in young people?
- For whom and in what contexts do SSRI treatments work best? What factors increase and decrease their efficacy?
- What are the current gaps in our understanding of SSRI use in young people?

Methodology

The team conducted a representative review of grey and peer-reviewed literature. Over 2,000 papers were screened and 156 studies covering a range of methodologies were included:

- meta-analyses and RCTs were used to determine SSRI efficacy.
- epidemiological and observational studies were assessed to determine the benefits and risks of SSRIs.

- preclinical studies of animal models exposed to SSRIs early in development helped elucidate potential mechanisms.

The review was written with input from a youth advisory group comprising 15 young people (aged 15-24), with different backgrounds, ethnicities, genders, and a range of lived experiences of depression and anxiety. Some of the young people had taken or were currently taking antidepressants, others had considered taking them but had decided not to, and some had supported other young people (e.g., friends, relatives) taking antidepressants.

Limitations included:

- inconsistencies between results from different trials, making effect sizes difficult to estimate.
- lack of statistical power in studies exploring predictors of treatment.
- most studies exploring mechanisms of treatment did not include a placebo control, making it hard to determine the treatment effect compared to the effects of repeat testing or recovery from depression.
- trials of SSRI action usually did not include a focus on symptoms, side effects, or experiences, which have been highlighted as important to young people with anxiety or depression.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Meta-analyses of clinical trials have shown that SSRIs are an effective treatment for youth depression and anxiety, with some evidence suggesting that SSRIs are more effective than CBT.

- Based on a high-quality study conducted in the US with 439 12 to 17-year-olds, the rate of response to the SSRI fluoxetine (61%) was higher than to CBT (43%) or placebo (35%). Fluoxetine combined with CBT provided additional benefits to fluoxetine alone, but this was not evident for those with severe depression.

- In another study focusing on youth anxiety, the combination of the SSRI sertraline and CBT was shown to be more effective than either treatment alone.

- There is therefore some evidence that SSRI use in young people may work best when combined with established therapies like CBT, but more research is needed to understand how best to do this.

For whom?

- Although not all young people are helped by SSRIs, SSRI treatment is particularly beneficial for those with severe symptoms or where psychological therapy alone is ineffective.

- Existing research has mainly focused on factors predicting non-response, with the following individuals finding it harder to benefit from treatment:

  - individuals with comorbidities, such as OCD, attention deficit hyperactivity disorder (ADHD), or substance abuse.

  - individuals with specific symptoms, like high levels of inflammation, cognitive dysfunction, or anhedonia.

  - individuals exposed to high levels of family conflict.

In what contexts?

The review did not address what works best in different contexts, since there was limited research in this area.

How and why?

Evidence so far suggests that SSRIs work by blocking serotonin transporters in the brain, leading to increased levels of serotonin – a multifaceted neurotransmitter believed to help modulate mood. This release of serotonin is thought to impact on our corticolimbic circuitry, changing neural activity and enhancing our ability to process information and regulate emotion, ultimately improving symptoms of depression and anxiety. While the effects of SSRIs occur quickly, they are not an instant fix and do not immediately ameliorate symptoms. Instead, they provide individuals with tools to help them better cope with the stressors around them.

Insights from young people

Youth advisors provided examples of how SSRIs had helped them cope with stress, interact more meaningfully with others, and engage more fully in therapy. Some felt that the SSRIs had helped validate their diagnosis, but others referred to the social stigma associated with taking antidepressants. There were also some concerns raised about side effects, long-term impact, and issues related to stopping treatment.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Young people beginning SSRI treatment commonly report headaches, feelings of agitation, nausea, and abdominal pain. However, the low discontinuation rate of SSRIs suggests that these symptoms are manageable and decline over time. Also common are psychiatric adverse effects such as increased impulsivity, restlessness, insomnia, and aggression, which affect around 11-14% of young people and are associated with high levels of treatment discontinuation. Related to this, there is real concern that SSRI treatment might be associated with an increased risk of suicidality, but there is limited research to support this. In fact, no suicides have been reported during any antidepressant trial, and one study that actively included suicidal patients reported a decrease in suicidality with SSRI treatment.

Recommendations

For practice

Despite the many unknowns regarding SSRI treatment in young people, evidence so far suggests that SSRIs are effective for those with depression and anxiety. The risks associated with taking SSRIs must therefore be carefully balanced against the risks of not properly treating young people.

For future research

Some of the key outstanding questions about the effects of SSRIs in youth include:

- How exactly do SSRIs work in young people, and how does this differ from how they work in adults?

- How can we best combine psychological and pharmacological therapies?

- What are the effects of SSRIs on cognition (e.g., ability to think clearly, attention, memory, planning)?

- Who is most or least likely to benefit from SSRIs? Which symptoms are not well treated by them? Why?

- What are the possible long-term effects of SSRIs on the developing brain and body?

Cognitive and attentional skills

13

Affective awareness: knowing how one feels

Focus: Prevention and treatment of depression

Affective awareness is defined as the ability to perceive, describe, understand, and differentiate emotions and moods.

Research has shown that affective awareness (or lack thereof) is linked to the development and maintenance of depressive symptoms in young people. Affective awareness undergoes critical development during adolescence and is a key building block for other important age-related emotional processes, including emotional regulation. Therefore, approaches that aim t o improve affective awareness, such as ecological momentary assessment (EMA) methods, may be a promising strategy to prevent or treat youth depression. Despite this potential, research is currently lacking.

Authors

Joanne Beames, Katarina Kikas & Aliza Werner-Seidler

Aim

The research team considered the evidence in relation to the following key questions:

- Does EMA increase affective awareness and reduce depressive symptoms in young people?
- What do experts think about affective awareness and using EMA in daily life, in and outside of therapy?
- What are the gaps between research, clinical practice, and what young people do in their daily lives?

Methodology

Guided by these research questions, the team conducted a narrative review. Studies had to include young people aged between 14 and 20, subclinical or non-clinical samples, a measure or report of affective awareness (i.e., self-report or verbal report), phone-based EMA methodology, and a measure of depressive symptoms. The team included 11 relevant articles in their review. In addition, they gathered data from 20 young people (aged 16-20) and 5 clinical psychologists through surveys, interviews, and focus groups, and from publicly available online sources (e.g., forums). The latter sources were explored to gauge what digital monitoring tools were being recommended in the public domain. The insights gathered informed the interpretation of the review findings.

Limitations included:

- few studies (i.e., only 11) have explored EMA and affective awareness in relation to youth depression, and in the studies that have, there is substantial variation in quality and methodologies used
- the expert groups are unlikely to be representative of young people in general or psychologists involved in care, due to the recruitment strategy.

Insights from young people

All the young people interviewed felt that affective awareness (or lack thereof) is related to depression. Most described this in terms of contributing to a pre-existing problem, rather than increasing vulnerability. Even though half of the young people interviewed had not previously monitored their mood, most thought it was potentially a good way of reducing depressive symptoms, particularly when used as an early intervention strategy. However, some young people and experts did suggest that EMA would not be sufficient as a standalone treatment, and instead should be used to supplement other mental health interventions.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Evidence shows that EMA indirectly reduces depression by heightening affective awareness, including among subclinical and clinical samples. EMA may therefore be a valuable early intervention and treatment approach.

- Research gaps mean that EMA's preventative effects are less clear:
  - The literature and expert insights indicate that EMA may be less effective as a preventative tool, due to a diminished motivation to monitor mood when young people are not symptomatic.
  - However, some psychologists did identify links between building awareness during early life and other cognitive and emotional skills which may prevent depression from developing.

For whom?

The literature reviewed by the research team did not comprehensively explore who benefits most from EMA or increased affective awareness. However, there is some evidence to suggest that EMA is particularly beneficial among subclinical samples, and that age and sex may moderate the relationship between difficulties with affective awareness and depression.

In what contexts?

The research team did not identify literature on what works best in different contexts. However, some research has shown that EMA reduces depressive symptoms when used as a standalone intervention or as part of a broader intervention.

How and why?

The research team presented two pathways through which affective awareness may influence depressive symptoms:

- Increased affective awareness may directly reduce depressive symptoms (or prevent their occurrence).

- Increased affective awareness may influence depression through links with other active ingredients. For instance, it may facilitate the use of other skills, such as emotional intelligence and regulation, problem solving, thought evaluation, and reflection. It is also possible that increased affective awareness may help young people to consolidate their identity, by helping them to understand themselves and better navigate interpersonal relationships.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

EMA has the potential to be scalable worldwide, as it overcomes numerous barriers associated with traditional pen-and-paper methods. For instance, EMA minimises the risk that young people will forget to monitor their mood and reduces the challenges of retrospective reporting. Smartphone EMA also has high reach, with minimal additional costs or resources. Encouragingly, this report found that young people, psychologists, and the wider public are interested in using EMA. However, there are numerous barriers to real-life application, including motivation, technical issues, difficulties interpreting EMA data, and concerns around data privacy.

Recommendations

For practice

- Repositories of monitoring apps, which have been reviewed for quality, should be publicly available to young people and psychologists. This could include an embedded social forum that facilitates the sharing of personal recommendations.

- Young people's needs and preferences should be considered when scaling up EMA.

- Action should be taken to help develop affective awareness earlier in life, including through childhood learning programmes in schools and early education contexts.

For future research

- A systematic approach to research must be taken, including an examination of (i) how affective awareness develops over time for different individuals; (ii) how EMA can be used to measure and/or increase affective awareness; (iii) the functionality of EMA; and (iv) what young people want in an EMA monitoring app.

- Research should identify the ideal parameters for EMA methodologies (e.g., number of daily prompts), with a focus on balancing research rigour with practical relevance and priorities set by young people.

14

Decentring: better able to shift perspective

Focus: Prevention and treatment of anxiety and depression

Decentring describes an ability to notice day-to-day psychological stressors (e.g., negative thoughts, feelings, and memories) from a distanced self-perspective. It is an ability to disengage from the content of negative inner experiences by noticing them more objectively, as products of the mind rather than genuine truths.

Decentring is a ubiquitous therapeutic concept that features in multiple psychological interventions. It is thought to dampen the impact associated with psychological stressors that might otherwise increase mental ill-health in vulnerable individuals. As a widely used therapeutic approach, understanding whether, how, why, and when decentring alleviates youth anxiety and depression is necessary to better comprehend this approach and the context in which it is (and isn't) effective.

Authors

Marc Bennett, Rachel Knight, Shivam Patel, Tierney So, Tamsin Ford & Tim Dalgleish

Publication

See also Appendix 4 for details of a follow-up trial, building on the findings of this review

Aim

The research team considered the evidence in relation to the following key questions:

- What is decentring?
- How does decentring relate to anxiety and depression?
- What is the mediating role of decentring in psychological interventions?
- What do young people think of decentring as a treatment option?

Methodology

The team conducted a narrative review following a systematic search of the literature. They identified 1,414 papers for screening and included 151 in their review. Based on the reviewed literature, the team presented a novel conceptual integration of decentring. They also established a youth advisory panel comprised of four young people (aged 14-25 years) who had a special interest in mental health; they provided expert feedback to the research team and helped shape the report.

Limitations included:

- most clinical trials seemed to focus on symptomatic adults rather than pre-symptomatic young people.
- clinical trials lacked sufficient temporal resolution to detect if improvements in decentring take place before decreases in symptom severity.
- reliably measuring decentring is difficult because assessments of different approaches target different features, which complicated analysis of outcomes in the literature.

Insights from young people

The youth advisors highlighted that social influence and age may be an important factor underlying the effective use of decentring as a technique. For example, it was noted that during teenage years it can be hard to objectively interpret thoughts and feelings if you're not yet self-aware or 'in tune' with yourself. In such cases, imagining events from a friends point-of-view can be helpful. They discussed its use as a tool to help them see the 'bigger picture' and suggested that some individuals may benefit from being trained to use it while others may feel discouraged if they are unable to feel better after trying it. The user experience was therefore deemed an important component of future research.

Key findings:
What works, for whom, in what contexts and why?

What works?

The evidence indicates that decentring mitigates mental ill-health by dampening the emotional impact of day-to-day psychological stressors that otherwise increase risk for depression and anxiety.

- For example, laboratory-based experimental studies with children and adolescents indicate that adopting a decentred perspective (e.g., instructions to adopt a third-person perspective or re-perceive events 'as if watching themselves in a movie') dampens emotional reactivity towards aversive stimuli.

- The research team also identified 20 papers which indicated that strengthening decentring abilities is a core component of psychological interventions for anxiety and depression, such as CBT, acceptance-based treatments, and mindfulness-based cognitive therapy.

- Emerging evidence suggests that the magnitude of treatment-related increases in decentring abilities may mediate downstream decreases in anxiety and depression; although most studies did not examine if decentring improves before symptoms decrease, meaning a causal relationship cannot be inferred.

For whom?

- The application of decentring can be spontaneous and self-initiated or result from direct instructions.

- Self-reported data suggest that the ability to decentre is continuously distributed, so some individuals are better at it than others. However, it is a malleable ability that can be strengthened. To date, there have been few studies investigating how and when the ability emerges, as well as who may benefit most from interventions targeting it.

In what contexts?

The ability to decentre emerges at an early age and can be boosted through psychological interventions. Some studies report that this ability increases over time and is likely due to age-related improvements in executive control. Few studies have investigated the effects of teaching decentring prior to anxiety or depression onset. However, there is some evidence of beneficial effects in healthy individuals, and so teaching it at an early age may have protective and preventative effects.

How and why?

The researchers synthesised the literature to propose a novel conceptual integration of decentring; they suggest decentring is a multifaceted construct that is characterised by two factors:

1. *Observer perspective* – the ability to intentionally disengage from the content of inner events by shifting perspective

2. *Reduced struggle* – the reduced emotional reactivity to the content of these events.

It is thought that the observer perspective results in a reduced struggle – i.e., the ability to voluntarily shift one's awareness results in a reduction in emotional responding towards negative inner events. With the view to promote future empirical research, the team reviewed a range of mechanistic pathways that might facilitate the salutary effects of the observer perspective. This included: the meta-awareness of underlying cognitive activities; the verbal re-construal of environmental contingencies surrounding emotional responses; and the differential activation of problematic cognitions.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Decentring is a skill that young people can possess and that can be taught and strengthened over time. In fact, techniques to boost decentring are nested within psychological interventions – these can be easily isolated and selectively taught to young people. Given this, interventions that seek to strengthen decentring abilities have the potential to be a scalable global treatment.

Recommendations

For practice

Techniques to achieve decentring are nested within psychological interventions; however, it can be helpful to target this pathway more directly and monitor changes in decentring-related abilities by using brief self-report measures.

For future research

- Longitudinal investigations into the development of this skill are needed so that this knowledge can be leveraged to create techniques to strengthen decentring from an early age.

- Valid measures and methods for experiments involving young people are also needed.

Emotion regulation: improved management of emotions

Emotion regulation (ER) can be defined as our ability to manage our own emotional responses. More specifically, ER skills represent a set of processes or strategies for monitoring, evaluating, and modifying emotional reactions, especially in terms of their intensity and duration, in order to accomplish goals.

ER develops across the life course, with key skills emerging at different times as individuals learn and are influenced by their caregivers, interpersonal relationships, and the wider context. Adolescence is a critical stage in the development of ER, partly due to the nature of changes occurring in regions of the brain responsible for affective development. As we mature into adulthood, we start to exhibit more stable patterns of ER skills, with individual differences in ER skills hypothesised to underlie the development and course of anxiety and depression. In fact, evidence suggests that individuals with anxiety and depression have more difficulties managing their emotions because they rely on ineffective ER skills (e.g., rumination, suppression, avoidance) more often than effective skills (e.g., cognitive reappraisal, problem solving, and acceptance).

Wellcome commissioned two different teams to review emotion regulation as an active ingredient; each team took a slightly different approach to reviewing the evidence.

A. Emotion regulation: improved management of emotions

Focus: Prevention of anxiety and depression

Authors

Sarah Skeen, Christina Laurenzi, Tatenda Mawoyo, Kelly Gemmell, Jackie Stewart, Nagendra Luitel, Bronwyne Coetzee, Chiara Servili, Alexander Tsai, Gerardo Melendez Torres & Mark Tomlinson

For information

For further information on this review, please contact the Team Lead, Sarah Skeen: skeen@sun.ac.za

Aim

The research team considered the evidence in relation to the following key question:

- How do psychosocial interventions improve ER skills to prevent and/or reduce symptoms of anxiety and depression in young people? Specifically, what works, for whom, and in what contexts?

Methodology

The team conducted a realist review of studies assessing psychosocial interventions that promote ER skills to prevent anxiety and/or depression in young people. They included 57 studies in their review, of which 51 (89%) assessed interventions that were either entirely focused on developing ER skills or were multicomponent interventions with ER as a primary component. Nearly half of the reviewed studies (n=26, 46%) were universally delivered and the majority were school-based (n=44, 77%). In addition, the team conducted focus group consultations with 28 young people (aged 12-19 years, 50% female) based in South Africa (n=6) and Nepal (n=22) to explore their views on the findings, with specific relevance to their applicability in low-resource settings.

Limitations included:

- most of the reviewed studies were conducted in high-income countries (n=42, 74%).
- most studies did not report on long-term follow-up and relied on self-report measures to track outcomes, which may be problematic if responses are influenced by social desirability.

- in many cases, publications contained limited contextual information and did not clearly describe the ER activities delivered.
- the interventions reviewed were highly heterogeneous in terms of their content, structure, delivery, target population, and measurement of outcomes, which made it difficult to draw clear conclusions on what works, for whom, and in what contexts.

Insights from young people

Young people endorsed the review findings and agreed that addressing external stressors was likely to be important for intervention effectiveness. While there was consensus that ER skills are useful in many situations, youth advisors agreed that interventions would be particularly beneficial if implemented around significant transition periods, such as moving from primary to secondary school. Young people also recognised the importance of practitioners in determining the success of interventions, and highlighted empathy, connectedness, relatability, and understanding of individual experiences as fundamental. Interventions were also described as needing to be adapted for the cultural context in which they took place. However, the youth advisors in South Africa and Nepal noted that there was a lack of support from parents and teachers in low- and middle-income contexts, and that engaging parents could be problematic. They found the idea of holding separate intervention sessions for parents acceptable but were sceptical of their impact.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Most studies reporting benefits to participants compared with controls used CBT-based activities or mindfulness-based practices (e.g., meditation, yoga). The studies employed a range of activities to develop ER skills, with different strategies proving successful in different contexts.

- While the research team did not identify a particular skill that seemed to be more effective than any other, they did find that when interventions use theory-based approaches to teach skills, they address factors underlying adolescent behaviour, and are thereby effective in supporting adolescents to regulate their emotions.

For whom?

The review did not address who benefits most from interventions seeking to promote ER skills.

In what contexts?

The research team was able to identify specific intervention factors that explain the relationship between successful development of ER skills and reduction in symptoms of anxiety and depression among young people.

These include interventions that:

- are tailored to the needs of the target population they are trying to benefit, in terms of their age, developmental stage, gender, mental health status, culture, and wider context.

- are delivered by skilled, well-trained, supported, and committed practitioners, who have time and capacity, and who can internalise the content of interventions, develop supportive relationships with young people, and act as role models for them on effective ER skills.

- engage parents and caregivers to sensitise them to the intervention content, and provide other opportunities for skills reinforcement outside of contact sessions.

- take account of external stressors that might influence young people's capacity to learn and use their new skills.

Taken together, these factors all contribute to adolescents' capacity to select and employ strategies to manage their emotions, thereby reducing their experiences of unwanted, uncontrolled emotions and maximising their potential for better mental health.

How and why?

The research team did not discuss the mechanisms by which promoting ER skills appears to prevent youth anxiety and depression.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Although there is evidence to suggest the importance of tailoring interventions to suit young people's needs, prevention programmes targeting ER skills can be delivered universally, in school settings, and therefore have potential to be scalable. However, studies that relied on teachers to implement interventions were less effective than those that used trained practitioners. Teachers tended to struggle with managing additional workloads and with shifting from didactic roles to the supportive, participatory style of engaging students that these interventions required.

Recommendations

For practice

The review findings provide recommendations for the content and delivery of ER programmes to prevent anxiety and depression in young people:

- With regard to programme content, the research team recommend using intervention theory to ensure that programmes are influencing systems of behaviour as opposed to standalone actions, and that programmes are designed according to the target group's characteristics and the intervention context.

- With regard to implementation, the team recommend substantial and sustained investment in practitioners who possess a mix of complex therapeutic skills, can form relationships with young people, and can internalise intervention concepts.

For future research

- Future studies should examine and report the extent to which individual characteristics, such as age, gender, and ethnicity, may moderate treatment effects.

- Furthermore, because schools have been identified as prime settings for the delivery of ER prevention programmes, there is a need for more development and research to ensure that these programmes are implemented in the most effective way possible.

B. Emotion regulation: improved management of emotions

Focus: Treatment of anxiety and depression

Authors

Alexander Daros, Sasha Haefner, Shayan Asadi, Sharifa Kazi, Terri Rodak & Lena Quilty

Publication

Aim

The research team considered the evidence in relation to the following key questions:

- Do psychological interventions improve ER skills in youth with anxiety and depression?

- Are improvements in ER skills associated with treatment success for anxiety and depression in 14 to 24-year-olds?

- What treatment or sample characteristics enhance positive relationships between improvements in ER skills and treatment outcomes?

Methodology

The research team conducted a systematic review and multivariate meta-analysis. Outcomes for improved ER skills were defined in three ways: (i) decreases in emotion dysregulation (general ER skills difficulties); (ii) decreases in disengagement ER skills (avoidance, rumination, and suppression); and (iii) increases in engagement ER skills (cognitive reappraisal, problem solving, and acceptance). They examined 90 RCTs (involving 11,652 participants) and 55 non-RCT studies (involving 3,224) that assessed symptoms of anxiety and/or depression in young people receiving psychological interventions in addition to ER outcomes. They also conducted sensitivity analyses to understand how improvements in ER skills related to treatment (e.g., intervention type) and sample (e.g., age) characteristics.

In addition, two youth facilitators and three young people (aged 18-24) with lived experience of anxiety and/or depression advised the team at all stages of the review process.

Limitations included:

- the meta-analysis relied almost entirely on data from self-report measures, which can be susceptible to recall bias – furthermore, youth with higher levels of emotion dysregulation may have more difficulty reporting on their emotional experiences, which may introduce significant variability in responses overall.

- the majority of included RCT studies were from high-income countries (n=76, 84%).

- the team was not able to conduct more causal, mediational analyses to answer whether improvements in ER skills act as a mediator of treatment outcome.

- symptoms of anxiety and depression can overlap with ER skills (e.g., rumination and depression; avoidance and anxiety) and may contribute to artificially inflated effects in the current synthesis.

Insights from young people

Discussions with youth indicated a need for greater awareness around the relationship between ER skills and mental health, including a better understanding of how improvements in ER skills contribute to more positive treatment outcomes. Young people suggested that peer-led group formats could be effective, especially for depression, where social skills also play an important role in treatment. They also suggested that increasing the agency and autonomy of young people, by developing self-assessment tools to help them understand which skills they already have and which they could improve, might be a helpful strategy.

Key findings:
What works, for whom, in what contexts and why?

What works?

- The psychological interventions reviewed significantly improved symptoms of anxiety and depression overall. They also improved ER skills across each of the three different definitions (reduced emotion dysregulation, reduced disengagement ER, and improved engagement ER). However, cognitive training interventions tended to underperform, but were almost always delivered in brief formats.

- In terms of associations, reductions in emotion dysregulation, reductions in disengagement ER skills, and improvements in engagement ER skills were positively associated with treatment gains for youth anxiety and depression. These effects were achieved across a variety of intervention types, lengths, and delivery formats.

- Findings largely converged when results from RCT studies were compared to non-RCT studies.

For whom?

- Interventions were more effective in reducing anxiety and depression for those aged 14-17 and 18-21 (versus 22-24), regardless of where participants were recruited from (e.g., high school, college students, outpatients).

- Positive associations between improvements in ER and treatment outcomes were relatively consistent across age and sample type (i.e., irrespective of whether youth were students or from the community).

In what contexts?

- The positive association between improved ER skills and treatment outcome was enhanced for longer treatments (>6 sessions), delivered in group formats (vs individual), and with cognitive-behavioural orientations, for both anxiety and depression. In addition, shorter interventions and individual formats enhanced the positive relationship between improved ER skills and depression (but not anxiety) outcomes.

- Different interventions improved ER outcomes in distinct ways. For example:
  - positive treatment outcomes for CBT interventions more consistently improved engagement (and reduced disengagement) ER skills.
  - positive treatment outcomes for acceptance/ER-based interventions were more successful in reducing emotion dysregulation.
  - positive treatment outcomes for mindfulness interventions were also particularly effective in reducing disengagement ER skills.

How and why?

- Depressed and anxious individuals often report higher levels of disengagement ER skills and lower levels of engagement ER skills before treatment, contributing to heightened emotion dysregulation.

- Psychological interventions for depression and anxiety may increase the use of a variety of ER skills and their competency. Rather than focusing purely on eliminating the use of disengagement ER skills, psychological interventions provide the opportunity to expand and practise new ways of regulating emotions (particularly engagement ER skills), which may improve the mental wellbeing of youth and reduce emotion dysregulation.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?
The youth advisors recommended reforms to school curriculums in order to incorporate ER skills training at all levels of education (e.g., elementary, secondary, and post-secondary) as a preventative strategy to mitigate mental health concerns in young people. This approach would enable large groups of individuals to be trained at a universal level, and would have the added benefit of removing barriers typically associated with treatment in young adults (e.g., cost of services, issues finding a therapist, stigma associated with seeking help) and could incorporate peer-led delivery of skills coaching.

Recommendations

For practice

Learning skills to regulate emotions in more diverse ways is an important target for treatment success. Hence, government and community initiatives could support access to interventions that actively improve ER skills and provide funding for their continued evaluation.

For future research

- As suggested by the youth advisors, research should explore different modes of delivery, such as peer-led group formats, as this could lead to enhanced treatment options for young people with anxiety and/or depression.

- To expand the present results, research could examine the potential mediation effects of changes in ER skills on treatment outcomes for depression and anxiety. It could also explore more long-term effects, as the present study only examines changes in outcomes from pre- to post-treatment.

16

Helpful attentional and interpretational thinking patterns

Focus: Prevention and treatment of anxiety and depression

Developing more helpful thinking patterns involves equipping individuals with two related skills: (i) a more flexible capacity to shift attention towards positive over negative information, depending on circumstances, and (ii) a tendency to endorse positive/benign over negative/threatening interpretations of uncertain situations.

Key cognitive theories propose that maladaptive attention and interpretation patterns (i.e., those focusing on or favouring negative/threatening information) maintain an increased risk for anxiety and depression. Adult treatment models show that encouraging more resilient cognitive patterns is efficacious. Training young people to adopt resilient cognitive patterns before maladaptive ones become habitual may be a key approach to preventing and treating anxiety and depression.

Authors

Jennifer Lau, Rebecca Watkins-Muleba, Isabelle Lee, Victoria Pile & Colette Hirsch

Publication

Aim

The research team considered the evidence in relation to the following key questions:

- How can we effectively target attention and interpretation patterns in youth with anxiety and depression?
- Who benefits most from promoting helpful attention and interpretation patterns, in which contexts, and why?
- How can we amplify the effects of these interventions?

Methodology

The team conducted an integrative narrative review of the literature. They identified 6,303 papers and included 80 in the qualitative synthesis stage of their review. The team looked at papers that reported on interventions or manipulations that sought to reduce self-reported anxiety or depression by explicitly altering attention and/or interpretation patterns. Of the 80 papers reviewed, 22 targeted attention, 52 targeted interpretation, and 6 targeted both. In addition, the research team consulted with ten young people (aged 15-24; seven females; six white British) about managing unhelpful thinking patterns in daily life.

Limitations included:

- the studies reviewed were heterogeneous in how the intervention was designed (for clinical treatment or for testing experimental questions), who the intervention was designed for (diagnosed patients or young people with high symptom scores), the number of sessions it involved, and the context in which it was delivered – making it difficult to directly compare different techniques for encouraging resilient thinking patterns
- for some studies, there was also an absence of measures assessing attention and/or interpretation, making it difficult to determine whether these active ingredients changed over the intervention or whether they were responsible for symptom reduction.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Most of the attention studies reviewed used attention bias modification training to shift attention patterns to positive stimuli. More than half of these studies showed expected changes in attention, but symptom reduction effects were inconsistent (between-group effect size, range=-0.73 to 1.38).

- For the studies that looked at modifying interpretations, techniques included cognitive bias modification of interpretations training, which uses repeated reinforcement learning to encourage the endorsement of positive interpretations of ambiguous information, and cognitive restructuring, which uses explicit instruction to encourage individuals to generate alternative explanations for situations and to consider evidence for and against each explanation.

- For cognitive bias modification of interpretations, 78% of studies reviewed showed expected changes in interpretation, and where there was symptom reduction, there were small to medium between-group effects (range=0.10 to 1.15).

- For cognitive restructuring interventions, within-group symptom-reduction effects were medium to large, but only seven studies assessed relevant change in interpretation patterns.

For whom?

The research team did not find many studies assessing individual differences in intervention responsiveness. While some studies did assess whether baseline symptoms moderated improvements, findings across studies were inconsistent.

In what contexts?

The scientific literature suggests that different delivery techniques have been used to encourage more helpful ways of thinking. For example, some techniques involve doing training exercises on a computer (e.g., finding the smiling face among lots of negative faces, or completing unfinished stories with a positive ending), while others are administered as part of larger treatment programmes, usually delivered in clinical settings (e.g., CBT or mindfulness programmes).

How and why?

There is evidence to suggest that techniques targeting attention and interpretation patterns work by promoting flexible attention to positive information and positive interpretations of ambiguous situations. However, the research team concluded that more work needs to be done to establish the mechanisms of action that underpin specifically how and why these techniques work to reduce symptoms of anxiety and depression.

Insights from young people

The young people consulted said that negative thought patterns can be very damaging in daily life. They agreed that adopting alternative perspectives such as those used in cognitive restructuring or cognitive bias modification of interpretations was useful, especially when employing a third-person perspective. One obstacle they noted was their inability to recognise irrational thoughts when they are happening, which makes it difficult to employ the techniques in the moment they are needed. Despite this, young people suggested that it would be empowering to have a toolbox of evidence-based strategies that they could learn and apply in daily life. Such a toolbox would enable young people to have more agency, and could be amenable to delivery in schools or through digital technologies, thereby improving access to help.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

The research team propose that for prevention these interventions could be delivered by non-specialist practitioners, making them more accessible, affordable, and scalable. Multiple studies have also shown that treatments such as cognitive bias modification of interpretations can be delivered on computers and smartphones, which could further favour acceptability and accessibility for young people globally.

Recommendations

For practice

Drawing on the reviewed evidence and on the perspectives of the young people, the team suggest that joint delivery of interventions targeting attention, interpretation, and other cognitive factors (e.g., memory), as well as using different techniques (e.g., training, guided instruction), could be a powerful multipronged and empowering option for young people.

For future research

- More research is needed to understand what constitutes optimum delivery and dosage of these interventions.

- More research is needed to explore how best to combine techniques to optimise resilient thinking habits in young people.

- To increase their therapeutic benefits, more research is needed to develop training exercises that are more engaging, age-appropriate, and relevant to young people. These exercises should be co-developed with young people. Harnessing the technology of virtual reality in training, for example, could be a fruitful approach.

- Finally, there should be a focus on determining the mechanisms of action underlying these interventions.

17

Hopefulness: learning to be more hopeful

Focus: Treatment of depression

Hopefulness can be defined as a goal-directed way of thinking, which involves the motivation and belief in one's ability to reach goals (self-agency) as well as the ability to find different routes to reach them (pathways thinking).

Hopefulness is particularly important in adolescence – a key time of vulnerability for mental health, but also of critical importance for developing a sense of self and future aspirations. Experimental studies indicate that negative thoughts about the future are central to the onset and experience of depression. Hopefulness, however, can protect against the impacts of adversity and lead to psychological, social, and occupational wellbeing. Still, evidence in youth is limited and there remains no consensus on how, when, and for whom hopefulness can best be enhanced.

Authors

Clio Berry, Joanne Hodgekins, Daniel Michelson, Laura Chapman, Olga Chelidoni, Lucie Crowter, Catarina Sacadura & David Fowler

Aim

The research team considered the evidence in relation to the following key questions:

- What is the evidence that hopefulness leads to improvements in depression and social recovery for young people with major or complex (comorbid) depression?
- In what settings and contexts, and for whom, does hopefulness appear most effective?
- What are the putative mechanisms by which hopefulness impacts on outcomes?

Methodology

The team conducted a rapid systematic review of published and grey literature, focusing on the role of hopefulness in the treatment of young people (aged 14-25) with depression. They identified 8,710 papers for screening and included 31 studies in their review. In addition, the research team consulted, in two virtual meetings, with a group of 15 young people (aged 15-24), of different genders (53% female) and nationalities, with lived experience of low mood or depression.

The 31 studies included in the review involved quantitative (e.g., RCTs, pre-post studies), qualitative (e.g., semi-structured interviews, focus groups), and mixed-methods studies. 18 focused on specific interventions and 13 on standard mental healthcare.

Limitations included:

- most studies were conducted in Western high-income countries, such as the US, UK, and Australia (90%)
- studies were of variable and often limited quality (e.g., quantitative studies were mostly non-randomised or uncontrolled studies with small sample sizes)
- studies did not provide much evidence on whether increasing hopefulness directly leads to reduced depression, or whether hopefulness is viewed as important to different people in different contexts
- limited evidence on what interventions worked best for enhancing hopefulness, including what combination of elements and dosage.

Insights from young people

Key findings:
What works, for whom, in what contexts and why?

What works?

- Although existing evidence is limited, standard mental healthcare and specific interventions involving talking and activity therapies can help to increase hopefulness and reduce depression:
  - cognitive and behavioural-based therapies (e.g., social recovery therapy, behavioural activation, and cognitive behavioural therapy) had the highest quality evidence, showing the largest effects.
  - camping, integrated yoga and meditation, and goal-skills interventions showed moderate effects.
- It is still unclear whether increasing hopefulness in this way is the key route to reducing depression, or an effect of that reduction.

For whom?

The research team did not find clear evidence of who benefits most from strategies seeking to improve hopefulness, and effect sizes did not differ according to study sample (e.g., age, gender, baseline hopefulness, or depression severity).

In what contexts?

Effect sizes also did not differ according to intervention characteristics (e.g., type, duration, frequency, mode of delivery), suggesting that there is no evidence of hopefulness working more or less well in specific contexts.

- Despite this, evidence from qualitative studies does emphasise the importance of:
  - a positive therapeutic relationship with a competent, kind, caring and authentic professional.
  - therapist assessment, which when performed competently and with relational authenticity, can enhance hopefulness through connection with the young person's unique strengths and difficulties.
  - 'groupiness' – sharing a therapeutic space with a group of young people who have similar goals and experiences can help to increase hopefulness, as can discussing the future with them.
- Some studies suggest that hopefulness is self-reinforcing, and that it develops gradually. Longer-term and systemic interventions may therefore be needed, especially for those with complex difficulties

How and why?

Evidence regarding mechanisms of hopefulness is limited. However, the research team combined existing evidence with lived experience insights to produce a preliminary process model in which hopefulness instigates help-seeking and increases engagement with treatment. This can result in positive outcomes through enhancing resilience, enabling clinical and functional improvements, and increasing engagement in goal pursuit.

The lived experience panel deemed hopefulness to be both centrally important and very powerful. They agreed that mental health services can enhance hopefulness, but described existing services as barely focusing on this. The panel agreed that positive therapeutic relationships are critical for supporting the development of hopefulness, and that mental health professionals should work with the individual to find what uniquely brings them hope, help to identify and break down personally meaningful goals, and encourage the celebration of small successes. Finally, the panel suggested that hopefulness may not be unilaterally beneficial and can be particularly challenging, for example for those with severe or long-lasting depression and in the context of additional intersecting medical or social challenges.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?
The review did not address the safety profile of interventions targeting hopefulness. However, based on feedback from the lived experience panel, hopefulness appears acceptable. Current evidence also suggests that hopefulness can be increased in non-clinical (e.g., educational) settings, which may help to make this an accessible and scalable approach, while facilitating help-seeking for youth who may need more specialist support.

Recommendations

For practice

- Hopefulness appears to be an important target for young people with major or complex depression, however the existing evidence is limited.

- Policymakers should consider how best to structure and fund treatment services in supporting professionals' own hopefulness and positive outcome expectancies, as this can result in positive outcomes for patients. Evidence suggests professional hopefulness can be increased through services being recovery-oriented, providing support for coping and managing stress, hopeful supervision, and regular reflections on beliefs about the therapeutic use of hopefulness.

For future research

The research team believe that high-quality trials, with long-term follow-ups and inbuilt process evaluations, are needed to better understand how hopefulness works and can best be enhanced.

In addition, the lived experience panel highlighted the following as their top three (of ten) future research priorities:

- How do specific marginalisations (for example, socioeconomic status, race, sexuality, and gender identity) interact with how young people with depression experience hopefulness?

- How does having hopefulness benefit a young person's ability to cope with depression, compared to people who do not have hopefulness or do not understand it as motivational or goal-directed?

- How can professionals help trigger hopefulness in young people who have long-term depression?

18. Mental imagery: helpful use of emotional mental imagery

Focus: Treatment of anxiety and depression

Emotional mental imagery (EMI) involves the ability to simulate and manipulate multisensory experiences in our minds, by using information from our internal representations (e.g., memories of events, images of the future).

Young people with anxiety and depression tend to experience upsetting images of the past; they struggle to imagine positive events in their future, and do not recall memories in detail. Although EMI is implicated in the development, maintenance, and reoccurrence of anxiety and depression, most existing interventions do not make use of the power of mental imagery. However, given its capacity to depict, process, and generate emotional events, EMI could play an important role in the treatment of youth anxiety and depression.

Authors

Victoria Pile, Grace Williamson, Aleks Saunders, Emily Holmes & Jennifer Lau

Aim

The research team considered the evidence in relation to the following key questions:

- In what ways do interventions use EMI?
- What individual and contextual factors influence its effectiveness?
- Why do these techniques work?

Methodology

The team conducted a systematic review of interventions targeting EMI. They identified 3,579 papers for screening and included 86 papers, covering seven different types of imagery-based interventions (e.g., imaginal exposure, imagery rescripting, guided imagery, imagery-enhanced protocols), in their review. In addition, the team conducted interviews with ten young people with lived experience of anxiety and depression (aged 15-24; seven females; six white British) and seven international experts in the field (five of whom also work clinically).

Limitations included:

- most studies were conducted in high-income countries (98%), with more than half in the US (52%)
- most studies involved participants over the age of 18 (81%), meaning that less is known about whether interventions work for younger individuals
- the primary outcome measure for the largest number of studies was in relation to anxiety (n=40), with fewer studies focusing on depression (n=7) or both anxiety and depression (n=5)
- only some studies reported on ethnicity (28%) and no studies compared gender effects.

Insights from young people

Interviews with lived experience advisors indicated that distressing images are common and can provide powerful mental evidence. Understandably, young people spoke of trying to avoid these images, but doing so can lead to the images popping up in upsetting ways when not wanted, and positive images being switched off. Young people also indicated that others often tell them to avoid negative imagery, but this avoidance is unhelpful as it does not stop the negative images coming back. Ultimately, young people with lived experience highlighted that EMI can be a powerful therapeutic tool, and more influential than thinking in words. The experts that the team consulted with agreed and suggested that, with the right training and tools, imagery can be effectively harnessed for everyone.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

A clear advantage of EMI techniques is that they tend

Key findings:
What works, for whom, in what contexts and why?

What works?

- Evidence for specific types of imagery-based interventions – including interventions using imagery rescripting (helping young people to explore a distressing event in their imagination in new ways), enhanced positive imagery (helping young people to generate positive future images), and imagery-enhanced protocols (embedding imagery in other treatment protocols, such as CBT) – have shown the most potential, with significant results even from relatively brief interventions.
- Although imagery rescripting appears to help those with anxiety, it has not yet been tried extensively in those with depression, and more research is needed to evaluate its efficacy.
- However, for some other imagery-based interventions, such as imaginal exposure, systematic desensitisation, hypnosis, and guided imagery, the evidence is currently limited (for example, due to mixed findings or lack of methodologically robust evaluation).

For whom?

- Greater mood changes can be induced in vivid imagers compared to weak imagers.
- Some people may struggle more than others to visualise images, especially positive images of the future, and so interventions need to be tailored to best help these individuals.

In what contexts?

- Evidence suggests that the ordering of intervention components matters, and that including imagery

techniques before other components could be beneficial. For individuals with public speaking anxiety, for example, starting the intervention with visualisation or systematic desensitisation produces significantly better results in reducing anxiety than starting with skills training.

- Imagery from a field perspective (through our own eyes) compared to an observer perspective (looking at ourselves) may increase emotional intensity. In addition, there is some evidence to suggest that self-distancing can lead to higher levels of reconstrual (finding insight and closure) relative to recounting thoughts (what happened and how this felt) and greater self-efficacy.
- Interventions may work best when tailored to an individual's personal needs and circumstances. They may also result in more positive outcomes when the young person is helped to imagine the end goal, the steps needed to get there, and how to overcome difficulties along the way

How and why?

Three ways in which EMI interventions may work are by:

- improving awareness of the power of EMI and the impact it has on mood and behaviour
- reducing the impact and intrusive nature of negative images by enabling emotional processing and addressing their meaning
- enhancing our ability to generate positive images that can protect against low mood and increase engagement in life.

to be brief, with a low risk of harm, and are likely to be transportable, as they are often protocol-driven. This also means they have the potential for low-cost scalability and delivery by non-specialist practitioners. For example, co-developing imagery interventions for educational settings could be particularly valuable to provide accessible and effective interventions for young people with anxiety and depression.

Recommendations

For practice

- Harnessing EMI to reduce youth anxiety and depression shows promise, and could be readily incorporated into routine care. However, feedback from experts and young people with lived experience suggests that EMI interventions are underutilised in current services.

- Interventions that target all three mechanisms (raising awareness of the power of EMI, reducing negative imagery, and building positive future images) could be the most beneficial for the largest number of young people, especially if individual tailoring of interventions is also considered.

For future research

- We need more research conducted with young people to better understand why these techniques work and for whom.
- Future research could also help to address two outstanding questions:
    - whether it is important to target negative intrusive imagery before using other techniques.
    - whether adding a positive imagery intervention, for example to image rescripting, could enhance effects and protect against relapse.

19

Perfectionism reduction

Focus: Prevention and treatment of anxiety and depression

Perfectionism describes when a person bases their self-worth on consistently (and at times unrealistically) meeting their own and others' high standards and expectations, despite negative consequences.

Evidence from a meta-analysis involving 41,641 North American and British college students suggests that perfectionism in youth has linearly increased since the late 1980s. Although perfectionism is associated with a range of positive beliefs about achievement and productivity, it is also strongly linked to depression, anxiety, and eating disorders. Perfectionism has therefore become a treatment target for several psychopathologies, and there is evidence that CBT for perfectionism reduces depression and anxiety in youth.

Authors

Tracey Wade, Sarah Egan, Maggie Wleklinski, Amy O'Brien, Grace Fitzallen & Roz Shafran

Publications

Egan SJ, Wade TD, Fitzallen G, O'Brien A & Shafran R. A meta-synthesis of qualitative studies of the link between anxiety, depression and perfectionism: Implications for treatment. Behavioural and Cognitive Psychotherapy, 2021; 1-17. https://www.doi.org/10.1017/S1352465821000357

Wade TD, Egan SJ, Wleklinski M, O'Brien A, Fitzallen G & Shafran R. A realist synthesis of websites containing content on perfectionism: Are the descriptions and advice empirically supported? BMC Psychology, 2021; 9: 119. https://doi.org/10.1186/s40359-021-00620-8

Aim

The research team considered the evidence in relation to the following key questions:

- What are the best intervention strategies for reducing perfectionism?
- Are there any barriers that may prevent interventions being effective?

Methodology

The team conducted a synthesis of qualitative research on perfectionism. They identified 17,891 records and included 37 eligible studies in their review. They also ran a realist synthesis of websites on perfectionism, yielding 992 websites, of which 266 were included. Finally, results were shared with a youth advisory group comprising 18 young people (aged 18-24, 80% female) with lived experience of depression and anxiety.

Limitations included:

- 97% of studies were conducted in high-income countries, with only one conducted in a middle-income country.
- the mean age of participants included in the studies was 24 years, and the vast majority (73.5%) were female.
- study sample sizes varied (range=8-215), and the methodological quality of the included studies was not particularly high, with the average rating being 16.16 (range=4-26) out of a possible 32.
- many of the reviewed websites (56%) were judged as being of moderate quality, with only one rated as excellent.

Insights from young people

Overall, the youth advisory group agreed with the results from this review. They felt that addressing unrealistic standards and developing alternative thoughts were potentially helpful strategies. However, they also recognised that change was difficult, and that it was unrealistic to expect change without a support network helping the individual to challenge their perfectionism while still pursuing valued goals.

Key findings:
What works, for whom, in what contexts and why?

What works?

15 different interventions were identified in the websites reviewed, with the most common strategies including those used in CBT for perfectionism: identifying cognitions and developing alternatives; moving from self-criticism to self-compassion; normalising mistakes and seeing their benefit; adjusting goals; getting practical support; and tips about procrastination and time management.

After the youth consultation, three key elements of perfectionism treatment were identified as critical in preventing and addressing youth anxiety and depression:

- broadening self-evaluation by judging one's self-worth on more than just achievements.
- re-evaluating goals and the value of mistakes.
- using self-compassion as opposed to self-criticism when facing adversity and setbacks.

For whom?

The review did not address who benefits most from strategies seeking to reduce perfectionism. However, it appears that many young people believe that their perfectionism is what helps them achieve, which may present a barrier to engaging them in interventions.

In what contexts?

The review did not address what works best in different contexts. However, based on information from participants who took part in the reviewed studies, we do know that either individual or group treatment is preferred over pure self-help strategies, and that bespoke guidance during internet treatments is considered important.

How and why?

The research team did not find any literature on the mechanisms by which reducing perfectionism works to address youth anxiety and depression. Instead, they focused on the mechanisms by which perfectionism may contribute to these problems and which, when tackled, may decrease perfectionism. According to the vicious cycle of perfectionism described by the youth advisory group, the pressures of perfectionism result in increased anxiety and depression, which can lead to lower self-esteem and increased self-criticism, in turn leading to an increased focus on defining one's self-worth by one's achievements.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Interventions targeting perfectionism have the potential to be scalable global treatments, as they have been successfully delivered in both face-to-face (e.g., classroom settings) and online formats (e.g., internet interventions). The websites providing information about perfectionism were deemed accessible to youth, although they contained very little practical advice.

Recommendations

For practice

- Prevention and intervention programmes for youth anxiety and depression should include strategies to reduce perfectionism. They must also actively help young people to develop social support networks.
- When working with young people who have depression and anxiety, clinicians should assess them for perfectionism and consider interventions targeting perfectionism, such as CBT for perfectionism.

- CBT for perfectionism should directly target parental expectations in treatment for young people, which may differ from CBT for perfectionism in older populations.
- The content on websites addressing perfectionism needs to be more closely aligned with the clinical and research literature; it should also be informed by the perspectives of those with lived experience.

For future research

More high-quality studies are needed to qualitatively assess young people's experience of their treatment and the impact it has had on their anxiety and/or depression.

Repetitive negative thinking reduction

Focus: Prevention and treatment of anxiety and depression

Repetitive negative thinking (RNT) is a thinking process, including worry and rumination, which is focused on negative content and occurs in a repetitive, excessive, and unproductive way that is hard to control.

Negative thinking is a common experience which can be useful: for example in helping us identify problems that we need to work through and situations that we need to prepare for. However, for some, this kind of thinking can become excessive and hence unhelpful. We now know that RNT is strongly associated with youth anxiety and depression, and longitudinal studies have shown that high levels of RNT are a risk factor for the development of these disorders. Reducing RNT may therefore be a key approach to prevent and treat youth anxiety and depression.

Authors

Imogen Bell, Sally Grace, Katherine Nguyen, John Gleeson & Mario Alvarez-Jimenez

Aim

The research team considered the evidence in relation to the following key questions:

- What are the effects of different psychological therapies on depression, anxiety, and RNT?
- Does the effect of psychological therapy differ depending on individuals, contexts, and therapies?
- What do young people and clinicians think about the role of RNT in the treatment of youth anxiety and depression?

Methodology

The team conducted a systematic review of RCTs. They identified 1,247 papers and included 25 trials in their review. To contextualise and inform the insights gathered, two focus group were run involving three clinicians and six young people with lived experience of anxiety and depression. The focus groups sought to better understand individual perspectives of RNT, including whether reducing RNT is important and what further research is needed.

The 25 trials reviewed assessed the efficacy of 16 different psychological treatments in addressing the RNT, anxiety, and depression of 2,251 young people.

Findings were limited in what they could tell us about male, younger individuals, from non-Caucasian ethnicities, with a lower level of education, and more severe symptoms.

Limitations included:

- most studies were conducted in Western, high-income countries (80%).
- samples mainly consisted of females (75%), university students (64%), and those with elevated levels of depression and/or anxiety but without a confirmed diagnosis (76%).
- the average age of participants was 18-24 years, making it difficult to compare effects across age groups.
- intervention trials were underpowered.

Insights from young people

Both young people and clinicians felt that reducing RNT was an integral part of treatment. They valued having several approaches to choose from and believed that empowering young people to make their own treatment choices was crucial in combating emotions of helplessness and hopelessness, common to those experiencing RNT. The importance of tailoring treatment, by considering timing and individual factors such as age, symptom severity, and the nature of negative thoughts, was also highlighted.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Digital and self-guided treatments had high dropout rates, despite their potential to be more affordable and accessible. To maximise future engagement and higher acceptability, online treatments may require an accompanying supporter or coach.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Psychological treatments are effective in reducing RNT (Hedges' g=0.69) and improving symptoms of anxiety (0.79) and depression (0.52).

- Mediation analyses suggest that reducing RNT is associated with improvements in youth anxiety and depression. For example, a rumination-focused CBT trial reported that post-treatment improvements in RNT were associated with a reduced prevalence of MDD diagnosis one year later. However, we do not know whether reducing RNT is the cause of improvements or whether other active ingredients may be involved.

- Process-focused treatments (e.g., mindfulness, meta-cognitive therapy) which aim to change how a young person thinks are more effective than content-focused treatments (e.g., cognitive restructuring, CBT) which mainly focus on modifying negative thoughts as the key driver of emotional problems.

- Process-focused techniques tend to focus on fostering greater awareness of thought and emotional processes, developing greater psychological flexibility to disconnect from negative thinking, and redirecting attention and efforts towards meaningful activities and goals.

For whom?

We do not yet know what works best for whom, but some provisional trends have emerged:

- Treatments appear to be more effective for young people with depression, but this result may have been influenced by one study with a very large effect.

- Effects are larger for studies involving older individuals with an average age of 21-24, but this may have been confounded by a range of factors such as study context and socioeconomic status.

In what contexts?

- Higher treatment doses do not yield better results, so treatments need not be too lengthy or complex.

- Treatments delivered by a clinician to a group setting may be more effective for young people with depression. In contrast, self-guided treatments delivered digitally seem more effective in reducing youth RNT and anxiety.

- The timing of treatment is important, with optimum time points potentially dependent on the stage of the RNT process. For example, the optimum time point for worry-related treatments may be when the young person first becomes aware of a future stressful event, on the day it occurs, or immediately after.

How and why?

Focusing on negative thoughts can bring about negative emotional states, for example by reinforcing attention towards these thoughts, or by promoting avoidance behaviours that can paradoxically maintain emotional problems. Intervening to reduce RNT interrupts this link between thoughts and feelings.

Recommendations

For practice

- RNT can be reduced with a range of psychological treatments and appears to be an important target for improving youth anxiety and depression.

- Young people with depression or anxiety should be assessed for RNT and treated, if appropriate.

- Given how important the timing of treatment may be, there is need for resources, including online and mobile-based tools, to provide momentary support in day-to-day life and at key moments of the RNT process.

For future research

- High-quality research trials with mediation analysis are needed, to determine whether reductions in RNT are the *cause* of improvements in youth anxiety and depression.

- We also need studies that assess individual treatment components and their pathways to reducing RNT, as well as studies exploring the factors that influence different experiences of RNT.

21

Self-compassion

Focus: Prevention and treatment of anxiety and depression

Self-compassion involves being kind and understanding towards ourselves. It includes taking a balanced and self-supportive approach in times of difficulty, while recognising that we are not alone in our suffering and that going through difficulties is a normal part of life.

Research has shown that higher self-compassion is associated with lower anxiety and depression, including in young people. Previous meta-analyses have found that self-compassion interventions are associated with a reduction in anxiety and depression. However, results could not be disaggregated by age to specifically consider the effectiveness of interventions for young people.

Authors

Sarah Egan, Clare Rees, Joanna Delalande, Danyelle Greene, Grace Fitzallen, Samantha Brown, Marianne Webb & Amy Finlay-Jones

Publication

Aim

The research team considered the evidence in relation to the following key questions:

- Are self-compassion interventions effective for treating anxiety and depression in young people?

- Do changes in self-compassion mediate outcomes of interventions for young people at risk of, or currently experiencing symptoms?

- Is self-compassion associated with anxiety and depression in young people?

- Does self-compassion mediate or moderate the relationship between a risk factor (e.g., bullying) and anxiety and depression in young people?

- How do young people experience self-compassion, and how does this relate to their experience of anxiety and depression?

Methodology

The team conducted a systematic review of the literature to synthesise evidence from quantitative and qualitative studies. To contextualise their findings, they consulted with four research experts and 20 young people (aged 14-24; 65% female; n=11 with personal lived experience of anxiety and depression). Consultations with young people took place through a combination of focus groups and interviews, with the first stage of consultations focusing on understanding perceptions of self-compassion and the second stage on testing the review findings.

3,922 articles were screened, resulting in 52 included studies (49 quantitative studies, 2 qualitative studies, and 1 mixed-methods study) from 16 countries (52% based in North America, 22% in Europe, 17% in Asia, 4% in Australia, and one study in Iran). The quantitative studies included 8 RCTs, as well as 34 cross-sectional, 6 longitudinal, 1 non-randomised controlled, and 1 prospective study.

Limitations included:

- there are few intervention studies focusing specifically on building self-compassion with young people, and very few controlled trials of specific self-compassion interventions

- most trials included small sample sizes (mean=63, range=34-131) and only two intervention studies included follow-up assessments (two weeks and three months follow-up)

- of the eight RCTs reviewed, only one included young people with elevated symptoms of depression as an inclusion criterion and no studies included elevated anxiety; one study investigated individuals with low self-compassion as an inclusion criterion, and the remaining six studies examined the general population.

Key findings:
What works, for whom, in what contexts and why?

What works?

- There is significant evidence that self-compassion is associated with lower rates of anxiety and depression in young people. Analysis of 24 studies (including three longitudinal studies) reporting associations with self-compassion found significant negative correlations between self-compassion and anxiety ($-0.72 < r < -0.19$) and between self-compassion and depression ($-0.61 < r < -0.3$).

- There is some evidence that interventions to increase self-compassion reduce symptoms of anxiety and depression when they are long enough (minimum four sessions) and when they are specific self-compassion interventions. Briefer interventions (only two sessions) of mindfulness or loving-kindness training were found to be less effective. However, the current evidence is limited as there are only a small number of intervention studies conducted with young people (n=8, 6 RCTs) and the results across these studies are mixed.

- Some studies also found that self-compassion could be a moderator or mediator between risk factors (e.g., bullying) and anxiety and depression, although the results were also quite mixed.

For whom?

The team found some studies suggesting that interventions could be effective for adolescents and university students, however they did not uncover more detailed findings about whether interventions work better or worse for different groups of young people.

In what contexts?

There is some evidence to support the delivery of self-compassion interventions in both high-school and university settings. Evidence to date supports the delivery of interventions in both individual and group formats, with qualitative studies suggesting that young people consider that group treatment helps them to feel comfortable showing their authentic self.

How and why?

There is some evidence to suggest that self-compassion interventions work by decreasing negative factors such as self-judgement, isolation, and over-identification, rather than by increasing self-kindness. This finding is echoed by engagement with research experts who emphasised that reducing self-criticism was key to the effectiveness of self-compassion interventions.

Insights from young people

Young people felt that self-compassion was relevant to their experience of anxiety and depression, and thought it could be helpful, particularly for tackling self-critical thoughts. However, there are barriers to using it in practice, with some young people expressing concerns that self-compassion would lead to giving up on goals and achievements, and others associating it with being 'weak' or 'lazy'. Young people suggested there was a need to raise awareness of self-compassion and how it differs from other terms such as 'self-kindness' or 'self-care'. Language also plays an important role, and framing self-compassion as being around courage to engage in suffering seemed to resonate more than focusing on self-compassion or self-kindness. In terms of interventions, young people expressed preferences for programmes that were targeted to their own experiences and challenges. They also highlighted the importance of self-compassion programmes being available in multiple formats, including online, face-to-face, individual, and group, as different individuals had different preferences.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Synthesis of three qualitative studies suggests that young people find self-compassion applicable to their daily lives and that it is something they can practise. However, consultations with young people and research experts highlighted how lack of awareness and misconceptions about self-compassion may be barriers to it being used in practice. Young people also suggested that family background, culture, and relationships may be an important factor affecting the awareness and ability to practise self-compassion.

Recommendations

For practice

Self-compassion interventions should be considered for reducing anxiety and depression, but programmes must be co-designed with young people. This would help to ensure that, among other things, the language used resonates with them and is focused on reducing negative aspects they highlight as important to them, particularly self-criticism.

For future research

- There is a need to conduct more controlled trials of self-compassion interventions for young people. These trials should include larger samples, longer follow-up periods, and youth with elevated symptoms of anxiety and depression. Some trials should also compare self-compassion treatments with active treatments, such as mindfulness-based cognitive therapy or CBT for perfectionism.

- Further mediation analysis is also recommended to determine effective elements of interventions.

Human
connections

22

Digital quality social connection

Focus: Prevention and treatment of anxiety and depression

Digital quality social connection can be defined as the perceived value of an online interaction between two or more people.

Research has shown that poor social connections contribute to youth depression and anxiety. Despite this, quality social connection (QSC) is an underconsidered component of digital interventions that aim to prevent and treat youth anxiety and depression. As the digitalisation of mental health support accelerates, it has become even more important to determine whether QSC is an active ingredient underpinning the successful prevention and treatment of anxiety and depression in young people.

Authors

Lindsay Dewa, Emma Lawrance, Lily Roberts, Ellie Brooks-Hall, Hutan Ashrafian, Gianluca Fontana & Paul Aylin

Preprint

Aim

The research team considered the evidence in relation to the following key questions:

- Can QSC in digital interventions help prevent and treat anxiety and depression in young people?
- Who might digital QSC work best for, and what elements of QSC help or hinder positive outcomes for anxiety and depression in young people?
- What are the indicators of QSC in non-digital and digital interventions, and what are the mechanisms in digital interventions that help QSC form?

Methodology

The team conducted a scoping review of published and grey literature assessing the impact of digital QSC on measures of anxiety and depression among youth populations. They identified 5,708 records (plus 7 from grey literature sources), and included 42 studies in the qualitative synthesis and 10 studies in the meta-analysis. In addition, they consulted with 19 young people (aged 14-30) with lived experience of mental health difficulties and 13 mental health and/or digital health experts, who were involved throughout the review, helping to inform the methodology, interpretation of the findings, proposed framework, and plans for moving forward.

Limitations included:

- only ten studies were included in the meta-analysis due to a lack of measured effect sizes and the heterogeneity across other studies.
- many studies did not control for previously established offline connections, prior to digital QSC.
- only English manuscripts were included, affecting cultural bias.

Insights from young people

Overall, the young people agreed with the findings of this review. In line with the evidence, both the young people and mental health professionals felt that digital QSC was more important for depression than for anxiety. Young people felt that QSC was a key active ingredient, and sometimes the main thing needed to prevent and treat youth anxiety and depression. Some suggested that one QSC mechanism that is working is improved engagement with interventions.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Digital QSC appears to improve depression outcomes among young people, with pooled analysis reporting a weighted mean decrease in depression of 26% following QSC.
- Evidence also suggests that digital QSC improves anxiety in young people, but the weighted mean decrease in anxiety was smaller than in depression (15% following QSC).

For whom?

Few studies have examined who benefits most from improving digital QSC. However, the existing literature suggests that demographic variables, including gender, age, and personality type, may modulate the influence QSC has on youth depression and anxiety. For example, perceived online social support from active Facebook use predicted a reduction in depressive symptoms among females but not males.

In what contexts?

There is limited evidence exploring the contextual factors that influence how digital QSC impacts on youth depression and anxiety. However, research has suggested that establishing a face-to-face connection beforehand or blending face-to-face with digital may improve the outcome of digital QSC. Face-to-face interactions might compensate for the loss of body language and facial expressions available during an online interaction, which is considered a barrier in digital QSC. Evidence also suggests that forum moderation (i.e., message boards moderated by people who have experienced mental health difficulties), confidentiality, ease of access, and anonymity can all help to develop QSC online.

How and why?

Numerous indicators of QSC were found to be associated with improved symptoms of anxiety and depression, including relatedness, feeling accepted, and reduced loneliness. Based on their review, the team also developed the RIVER framework, which outlines five key attributes that underpin QSC in digital interventions:

- *Rapport* – words and actions that build quality social connection
- *Identity and commonality* – shared attributes, values, or experiences that help individuals feel like they are part of the same group
- *Valued interpersonal dynamic* – factors facilitating an individual subjectively assessing a relationship as highly valued
- *Engagement* – individual feels reduction of barriers to actively engaging in formal and informal support
- *Responded to and accepted* – individual feels they are valuable and worthy of care and support.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

While the review did not explicitly address the scalability of digital QSC, based on the key findings, targeting QSC through digital interventions could potentially be a scalable mental health strategy. When considering all healthcare fields, the research team proposed that mental healthcare may be one of the best candidates for a digital revolution – with diagnosis, prevention, treatment, and ongoing management amenable to remote delivery, allowing timely, accessible, cost-effective, and scalable support to meet existing needs. Young people are also among the most digitally fluent age groups, which could substantially facilitate scalability and accessibility. However, the review also identified numerous potential barriers to using digital QSC as a mental health strategy, including the risk of harassment, lack of privacy, issues with internet connection, distrust, stigma, cost of therapy, and a lack of time to develop QSC.

Recommendations

For practice

- QSC should be considered in the development and application of all digital interventions, particularly those targeting depression.
- Clinicians should be trained in how to incorporate techniques for developing or maintaining QSC online, including guidance on how to move face-to-face therapies online.
- Online therapy should prioritise video communication to allow body language to be observed, while recognising the importance of anonymity to some users.
- Blended care should enable patients to first meet their therapist in person, if desired, to facilitate the development of a QSC. Digital interaction would follow this initial introduction.

For future research

- Further research needs to establish which individuals, conditions, and therapeutic mechanisms respond most strongly to QSC.

- Research should examine the interconnectedness of individual QSC indicators, including any variation across different digital interventions and the impact they may have on outcomes across different users worldwide. Factors that may mediate causal relationships between QSC and mental health outcomes deserve further attention.

- New measures should be developed to assess (i) the attributes of a digital intervention that support or hinder good QSC; and (ii) the perceived value of a particular QSC for an individual and its relationship to outcomes, in digital interventions.

23

Loneliness reduction

Focus: Prevention and treatment of anxiety and depression

Loneliness can be defined as a perceived mismatch between the quantity and quality of social relationships that an individual has and that they desire to have.

Loneliness in young people is a common problem, which can arise for many reasons, including individual and situational characteristics (e.g., life transitions, bereavement). Previous research suggests that childhood loneliness can increase the risk of depression and anxiety in later life, and that loneliness may impact future risk of social anxiety and suicidal ideation. It therefore seems plausible that addressing loneliness may help to prevent and alleviate youth anxiety and depression. However, loneliness interventions in the context of mental health are still emerging, and although there is at least one meta-analysis with promising results, there are also studies showing no effects.

Authors

Eiluned Pearce, Pamela Myles-Hooton, Sonia Johnson, Emily Hards, Samantha Olsen, Denisa Clisu, Sarah Pais, Heather Chesters, Shyamal Shah, Georgia Jerwood, Marina Politis, Joshua Melwani, Gerhard Andersson & Roz Shafran

Aim

The research team considered the evidence in relation to the following key questions:

- In which ways and in which contexts does addressing loneliness appear to prevent and/or improve anxiety and depression in youth, and why?

- In which ways, in which contexts, and for whom does addressing loneliness appear not to work, and why?

Methodology

The team conducted a critical interpretative synthesis combining quantitative and qualitative evidence from academic and grey literature. They then developed a conceptual framework of how loneliness, depression, and anxiety may be helped in young people.
The team also consulted with 13 academic experts and 18 youth (aged 18-24) with lived experience of mental ill-health, who contributed to both the search strategy and the framework.

10,229 records were screened, resulting in 53 included sources (27 papers, 25 charity/policy websites, 2 MSc dissertations).

Limitations included:

- reviewed studies often did not measure anxiety or depression, resulting in a lack of clarity regarding whether strategies worked.

- studies were included based on their relevance and not their quality.

- most studies were underpowered feasibility trials with small sample sizes, which limited the meaningfulness of findings and prohibited firm conclusions regarding what works for whom.

Insights from young people

Lived experience advisors agreed that there is a strong interlink between loneliness and mental ill-health, and that loneliness may be an important target for preventing and reducing youth anxiety and depression. The advisors also emphasised:

- the importance of strategies being personalised and co-designed with the young person, to best fit their individual needs, circumstances, and interests.

- the need for individuals to have more agency when engaging in mental health interventions and with providers.

Key findings:
What works, for whom, in what contexts and why?

What works?

Although we can't be completely sure yet, reducing loneliness appears to be a promising way to reduce anxiety and depression in young people. There are several strategies that might help address loneliness, but interventions that flexibly combine the following strategies may be particularly effective:

- intrapersonal strategies, which may involve positive psychology to improve relationship quality and facilitate social goals, or learning new ways of thinking (e.g., via CBT or mindfulness).
- self-help strategies, such as therapeutic apps or taking time for self-reflection, exercise, or music.
- interpersonal strategies that attempt to improve social skills and confidence.
- social strategies seeking to enhance ongoing social support (e.g., peer mentorship programmes) or create opportunities for youth to engage meaningfully with peers who have similar experiences to themselves through shared activities (e.g., music, sport).

For whom?

- The review did not address who benefits most from strategies seeking to reduce loneliness.
- However, the team did find that some individuals may be more affected by loneliness than others, including those with existing anxiety and depression, psychological difficulties such as low interpersonal trust and self-esteem, poor social skills, or a lack of social confidence. What remains unclear is whether these individuals would be those most helped by loneliness interventions.

- The reviewed studies targeted young people considered 'at risk' of loneliness, rather than those who were actually lonely, and also failed to distinguish between transient and chronic/persistent loneliness, so we do not know which approaches might work best for these different groups.

In what contexts?

- There are several barriers to effectively addressing loneliness, including:
- psychological barriers, such as lack of motivation and not wanting to burden others
- situational barriers, which may result from, e.g., caring responsibilities or immigration status
- practical barriers, related to the accessibility of services due to disability, transport, or financial exclusion
- social barriers like stigma, unsupportive home environment, a lack of close relationships or sense of belonging, and not feeling understood by service providers.

How and why?

There are many mechanisms by which reducing loneliness may help reduce anxiety and depression, including psychological (e.g., building identity, self-esteem, and self-reliance), interpersonal (e.g., developing social skills, confidence, and trust), and social mechanisms (e.g., finding commonality and belonging with others). Few studies have directly tested these.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Given the wide range of strategies available to tackle loneliness, there are variable degrees of acceptability, accessibility, and scalability, depending on the strategy being considered. Online peer support interventions, for example, are likely to be accessible to a wider range of individuals than face-to-face CBT; however, these spaces must be safe so that individuals can properly support one another.

Recommendations

For practice

- Reducing loneliness has the potential to prevent and alleviate youth anxiety and depression, and a range of promising strategies is available.
- Although it is not yet clear which strategies work best for whom, strategies should be co-designed alongside young people to meet their individual needs and interests.
- Promising interventions – such as those that facilitate ongoing social support, create opportunities for young people to engage meaningfully with peers who have similar experiences to them, and help individuals develop positive attitudes to themselves and others – should also be incorporated into the prevention and/or treatment of youth anxiety and depression.

For future research

We need more:

- properly powered trials targeting chronically lonely youth, which assess loneliness, anxiety, and depression

- interventions addressing societal stigma, incorporating the built environment, and seeking to help build identity, positive family relationships, and cognitive biases associated with loneliness

- research to develop and evaluate approaches that provide both social support and psychological therapy, as intrapersonal and social strategies may reinforce one another.

24

Neighbourhood cohesion: increased neighbourhood social connection

Focus: Prevention of anxiety and depression

Neighbourhood social connection (or cohesion) is about the extent to which you feel safe and have positive relationships in your local area. It consists of having strong social bonds with those around you, as well as an absence of underlying social conflict, which may arise from factors such as violence, income inequality, and racial and/or ethnic tensions.

Adolescence and young adulthood are important phases for social development, with young people starting to build their social networks and form more connections outside their family unit. Neighbourhoods can play an important role in this, and previous research has found that increased neighbourhood social connection is associated with fewer common mental health symptoms among young people living in low socioeconomic areas. However, to date, there has not been a comprehensive review of the potential for neighbourhood social connection to prevent youth anxiety and depression.

Authors

Josefien Breedvelt, Henning Tiemeier, Evelyn Sharples, Sandro Galea, Claire Niedzwiedz, Iris Elliott & Claudi Bockting

For information

For further information on this review, please contact the Team Lead, Josefien Breedvelt: josefien.breedvelt@natcen.ac.uk

Aim

The research team considered the evidence in relation to the following key questions:

- What factors of neighbourhood social connection affect symptoms of anxiety and depression?
- Can interventions to increase neighbourhood social connection prevent anxiety and depression in young people? If so, in what ways and for whom does this work?

Methodology

The team conducted a rapid review of grey and peer-reviewed literature on neighbourhood social connection. They identified 2,261 studies for screening and included 40 peer-reviewed studies (27 cross-sectional studies, 11 longitudinal studies, and 2 systematic reviews) in their review. The team also carried out an online search to identify citizen science projects and lived experience reports, through which they identified 42 reports, of which 18 met the full eligibility criteria. In addition, they conducted two online workshops with six to seven young people

(aged 14-24) from across the UK. The first workshop focused on the definition and meaning of neighbourhood cohesion and how it may impact mental health, and the second focused on what needs to change to improve neighbourhood cohesion.

Limitations included:

- no experimental or quasi-experimental studies were identified .
- most studies were conducted in North America (82.5%).
- neighbourhood social connection was measured in different ways across studies, with studies often adapting scales or using newly self-developed scales.
- none of the reviewed studies measured anxiety symptoms separately to depression.
- only one study included outcomes for those aged 18 and older.
- there was a high risk of bias across studies.

Key findings:
What works, for whom, in what contexts and why?

What works?

- It is not possible to say whether interventions to increase neighbourhood social connection have a preventative effect, due to the lack of intervention studies available.
- However, the team did find several elements of neighbourhood social connection that were associated with anxiety and depression in young people:
  - Having positive relationships, the availability of social support, being able to enforce social norms, feeling safe, having little antisocial behaviour, and trusting others in your neighbourhood, were all associated with reduced symptoms of depression and anxiety.
  - On the other hand, neighbourhood violence was associated with increased symptoms of depression and anxiety.
- Interventions that may increase neighbourhood social connection include volunteering opportunities, arts and cultural projects, sports groups, creating neighbourhood online spaces, increasing green spaces, neighbourhood regeneration programmes, community groups which provide space to share experiences,

and policy interventions aimed at increasing social cohesion. However, further research is needed to assess the effectiveness of these interventions, particularly in relation to mental health outcomes.

For whom?

The team did not identify who benefits most from interventions that aim to increase neighbourhood social connection as there was not enough evidence to be able to make any conclusions about this.

In what contexts?

Due to a lack of available literature, the review did not identify whether there are particular contexts where increasing neighbourhood social connection may have more impact.

How and why?

Understanding how and why neighbourhood social connection impacts on anxiety and depression is complex. Most studies combine different factors related to neighbourhood social connection into one measurement (for example, combining positive relationships with an absence of social conflict), making it difficult to disentangle how each factor impacts on mental health.

Insights from young people

Young people associated more with the term 'neighbourhood social connection', rather than 'neighbourhood cohesion'. Irrespectively, they felt that neighbourhood social connection could be a helpful preventative approach, if done in the right way. Having roots in the community, access to communal spaces, and feeling a connection to people in your street were all identified as factors that could increase feelings of social connection. In contrast, crime, segregation within the community, and young people feeling as though they do not have a voice were all highlighted as factors that may reduce feelings of social connection. Young people found it difficult to identify existing examples of social connection in their communities, and suggested that lots of work would be needed to improve this. Their ideas for increasing neighbourhood social connection included creating support groups, finding community leaders to bring people together, creating safe and

inclusive communal spaces, fostering open communication, including young people in decision making, and providing community funding for projects.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Given the wide range of potential intervention points for increasing neighbourhood social connection, there are likely to be variable degrees of acceptability, accessibility, and scalability, depending on the intervention being considered. There may also be potential adverse effects of neighbourhood social connection. For example, highly cohesive areas may become exclusionary towards outsiders, and areas with high levels of social control or observation from neighbours and caregivers may also limit young people's mobility and their freedom to explore.

Recommendations

For practice

- Given the association between neighbourhood social connection and anxiety and depression, practitioners and clinicians should consider encouraging activities that enhance neighbourhood connections. They could also actively find out about existing neighbourhood activities that they can signpost young people to.

- Interventions and policies to increase neighbourhood social connection should be co-designed and co-produced with young people, to ensure that the spaces that are created are safe, inclusive, and accessible, while providing opportunities for meaningful interaction. Involving young people in the co-design and co-production process can in itself have positive effects on bonding, building connections, and feeling safe.

For future research

- Further experimental and quasi-experimental studies are needed to understand whether interventions to increase neighbourhood social connection can reduce symptoms of youth depression and anxiety.

- Exploring how different social connection factors interact over time, and within a complex system, would also be important.

- Finally, improved methods of measurement are needed, and the review team recommends focusing on consistent measures that capture neighbourhood social connection at a community level.

25

Social relationships: facilitating improvements in social relationships

Focus: Prevention and treatment of depression

Social relationships are connections that exist between individuals who have recurring and personally meaningful interactions with one another.

Interpersonal difficulties typically exacerbate depressive symptoms, and are often associated with the onset of depressive disorders. This is particularly true for young people, given the rapid changes in, and the increased importance of, their social relationships. At this critical stage of social identity formation, fostering supportive relationships provides lifelong resources not only to prevent or manage depressive illness, but to aid in mitigating the long-term health and economic consequences of depressive symptoms. Targeting social relationships may therefore be a key approach to prevent and treat youth depression.

Authors

Kate Filia, Oliver Eastwood, Sarah Herniman & Paul Badcock

Aim

The research team considered the evidence in relation to the following key questions:

- What approaches aim to prevent or treat depression in young people by facilitating improvements in social relationships?
- What is the evidence base for these approaches?
- What do young people think of these approaches?

Methodology

The team conducted a narrative review of the literature examining interventions that seek to facilitate improvements in young people's social relationships. They identified 1,357 papers for screening and included 57 studies in their review, ranging from controlled trials to systematic reviews and meta-analyses. The team reviewed school-based and online interventions, interpersonal psychotherapy, and family-focused treatment programmes. To ensure the outcomes of the review were meaningful and translatable, the team conducted expert consultations with clinicians (n=5) and with youth consumers and advocates (n=17, aged 15-25). The consultations helped to refine the search strategy, interpret the results, and ensure that the review focused on topic areas relevant to young people and the clinicians working with them.

Limitations included:

- variability in the quality of studies included.
- the fact that most reviewed studies drew from manualised therapies designed for clinical settings (e.g., CBT), largely concentrating on improving social skills rather than social connectedness per se.
- limited research focusing on the potential mechanisms of action.

Insights from young people

In discussing the review findings, there was a clear disconnect between the types of approaches that young people considered important and the evidence-based approaches currently available. Despite the positive findings, young people had reservations about the use of school-based approaches. Online approaches were more enthusiastically received, with accessibility and the destigmatised environment noted as attractive features. Moreover, young people suggested improvements such as delivering successive programmes to allow for the consolidation of skills. They also stressed the importance of ensuring that content is relevant to those from minority groups. Overall, young people emphasised the need for informal ways to foster social connection and social support, which were unequivocally preferred to formal strategies that focus on improving social skills.

Key findings:
What works, for whom, in what contexts and why?

What works?

- In terms of prevention there was evidence of impact for training to help young people develop effective communication, support giving, coping skills, and social activity scheduling. The team also found preliminary evidence to support school- and internet-based approaches as effective prevention strategies for depression.

- In terms of treatment, there was strong evidence for a 12-week course of interpersonal psychotherapy for adolescents (IPT-A) – a structured intervention which targets personal disputes (e.g., conflict with parents), transitions (e.g., changing schools, roles), grief (e.g., loss of a friend), and interpersonal deficits (e.g., poor communication skills). Some evidence was also found in favour of attachment-based family therapy (ABFT) as a treatment approach.

For whom?

- The research team did not find clear evidence of who benefits most from strategies seeking to facilitate improvements in social relationships.

- For IPT-A, for example, there was no evidence to suggest that participant characteristics moderate treatment effects. However, IPT-A had less significant effects in studies involving children and those with psychiatric comorbidities.

- The school-based programme, interpersonal psychotherapy – adolescent skills training (IPT-AST), shows promise as an early intervention strategy for those with high levels of depressive symptoms but who do not yet meet thresholds for referral to specialist services.

In what contexts?

- For school-based approaches, effects were larger for targeted programmes vs universal (Hedge's g=0.32 vs 0.19), and for those delivered by external personnel vs school staff (Hedge's g=0.30 vs 0.17).

- One of the internet-based approaches reviewed (SPARX-R) showed positive effects when administered to those anticipating a known stressor, such as school examinations.

- Involvement of parents and carers also seems to be beneficial.

How and why?

For school-based and online programmes, the mechanism of action is unclear. These programmes are often based on CBT and aim to improve resilience and coping skills rather than directly working on improving connections with others. The team hypothesise that IPT-A reduces depression by improving social functioning and that family-focused interventions work by strengthening familial bonds and promoting young people's autonomy and problem-solving ability.

Real-life application

Is it safe, acceptable, accessible, and scalable to young people worldwide?

Despite being highly accessible environments globally, young people had reservations about school-based approaches, and the team noted high refusal rates for one of these approaches (IPT-AST). Online interventions afford a safe space to attract young people who experience barriers to accessing traditional face-to-face interventions, yet poor adherence was noted as a key challenge for online interventions. Acceptability may be improved by smartphone-based delivery, but risks of potentially harmful social interactions such as cyberbullying need to be borne in mind.

Recommendations

For practice

- Extensive evidence suggests that interpersonal psychotherapy is a highly effective psychotherapeutic strategy for young people experiencing depression.

- The evidence also suggests that digital mental health interventions can reduce depressive symptoms in clinical and non-clinical samples, particularly when programmes involve a high degree of therapist interaction.

- Combining online delivery with traditional interpersonal psychotherapy might therefore present a viable means to deliver a highly accessible, youth-friendly, evidence-based intervention for young people with depression.

For future research

The review team and young people they consulted with suggest that the following is needed:

- Greater use of randomised controlled trials, with larger samples, appropriate blinding, and other measures to reduce risk of bias.

- Research that explores whether socially orientated approaches are only well suited to those experiencing interpersonal difficulties.

- Investigation into the efficacy of online approaches (e.g., online support groups and online social therapy), involving rigorous controlled trials with samples of young people with depression.

Socioeconomic factors

Economic transfers: increased financial resources via cash transfers

Focus: Prevention and treatment of depression

Economic transfers encompass conditional and unconditional transfers (which consist of transfers of money to families, either with 'no strings attached', or conditional upon certain requirements, such as school attendance), housing vouchers, asset transfers, lottery prizes, insurance provision, and multifaceted poverty graduation programmes.

Mental health challenges are strongly associated with poverty in cross-sectional studies, with low-income individuals having higher rates of mental illness compared to wealthier individuals. This suggests there may be a bidirectional relationship between poverty and mental health. Researchers have recently started investigating the impact of both conditional and unconditional cash transfers on outcomes beyond economics, including measures of mental health.

Authors

Jimena Romero, Joel McGuire, Kristina Esopo & Johannes Haushofer

Aim

The research team considered the evidence in relation to the following key question:

- What is the effect of economic transfers on mental health and subjective wellbeing?

Methodology

The team conducted a systematic search of published and grey literature, focusing on RCTs examining the impact of economic transfers on mental health. Research was eligible for consideration if it included treatment effects on aspects of mental health or subjective wellbeing, such as depression, happiness, life satisfaction, or wellbeing. There were no restrictions to inclusion by date of publication or geographical location of the study. The team identified 1,640 papers for screening and included 57 studies in their review. Of these 57 studies, there were 27 studies on unconditional cash transfers, 11 on housing vouchers, 6 on conditional cash transfers, 6 on lotteries, 3 on graduation programmes, 3 on insurance provision, and 3 on asset transfers and savings programmes.[4]

From these 57 studies, 253 treatment effects were extracted and standardised, to make them comparable across studies. The team used a fixed-effects meta-analysis model using cluster-robust standard errors at the study level.

In addition, the research team consulted with three randomly chosen recipients of unconditional cash transfers based in Kenya, who had each received a cash transfer of US $500 three years earlier. Recipients of unconditional cash transfers participated in calls lasting 30 minutes and were taken through a series of open-ended questions.

Limitations included:

- few studies (i.e., only 57) have explored the effect of economic transfers on mental health, with even fewer (27) including separate effects for young people aged 14-24.

- the substantial heterogeneity in effect sizes observed across studies raises some concerns that study-specific characteristics may be driving some of the individual intervention and outcome associations reported in the literature.

Endnotes

4   Please note that there is some overlap: one study covered both unconditional cash transfers and conditional cash transfers, and one study included both unconditional cash transfers and insurance provision.

Key findings:
What works, for whom, in what contexts and why?

What works?

- Economic transfers appear to be a promising approach to improving young people's mental health. Although the magnitude of the treatment effect is small, it is consistent and robust.

- Overall, the aggregated effect of economic transfers increases measures of mental health by 0.1 standard deviations (SD), with a statistically significant effect of 0.15 SD ($p \leq 0.01$) observed for unconditional cash transfers.

- Analysis by outcome variable indicated that the largest effects of economic transfers were on happiness/life satisfaction (0.13 SD), depression (0.13 SD), and on stress/anxiety (0.06 SD), all statistically significant ($p \leq 0.01$).

- Of all economic transfers evaluated, the largest effect generated was for unconditional cash transfers on happiness/life satisfaction (0.18 SD, $p \leq 0.01$).

For whom?

- The reviewed literature showed little heterogeneity by age and sex, suggesting that economic transfers have similar effects when tested with different age groups and with men vs women.

- There was also no differential effect from the intervention value (as a share of gross domestic product (GDP) per capita of the country of intervention), which the team found somewhat surprising. One possible reason for this result is the substantial heterogeneity in the types of interventions that are deployed in different countries (e.g., cash transfers are mostly restricted to low-income countries).

In what contexts?

The studies included in this review were based in both high-income (n=18) and low- or middle- income countries (n=39). When analysing the treatment effect by country, studies in low- and middle-income countries had a pooled effect size of 0.12 SD, whereas in high-income countries the pooled effect size was 0.07 SD. Thus, the effects were qualitatively larger in magnitude in low-income countries.

How and why?

Economic transfers aim to improve depression and overall mental health through poverty alleviation; however, no exploration of mechanisms or intermediary variables was included in this review.

Insights from young people

Overall, recipients of unconditional cash transfers considered mental health to be important for maintaining good relationships with others and for being productive. Moreover, cash transfers were seen positively and were considered a respectful way of assisting people. Cash transfers were also considered to have an overall positive effect on mental health and happiness, with stress reduction mentioned more commonly than all other outcomes.

Real-life application

Is it safe, acceptable, accessible, nd scalable to young people worldwide?

Issues around real-life application of economic transfers were not discussed as part of this review.

Recommendations

For practice

The use of economic transfers as welfare interventions is supported not only by the economic impact of such interventions, but also by their effects on mental health.

For future research

Explore the mechanisms and intermediary variables of how mental health is impacted by different economic interventions.

27

Urban access to green space

Focus: Prevention of anxiety and depression

Access to green space refers to our proximity to spaces such as parks or vegetation, as well as our exposure to activities that take place in green or natural environments, such as walking or adventure training.

55% of the current global population lives in urban areas, with this figure likely to increase to 68% by 2050. There are therefore about 700 million 14 to 24-year-olds living in urban settings across the world. Urbanisation is a known risk factor for poor mental health, but the risk may be alleviated by providing better access to green space in urban areas. Evidence from systematic reviews with children, adolescents, and adults suggests that exposure to green space is associated with a range of improvements in mental health, from reduced symptoms of stress, depression, and anxiety, to improved mood and cognitive development. However, these reviews have not focused on 14 to 24-year-olds, nor have they sought to explore whether, or how, green space can reduce the risk of developing anxiety and/or depression.

Authors

Isabelle Bray, Danielle Sinnett, Faith Martin, Robert Hayward & Rebecca Reece

Publication

Preprint

Aim

The research team considered the evidence in relation to the following key question:

- In which ways, in which contexts, and for whom does exposure to green space reduce the risk of anxiety and depression among young people aged 14-24 living in urban settings?

Methodology

The team conducted a systematic review of multidisciplinary literature. 9,204 papers were identified, and 47 were included in the review. Based on the evidence reviewed, the team developed a conceptual model to elucidate causal pathways. The insights of seven young people with lived experience of depression and anxiety were also gathered, to help shape the scope of the project and inform the conceptual model.

Of the 47 studies reviewed, most were experimental studies (n=36, 77%) which (i) assessed a particular aspect of being in a green space; (ii) compared symptoms of anxiety and depression in young people who had been in a green space (e.g., forest, park) vs an urban environment (e.g., street); or (iii) who had taken part in indoor vs outdoor exercise. Some non-experimental studies (n=11, 23%) were also included, which assessed young people's perceptions of green space and exposure to residential vegetation.

Limitations included:

- most studies took place in high-income countries (n=33, 70%), with 53% of experimental studies conducted in Asia.
- many studies did not include symptoms of anxiety or depression as the main outcome of interest.
- the average sample size of experimental studies was small (mean=76.5, range=12-585) and not representative of the global youth population, carried out with high-school or university students of very similar ages.
- insufficient detail on the demographic diversity of the samples prohibited subgroup or moderation analysis.
- lack of long-term follow-up.

Key findings:
What works, for whom, in what contexts and why?

What works?

There is strong evidence that walking or being in a green space such as a forest or a park, even if just for 15 minutes, can immediately and momentarily improve mood and reduce feelings of anxiety for young people. It is less clear, however, whether exposure to green space provides a sustained effect on general mood and reduces the risk of developing anxiety and depression in the long term.

For whom?

- Very few studies investigated differences in demographic variables, so little is known about what works best for whom.
- Based on male- and female-only studies yielding similar results, evidence suggests that exposure to green space promotes the mental health of both young men and women.

In what contexts?

There are larger and longer-lasting psychological benefits to be gained from spending time in a forest as opposed to an urban park. Studies show a 14-19% reduction in anxiety when taking a short walk in an urban park vs an urban street, but this value is increased to 23-27% when walking in a forest.

How and why?

Several factors influence the association between green space and mental health. For example, green space appears to promote social interaction, physical activity, and sleep, which in turn is associated with reduced emotional and behavioural problems. Exposure to nature also appears to have a restorative effect, potentially leading to reduced rumination and stress as well as increased mindfulness and relaxation.

Insights from young people

Young people described being in green space as time spent away from traffic, technology, noise, people, work, and social media. It was *this*, they believed, that enabled them to truly appreciate nature and gain perspective. In turn, this helped to promote mindfulness, stop rumination, enable better problem-solving, increase resilience to stress, and allow for relaxation and restoration to take place.

Real-life application
Is it safe, acceptable, accessible, and scalable to young people worldwide?

Some studies reported elevated levels of state anxiety immediately prior to an outdoor excursion, which may suggest that this can be a threatening or unfamiliar experience for some. Despite this, the dropout rates of the experimental studies reviewed were low, although very few conducted long-term follow-up assessments. What is clear is that increasing urban access to green space is a structural change with the potential to have far-reaching and long-lasting benefits, as well as to reduce inequalities, since those in the most deprived areas are likely to reap the most benefit.

Recommendations
For practice

Policymakers should work to bring the benefits of exposure to green spaces into global urban settings, by designing, maintaining, and promoting these spaces as well as ensuring that they are accessible, acceptable, and safe for young people to use. This could be achieved collectively by:

- improving access to urban green spaces, by protecting, creating, and enhancing green spaces in new and existing areas
- maximising opportunities for daily engagement with green spaces, through greening school grounds, university campuses, and workplaces
- ensuring that outdoor activities are embedded in the educational curriculum and prescribing outdoor adventure interventions for young people at risk of depression or anxiety.

For future research

- Measure the development of anxiety and depression in high-quality studies with long-term follow-up.
- Determine the optimal treatment dose and frequency of exposure to green space.
- Conduct studies with more representative samples of young people, to explore the effect of demographic variables and individual preferences on the association between green space and mental health outcomes.
- Assess changes in psychological processes that are key to anxiety and depression.
- Examine the mental health benefits of access to blue spaces, such as rivers, lakes, and canals.

Concluding remarks

What we have learnt and where do we go from here?

Our aim when we commissioned these reviews was to provide the field with an overview of what is and isn't known about what helps prevent or treat anxiety and depression in 14 to 24-year-olds globally.

In so doing we sought to move away from 'brand comparison', to really dig into the active ingredients of effective interventions.

By bringing together insights from diverse cross-disciplinary literatures, we hope to highlight potential future research priorities.

Looking across the results, we highlight several key insights:

- There is evidence to support many of the active ingredients reviewed, from the cellular to the societal. However, we do not see the emergence of clear front runners for 'best bets' that stand out. Rather, the overall impression is of many possible ingredients of small effect.

- No one active ingredient is likely to be enough or effective for everyone. It is likely that different people in different global contexts will need a range of ingredients in different combinations. Personalisation will be required at the individual level. What also appears to be important is giving young people the autonomy and agency to make more informed choices about how they manage their own mental health.

- Active ingredients interact as part of a complex system. For example, there can be bidirectional relationships between different ingredients – more bodily movement may result in better sleep, while individuals may take on more physical activity if they feel well rested. Ingredients are also linked as part of causal chains – for example, social connection can either be directly or indirectly targeted via other active ingredients, such as engagement with the arts, access to green space, use of SSRIs, or reducing inflammation.

- We see heterogeneity at all levels, with the active ingredients reviewed ranging from:
  - the cellular (e.g., reduced inflammation) to the societal (e.g., neighbourhood cohesion).
  - those that require professional input (e.g., use of SSRIs) to those that involve 'self-care' (e.g., relaxation techniques).
  - those with an individual focus (e.g., emotion regulation) to those requiring societal policies (e.g., economic transfers).

  - those provided in a healthcare setting (e.g., exposure) to those provided in other settings (e.g., engagement with the arts).

- There are considerable limitations in the existing evidence base, as highlighted in many of the individual summaries:
  - The vast majority of existing work has taken place in high-income countries, and it is unclear how applicable the findings are to low- and middle-income contexts.
  - Some research teams struggled to find studies that focused on young people aged 14-24 years, which led them to rely on a small number of studies that were eligible for inclusion in their review or to extrapolate findings from other age groups.
  - Many studies are underpowered or at risk of bias, limiting the conclusions that can be drawn, specifically around what works, for whom, and in what contexts.
  - There is limited understanding of the mechanisms of efficacy.
  - Finally, there is a lack of dismantling trials or similar designs that can tease apart the relative efficacy of different components or active ingredients within trialled interventions.

We hope these reviews will inspire researchers to develop potential proposals for well-powered studies to tease out the mechanisms underpinning effective interventions so we can develop more personalised interventions for young people.

Our call is for mental health scientists to come together to explore the different potential ingredients, but also the relationships between them. To do so will require commitment to learning different languages used by different scientific siloes and seeking to find commonly agreed conceptual clarity. This is no easy task, but the rewards are likely to be worth it.

Wellcome is looking to launch a major funding call in 2022 that builds on the learning in this publication, to examine the causal mechanisms underpinning effective interventions. We will be looking for interdisciplinary collaborations to rise to this challenge, and suggest that all interested readers keep an eye on our website: https://wellcome.org/what-we-do/mental-health

Appendices

Appendix 1: Examples of how the research teams we commissioned involved young people with lived experience

Below we provide some examples of how the research teams commissioned in 2020 involved young people with lived experience of anxiety and/or depression at different stages of the review process, from the initial design through to dissemination.

The examples are collated from multiple teams, to show some of the different methods used by researchers to involve young people, and they are not a description of the activity of any one team. For example, some teams involved young people with lived experience in the core team as co-investigators, while others ran workshops or online discussions with youth advisory groups. Teams with young people as co-investigators said it was also useful to have a wider group of young people to draw on, who could provide input with more flexibility.

Many of the review teams we commissioned said that working with young people with lived experience was an incredibly rewarding and exciting part of the project, which had a transformative effect on their research. They stressed the value of integrating young people into their team and its processes, ensuring that their expert advice carried the same weight as that of other researchers or professionals. Some teams also highlighted that the involvement of young people with lived experience brought significant additional expertise, perspective, and insight that the research teams would have otherwise lacked, including, for example, pointing out possible gaps in the literature.

The examples collated are included in the table below:

Stage of project	Examples of how young people with lived experience were involved
Project design	• Reviewing the scope and design of the study • Refining and prioritising the research questions • Exploring and agreeing a shared definition and understanding of the chosen active ingredient and discussing its acceptability and utility
Defining the review process and reviewing the evidence	• Reviewing the search protocol and search terms, and suggesting additional search terms • Screening the literature, extracting the data, and quality-assuring • Identifying significant gaps in the literature • Discussing how interventions are conducted in studies vs how they may be experienced in real-world contexts • Highlighting diversity and equity issues in the literature (e.g., gender analysis)
Analysis and evidence synthesis	• Co-developing the questions for stakeholder engagement with professionals • Planning and co-facilitating engagement with wider groups of young people with lived experiences to inform the analysis • Exploring the preliminary findings from the review, and engagement with other young people with lived experience as well as professionals to inform the evidence synthesis • Discussing and drawing inferences from the evidence and engagement • Checking the credibility of the initial evidence synthesis and suggesting refinements • Exploring the draft active ingredient framework with other young people and discussing how this reflected their experiences • Identifying future research priorities
Reporting and dissemination	• Contributing to the final report, including a sensitivity and accessibility check on language and terminology • Co-developing outputs, including the scripts and development of the video or animation • Identifying the best knowledge dissemination routes and methods • Writing reflective pieces about the project and/or their involvement in the project)

Please note:

• These examples are not exhaustive, and there were other ways that young people with lived experience contributed to the active ingredient reviews.

• For the purposes of these reviews, we define young people with lived experience as those who identify as having experienced anxiety and/or depression, rather than requiring that they must have been diagnosed by a clinical professional. We are interested in hearing from a range of individuals who have, and who have not, received access to any form of support for their anxiety and/or depression.

Appendix 2: Research team members and affiliations

Please note that the Team Lead for each project has been underlined.

Behaviours and activities

Behavioural activation: increasing engagement with positive activities

Kanika Malik[1,2], Maliha Ibrahim[1,2], Adam Bernstein[3], Rahul KV1, Tara Rai[1], Bruce Chorpita[4] & Vikram Patel[1,5]

[1] Sangath, New Delhi, India

[2] Jindal School of Psychology and Counselling, OP Jindal Global University, India

[3] PracticeWise, LLC, Florida, USA

[4] Department of Psychology, University of California, Los Angeles, USA

[5] Department of Global Health and Social Medicine, Harvard Medical School, Boston, Massachusetts, USA

Engagement with the arts

Kamala Easwaran*[1], Lakshmi Narasimhan*[1], Anussha Murali[1], Deepika Easwaran[1], Tasneem Raja[2] & Yog Varun Japee[1]

* Joint first authors

[1] Sumunum Arts and Wellbeing Pvt. Ltd, Chennai, India

[2] UDAAN, Tata Trusts, Mumbai, India

Exposure: facing one's fears in a planned manner

Alessandra K. Teunisse*[1], Lorna Pembroke*[1], Maddison O'Gradey-Lee[1,3], Ronald M. Rapee[1], Viviana M. Wuthrich[1], Cathy Creswell[2] & Jennifer L. Hudson[1,3]

* Joint first authors

[1] Centre for Emotional Health, Department of Psychology, Macquarie University, New South Wales, Australia

[2] Department of Experimental Psychology and Department of Psychiatry, University of Oxford, Oxford, UK

[3] Black Dog Institute, University of New South Wales, Sydney, Australia

Physical activity: more bodily movement

Alan Bailey[1], Rebekah Street*[1], Shaira Baptista*[1], Alexandra Parker[1,2] & Rosemary Purcell[1]

* Joint second authors

[1] Orygen, and Centre for Youth Mental Health, University of Melbourne, Parkville, Victoria, Australia

[2] Institute for Health and Sport, Victoria University, Melbourne, Victoria, Australia

Problem solving

Daniel Michelson*[1], Eleanor Hodgson*[1], Adam Bernstein[2], Bruce F. Chorpita[3] & Vikram Patel[4]

* Joint first authors

[1] School of Psychology, University of Sussex, UK

[2] PracticeWise, LLC, Florida, USA

[3] Department of Psychology, University of California, Los Angeles, USA

[4] Department of Global Health and Social Medicine, Harvard Medical School, Boston, Massachusetts, USA

Jane Lewis[1], Jade Mitchell[1], Sangita Chakraborty[1], Bryce D. McLeod[2], Kristina L. Metz[3], Ludvig Bjørndal[1], Robyn Mildon[1] & Aron Shlonsky[4]

[1] Centre for Evidence and Implementation, UK and Australia

[2] Department of Psychology, Virginia Commonwealth University, Richmond, Virginia, USA

[3] Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland, USA

[4] Department of Social Work, Monash University, Melbourne, Australia

Karolin Krause[1,2], Darren Courtney[1,3], Benjamin W. C. Chan, Sarah Bonato[1], Jacqueline Relihan[1], Matthew Prebeg[1], Karleigh Darnay[1], Madison Aitken[1,3], Lisa D. Hawke[1,3], Priya Watson[1,3] & Peter Szatmari[1,3,4]

[1] Cundill Centre for Child and Youth Depression, Centre for Addiction and Mental Health (CAMH), Toronto, Ontario, Canada

[2] Evidence-Based Practice Unit, University College London and Anna Freud National Centre for Children and Families, London, UK

[3] Department of Psychiatry, University of Toronto, Toronto, Ontario, Canada

[4] Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

Relaxation techniques: better stress response via relaxation

Syed Usman Hamdani[1,2,3]**, Zill-e-Huma**[1,2,3]**, Syed Wajeeha Zafar**[1,2]**, Ahmed Waqas**[1,3] **& Atif Rahman**[3]

[1] Human Development Research Foundation (HDRF), Pakistan

[2] Global Institute of Human Development (GIHD), Shifa Tameer-e-Millat University, Islamabad, Pakistan

[3] Institute of Population Health, Department of Primary Care and Mental Health, University of Liverpool, Liverpool, UK

Beliefs and knowledge

Sense of mattering

Geckhong Yeo[*1,2]**, Alexandria Remus**[*1,2,3]**, Qiao Ying Leong**[1,2]**, Lauren Koh**[4]**, Olivia Ong**[4]**, Theodore Kee**[1,2,3]**, Matt Oon**[3] **& Dean Ho**[1,2,3]

* Joint first authors

[1] N.1 Institute of Health, National University of Singapore, Singapore

[2] The Institute for Digital Medicine (WisDM), Yong Loo Lin School of Medicine, National University of Singapore, Singapore

[3] Department of Biomedical Engineering, NUS Engineering, National University of Singapore, Singapore

[4] Acceset, Singapore

Self-evaluation: improved view of self

Faith Orchard[1]**, Juliette Westbrook**[1]**, Brioney Gee**[2,3]**, Tim Clarke**[2,3]**, Sophie Allan**[2,3] **& Laura Pass**[3]

[1] School of Psychology and Clinical Language Sciences, University of Reading, Reading, UK

[2] Research and Development Department, Norfolk and Suffolk NHS Foundation Trust, Norwich, UK

[3] Department of Clinical Psychology and Psychological Therapies, Norwich Medical School, University of East Anglia, Norwich, UK

Brain/body functions

Circadian rhythms: better sleep-wake cycles

Jacob J. Crouse[1]**, Joanne S. Carpenter**[1]**, Yun Ju Christine Song**[1]**, Samuel Hockey**[1]**, Sharon L. Naismith**[2]**, Ronald R. Grunstein**[3,4]**, Elizabeth M. Scott**[1,5]**, Kathleen R. Merikangas**[6]**, Jan Scott**[1,7,8,9] **& Ian B. Hickie**[1]

[1] Youth Mental Health & Technology Team, Brain and Mind Centre, University of Sydney, NSW, Australia

[2] Healthy Brain Ageing Program, Brain and Mind Centre, University of Sydney, NSW, Australia

[3] Royal Prince Alfred Hospital and University of Sydney, NSW, Australia

[4] Woolcock Institute of Medical Research, Sleep and Circadian Research Group, NSW, Australia

[5] St Vincent's and Mater Clinical School, University of Notre Dame, NSW, Australia

[6] Genetic Epidemiology Research Branch, Division of Intramural Research Program, National Institute of Mental Health, USA

[7] Academic Psychiatry, Institute of Neuroscience, Newcastle University, Newcastle, UK

[8] Diderot University, Sorbonne City, Paris, France

[9] Norwegian University of Science and Technology, Trondheim, Norway

Gut microbiome: improving gut microbial function

Kathrin Cohen Kadosh[1]**, Melissa Basso**[*1]**, Paul Knytl**[*1]**, Nicola Johnstone**[1]**, Jennifer Y. F. Lau**[2,3] **& Glenn Gibson**[4]

* Joint second authors

[1] School of Psychology, Faculty of Health and Medical Sciences, University of Surrey, Guildford, UK

[2] Youth Resilience Research Unit, Queen Mary University of London, London, UK

[3] Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK

[4] Department of Food and Nutritional Sciences, University of Reading, Reading, UK

Reduced levels of inflammation in the body

Yara J. Toenders[*1,2]**, Liliana Laskaris**[*1,2]**, Christopher G. Davey**[3]**, Michael Berk**[1,2,3,4,5]**, Yuri Milaneschi**[6]**, Femke Lamers**[6]**, Brenda W.J.H. Penninx**[6] **& Lianne Schmaal**[1,2]

* Joint first authors

[1] Orygen, Parkville, Australia

[2] Centre for Youth Mental Health, University of Melbourne, Australia

[3] Department of Psychiatry, University of Melbourne, Australia

[4] Deakin University, IMPACT – the Institute for Mental and Physical Health and Clinical Translation, School of Medicine, Barwon Health, Geelong, Australia

[5] Florey Institute of Neuroscience and Mental Health, University of Melbourne, Australia

[6] Department of Psychiatry, Amsterdam UMC, Department of Amsterdam Public Health Research Institute and Amsterdam Neuroscience, Vrije Universiteit, Amsterdam, Netherlands

Selective serotonin reuptake inhibitors:

use of antidepressants

Susannah E. Murphy*[1], Liliana Capitão*[1], Sophie Giles[1], Philip J. Cowen[1], Argyris Stringaris[2] & Catherine J. Harmer[1]

* Joint first authors

[1] University Department of Psychiatry, Warneford Hospital, Oxford, UK

[2] NIMH, Bethesda, USA

Cognitive and attentional skills

Affective awareness: knowing how one feels

Joanne Beames[1], Katarina Kikas[1] & Aliza Werner-Seidler[1]

[1] Black Dog Institute, University of New South Wales, Sydney, NSW, Australia

Decentring: better able to shift perspective

Marc Bennett[1], Rachel Knight[1], Shivam Patel[1], Tierney So[1], Tamsin Ford[2] & Tim Dalgleish[1]

[1] MRC Cognition and Brain Sciences Unit, University of Cambridge, Cambridge, UK

[2] Department of Psychiatry, University of Cambridge, Cambridge, UK

Emotion regulation: improved management of emotions

Sarah Skeen[1], Christina Laurenzi[1], Tatenda Mawoyo[1], Kelly Gemmell[1], Jackie Stewart[1], Nagendra Luitel[2], Bronwyne Coetzee[3], Chiara Servili[4], Alexander C. Tsai[5], Gerardo J. Melendez Torres*[6] & Mark Tomlinson*[1,7]

* Joint last authors

[1] Institute for Life Course Health Research, Department of Global Health, Stellenbosch University, Tygerberg, South Africa

[2] Transcultural Psychosocial Organization Nepal, Kathmandu, Nepal

[3] Department of Psychology, Stellenbosch University, Stellenbosch, South Africa

[4] Department of Mental Health and Substance Use, World Health Organization, Geneva, Switzerland

[5] Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, USA

[6] Peninsula Technology Assessment Group, University of Exeter, Exeter, UK

[7] School of Nursing and Midwifery, Queens University Belfast, Belfast, UK

Alexander R. Daros[1], Sasha A. Haefner[1,2], Shayan Asadi[1], Sharifa Kazi[1], Terri Rodak[3] & Lena C. Quilty[1,4]

[1] Campbell Family Mental Health Institute, Centre for Addiction and Mental Health, Toronto, Ontario, Canada

[2] Ontario Institute for Studies in Education, University of Toronto, Toronto, Ontario, Canada

[3] CAMH Library and Archives, Centre for Addiction and Mental Health, Toronto, Ontario, Canada

[4] Department of Psychiatry, University of Toronto, Toronto, Ontario, Canada

Helpful attentional and interpretational thinking patterns

Jennifer Y. F. Lau[1,2], Rebecca Watkins-Muleba[1], Isabelle Lee[1], Victoria Pile[1] & Colette R. Hirsch1

[1] Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK

[2] Youth Resilience Research Unit, Queen Mary University of London, London, UK

Hopefulness: learning to be more hopeful

Clio Berry[1], Joanne Hodgekins[2], Daniel Michelson[3], Laura Chapman[3], Olga Chelidoni[4], Lucie Crowter[3], Catarina Sacadura[5] & David Fowler[3]

[1] Brighton and Sussex Medical School, University of Sussex, UK

[2] Norwich Medical School, University of East Anglia, UK

[3] School of Psychology, University of Sussex, UK

[4] School of Life Sciences, University of Sussex, UK

[5] Research & Development, Sussex Partnership NHS Foundation Trust, UK

Mental imagery: helpful use of emotional mental imagery

Victoria Pile[1], Grace Williamson[1], Aleks Saunders[1], Emily A. Holmes[2,3] & Jennifer Y. F. Lau[1,4]

[1] Department of Psychology, Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK

[2] Department of Psychology, Uppsala University, Uppsala, Sweden

[3] Division of Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden

[4] Youth Resilience Research Unit, Queen Mary University of London, London, UK

Perfectionism reduction

Tracey Wade[1], Sarah Egan[2], Maggie Wleklinski[1], Amy O'Brien[2], Grace Fitzallen[2] & Roz Shafran[3]

[1] Órama Institute and Blackbird Initiative, Flinders University, Adelaide, Australia

[2] School of Psychology, Curtin University, Perth, Australia

[3] University College London Great Ormond Street Institute of Child Health, London, England

Repetitive negative thinking reduction

Imogen Bell[1,2], Sally Grace[1,2], Katherine Nguyen[1,2], John Gleeson[3] & Mario Alvarez-Jimenez[1,2]

[1] Orygen, Melbourne, Australia

[2] Centre for Youth Mental Health, University of Melbourne, Australia

[3] Healthy Brain and Mind Research Centre and School of Behavioural and Health Sciences, Australian Catholic University, Melbourne, Victoria, Australia

Self-compassion

Sarah Egan[1,2], Clare Rees[2], Joanna Delalande[2], Danyelle Greene[2], Grace Fitzallen[2], Samantha Brown[2], Marianne Webb[2] & Amy Finlay-Jones[2,3]

[1] Curtin enAble Institute, Faculty of Health Sciences, Curtin University, Perth, Australia

[2] Discipline of Psychology, School of Population Health, Curtin University, Perth, Australia

[3] Telethon Kids Institute, Perth Children's Hospital, Perth, Australia

Human connections

Digital quality social connection

Lindsay H. Dewa*[1,2,3], **Emma L. Lawrance***[2,4], **Lily F. Roberts**[2], **Ellie Brooks-Hall**[5], **Hutan Ashrafian**[2], **Gianluca Fontana**[2] **& Paul Aylin**[1,2,3]

[1] NIHR Patient Safety Translational Research Centre, Imperial College London, London, UK

[2] Institute of Global Health Innovation, Imperial College London, London, UK

[3] School of Public Health, Imperial College London, London, UK

[4] Mental Health Innovations, London, UK

[5] Person with lived experience, UK

Loneliness reduction

Eiluned Pearce[1]**, Pamela Myles-Hooton**[2]**, Sonia Johnson**[1]**, Emily Hards**[3]**, Samantha Olsen**[2]**, Denisa Clisu**[4]**, Sarah M. A. Pais**[1]**, Heather A. Chesters**[2]**, Shyamal Shah, Georgia Jerwood**[1]**, Marina Politis, Joshua Melwani, Gerhard Andersson**[5] **& Roz Shafran**[2]

[1] Division of Psychiatry, University College London, UK

[2] Great Ormond Street Institute of Child Health, University College London, UK

[3] Department of Psychology, University of Bath, UK

[4] Division of Psychology and Language Sciences, University College London, UK

[5] Department of Behavioural Sciences and Learning, Linköping University, Sweden

Neighbourhood cohesion: increased neighbourhood social connection

Josefien Breedvelt[1,2,3]**, Henning Tiemeier**[4]**, Evelyn Sharples**[5]**, Sandro Galea**[6]**, Claire Niedzwiedz**[7]**, Iris Elliott**[8] **& Claudi Bockting**[1,2]

[1] Centre for Urban Mental Health at the University of Amsterdam, Amsterdam, Netherlands

[2] Department of Psychiatry at the Amsterdam University Medical Centers, Amsterdam, Netherlands

[3] National Centre for Social Research, London, England

[4] Harvard TH Chan School of Public Health, Boston, USA

[5] Independent consultant

[6] Boston University School of Public Health, Boston, USA

[7] Institute of Health & Wellbeing, University of Glasgow, Scotland

[8] Irish Human Rights and Equality Commission, Dublin, Ireland

Social relationships: facilitating improvements in social relationships

Kate Filia[1,2]**, Oliver Eastwood**[1,2]**, Sarah Herniman**[1,2,3] **& Paul Badcock**[1,2,3]

[1] Centre for Youth Mental Health, University of Melbourne, Melbourne, Victoria, Australia

[2] Orygen, Melbourne, Victoria, Australia

[3] Melbourne School of Psychological Sciences, University of Melbourne, Melbourne, Victoria, Australia

Socioeconomic factors

Economic transfers: increased financial resources via cash transfers

Jimena Romero[1]**, Joel McGuire**[2]**, Kristina Esopo**[3] **& Johannes Haushofer**[1,4,5,6]

[1] Stockholm University, Stockholm, Sweden

[2] Happier Lives Institute, UK

[3] University of California, Santa Barbara, California, USA

[4] National Bureau of Economic Research, Cambridge, Massachusetts, USA

[5] Busara Center for Behavioral Economics, Nairobi, Kenya

[6] Max Planck Institute for Research on Collective Goods, Bonn, Germany

Urban access to green space

Isabelle Bray[1]**, Danielle Sinnett**[1]**, Faith Martin**[2]**, Robert Hayward**[1] **& Rebecca Reece**[1]

[1] University of the West of England, Bristol, UK

[2] Coventry University, Coventry, UK

Appendix 3: Measures used to assess active ingredients

The table below provides a brief description of up to three measures currently used to assess each of the 27 active ingredients reviewed by Wellcome-funded researchers in 2020. It has been developed with input from the research teams and is not based on a systematic search of the literature. Inclusion of a measure in the table does not reflect endorsement for use by Wellcome.

Active ingredient	Measures used to assess this active ingredient
Behaviours and activities	
Behavioural activation: increasing engagement with positive activities	The research team found limited evidence for the use of standardised tools to assess activation and other behavioural activation-related skills in young people. Self-monitoring, on the other hand, was frequently used to examine engagement with activities and their impact on mood.
	This finding opens up a debate on the extent to which a standardised tool, such as the Behavioral Activation for Depression Scale (BADS; Kanter et al., 2009), versus an idiographic measure or ecological momentary assessment (EMA) derived from self-monitoring, can be used effectively in assessing activation. Existing literature suggests that idiographic measures are typically more sensitive to change than the standardised measures of skills assessment, and more reflective of young people's 'voices' in identifying and addressing health concerns. Further, technology aids such as mobile apps and wearable devices can facilitate EMAs and provide easily accessible feedback for young people and providers. Systematic research will be needed on how these measures can be structured throughout the intervention to assess, monitor, and evaluate activation.
	Kanter JW, Rusch LC, Busch AM & Sedivy SK. Validation of the Behavioral Activation for Depression Scale (BADS) in a community sample with elevated depressive symptoms. Journal of Psychopathology and Behavioral Assessment, 2009; 31(1): 36-42. https://doi.org/10.1007/s10862-008-9088-y
Engagement with the arts	The research team did not identify a specific measure for assessing engagement with the arts, and therefore suggest using a general measure of wellbeing, such as: • Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS; Tennant et al., 2007) The WEMWBS is a strengths-based measure, which covers critical aspects of psychological functioning, including autonomy, agency, optimism and aspiration, curiosity, clarity of thought, positive affect, and positive relationships. The measure has been translated into over 25 languages and has been validated for use in a wide variety of different geographical locations.
	Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, Parkinson J, Secker J & Stewart-Brown S. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. Health and Quality of Life Outcomes, 2007; 5: 63. https://doi.org/10.1186/1477-7525-5-63
Exposure: facing one's fears in a planned manner	There is significant variation in how exposure characteristics are measured. However, based on the current literature, the research team suggest using independent observations of exposure sessions, such as: • Exposure Session Rating Form (Tiwari et al., 2013) Although there are strengths to this approach (e.g., reliability, validity, and reduced reporter bias), the research team also recognise that there are multiple issues with observational measures – in particular, the acceptability and practicality of having an independent observer present during exposure opportunities.
	Tiwari S, Kendall PC, Hoff AL, Harrison JP & Fizur P. Characteristics of exposure sessions as predictors of treatment response in anxious youth. Journal of Clinical Child & Adolescent Psychology, 2013; 42(1): 34-43. https://doi.org/10.1080/15374416.2012.738454
Physical activity: more bodily movement	The research team suggest using: • Research-grade triaxial accelerometers (e.g., Actigraphs) Increasingly, these are the preferred method to capture motor activity in both epidemiological studies and in physical activity intervention trials. These devices are commonly worn on the wrist or hip/thigh, passively collecting bodily accelerations which are converted into estimates of movement behaviour using validated acceleration thresholds (e.g., volume of activity, time spent sedentary, in light-, moderate- or vigorous-intensity activity, energy expenditure) (Santos-Lozano et al., 2013). Wearable devices have posture (sitting/standing) and activity-type detection (Skotte et al., 2014), are unobtrusive in daily living, have good compliance, and a long battery life, thus allowing capture of motor activity across the 24-hour movement cycle for a month or more at a time.

	Device-based measures provide less biased estimates than traditional self-report measures, which are prone to recall and response biases. Further advantages over self-reporting include accurate capture of incidental and low-intensity motor activity, which may be important for mental health benefit. Additionally, moment-to-moment recording supports measurement of within-person change, which is important when assessing activity pattern fluctuations over time, or as a result of intervention. Santos-Lozano A, Santín-Medeiros F, Cardon G, Torres-Luque G, Bailón R, Bergmeir C, Ruiz JR, Lucia A & Garatachea N. Actigraph GT3X: validation and determination of physical activity intensity cut points. International Journal of Sports Medicine, 2013; 34(11): 975⦸982. https://doi.org/10.1055/s-0033-1337945 Skotte J, Korshøj M, Kristiansen J, Hanisch C & Holtermann A. Detection of physical activity types using triaxial accelerometers. Journal of Physical Activity and Health, 2014; 11(1): 76-84. https://doi.org/10.1123/jpah.2011-0347
Problem solving	Daniel Michelson and team suggest using the: • Youth Top Problems (YTP; Weisz et al., 2011) The YTP is directly relevant to assessing functional difficulties and negative internal states that are typically nominated by young people as the foci of problem solving. As such, the measure is both ecologically valid and sensitive to change, which the team has demonstrated in previous studies from high- and lower-income countries (Michelson et al., 2020; Ebesutani et al., 2012). Moreover, the YTP is a brief measure (three items assessing self-defined problems) that ensures low burden and high practicability for routine use in a diverse range of settings. Ebesutani C, Bernstein A, Chorpita BF & Weisz JR. A transportable assessment protocol for prescribing youth psychosocial treatments in real-world settings: Reducing assessment burden via self-report scales. Psychological Assessment, 2012; 24(1): 141-155. https://doi.org/10.1037/a0025176 Michelson D, Malik K, Krishna M, Sharma R, Mathur S, Bhat B, Parikh R, Roy K, Joshi A, Sahu R, Chilhate B, Boustani M, Cuijpers P, Chorpita B, Fairburn CG & Patel V. Development of a transdiagnostic, low-intensity, psychological intervention for common adolescent mental health problems in Indian secondary schools. Behaviour Research and Therapy, 2020; 130: 103439. https://doi.org/10.1016/j.brat.2019.103439 Weisz JR, Chorpita BF, Frye A, Ng MY, Lau N, Bearman SK, Ugueto AM, Langer DA, Hoagwood KE & The Research Network on Youth Mental Health. Youth top problems: Using idiographic, consumer-guided assessment to identify treatment needs and to track change during psychotherapy. Journal of Consulting and Clinical Psychology, 2011; 79(3): 369-380. https://doi.org/10.1037/a0023307 Both Robyn Mildon's team and Karolin Krause's team suggest using the: • Social Problem-Solving Inventory – Revised (SPSI-R; D'Zurilla et al., 1996) The SPSI-R is a comprehensive and theoretically grounded multidimensional scale of 52 or 25 (short form) items. Both versions assess problem-solving styles and strategies via five subscales: (i) positive problem orientation; (ii) negative problem orientation; (iii) rational problem solving; (iv) impulsivity/ carelessness style; and (v) avoidance style. The SPSI-R is suitable for use in adolescents aged 13 years and older, with adolescent population norms available. The SPSI-R short form has demonstrated excellent internal consistency and test-retest reliability in a sample of Australian youth aged 16-25, and was found to discriminate well between low and high levels of depressive symptomatology (Hawkins et al., 2009). D'Zurilla T, Nezu A & Maydeu-Olivares A. Manual for the Social Problem-Solving Inventory – Revised. North Tonawanda, NY: Multi-Health Systems, 1996. Hawkins D, Sofronoff K & Sheffield J. Psychometric properties of the Social Problem Solving Inventory – Revised short-form: Is the short form a valid and reliable measure for young adults? Cognitive Therapy and Research, 2009; 33: 462-470. https://doi.org/10.1007/s10608-008-9209-7
Relaxation techniques: better stress response via relaxation	According to the research team, physiological indicators provide an objective measure of relaxation response (Payne, 2005). Relevant physiological indicators include: • autonomic nervous system activity • blood flow • blood pressure • catecholamine (e.g., epinephrine) levels • heart rate • muscle tension • physical and cardiovascular fitness • respiratory rate • stress hormone (e.g., cortisol) levels • sweating. However, collecting objective data on the physiological stress response is challenging. While some of the indicators are easy to measure, others require sophisticated equipment and expertise which is not often accessible. To be meaningful, the data on physiological parameters needs to be collected at multiple time points, in a controlled setting, and it needs to consider individual factors which may act as confounders. Payne RA. Chapter 26 – Measurement: Patient assessment and clinical audit. In: Payne RA, editor. Relaxation Techniques, 3rd edition. Edinburgh: Churchill Livingstone, 2005. pp. 221-228. https://www.elsevier.com/books/relaxation-techniques/9780443074479
Beliefs and knowledge	
Sense of mattering	The research team suggest the: • Anti-Mattering Scale (AMS; Flett, 2018) This measure consists of five items measured on a three-point scale (from 1 = hardly ever, to 3 = often) and includes items such as 'How often have you been treated in a way that makes you feel like you are insignificant?'

	The AMS has psychometric properties that are comparable to well-established mattering scales, such as the General Mattering Scale (GMS). However, the AMS focuses on assessing feelings of not mattering and being marginalised by other people, rather than feelings of being important and significant in the eyes of other people, which the GMS assesses. Another important distinction of the AMS is that it has a stronger association with social anxiety and other risk factors for anxiety and depression, such as loneliness and low self-esteem. Flett GL. The Psychology of Mattering: Understanding the Human Need to Be Significant. Cambridge, MA: Academic Press/Elsevier, 2018. https://doi.org/10.1016/C2015-0-06160-3
Self-evaluation: improved view of self	There are a wide range of measures available that assess self-evaluation, and many measures of depression also include single questions or subscales on self-evaluation (e.g., Self-Perception Profile for Children, Self-Appraisal Inventory, Beck Self-Concept Inventory for Youth). Some self-evaluation measures report on global scores and/or subscales of self: • The Offer Self-Image Questionnaire (Laukkanen et al., 2000) The Offer Self-Image Questionnaire is an example of a widely used self-evaluation measure that provides a global score as well as the examination of a range of subscales of self. These include impulse control; emotional tone; body image; social relationships; morals; sexual attitudes; family relationships; mastery of the external world; vocational and educational goals; emotional health; superior adjustment; and idealism. Other measures allow for examination of individual items, such as self-referent judgement measures: • The Self-Description Questionnaire (Teasdale & Dent, 1987) The Self-Description Questionnaire is an example of a self-referent judgement measure. The measure is a tool from the cognitive bias literature and was initially created to examine depression-related memory biases. This measure was adapted for use with adolescents by Kelvin and colleagues (1999). It is a brief, user-friendly questionnaire, which is easy to understand and complete. The measure also examines positive and negative self-evaluation, as well as individual components within each. Laukkanen E, Halonen P, Aivio A, Viinamäki H & Lehtonen J. Construct validity of the Offer Self-Image Questionnaire in Finnish 13-year-old adolescents: Differences in the self-images of boys and girls. Nordic Journal of Psychiatry, 2000; 54(6): 431-435. https://doi.org/10.1080/080394800750061423 Teasdale JD & Dent J. Cognitive vulnerability to depression: An investigation of two hypotheses. British Journal of Clinical Psychology, 1987; 26(2): 113-126. https://doi.org/10.1111/j.2044-8260.1987.tb00737.x Kelvin RG, Goodyer IM, Teasdale JD & Brechin D. Latent negative self-schema and high emotionality in well adolescents at risk for psychopathology. Journal of Child Psychology and Psychiatry, 1999; 40(6): 959-968. https://doi.org/10.1111/1469-7610.00513

Brain/body functions

Circadian rhythms: better sleep-wake cycles	To measure the key psychological, somatic, and sleep-wake cycle features of 'circadian depression', the research team suggest using the: • 21-item Somatic and Psychological Health Report (SPHERE-21; Couvy-Duchesne et al., 2017) The SPHERE-21 comprises a 12-item 'anxiety-depression' scale and a 10-item 'chronic fatigue' scale, with three items overlapping. The 'anxiety-depression' scale measures symptoms including rapidly changing moods, irritability, feeling unhappy/depressed, nervousness, and stress. The 'chronic fatigue' scale measures symptoms of non-restorative sleep, anergia, back pain, and poor sleep quality. Cognitive symptoms overlap across both scales, including poor memory, poor concentration, and feeling lost for words. The SPHERE-21 has been validated in a large, young, Australian-based population sample. Through this, it has been demonstrated that the SPHERE-21 scores are heritable, genetically correlated, predict future major depressive disorder, and measure valid and comparable constructs across sex and age groups (9-28 years). For more information on other assessments of the sleep-wake cycle and circadian rhythms, see Panel 3, included in the team's published review (Crouse et al., 2021). Couvy-Duchesne B, Davenport TA, Martin NG, Wright MJ & Hickie IB. Validation and psychometric properties of the Somatic and Psychological HEalth REport (SPHERE) in a young Australian-based population sample using non-parametric item response theory. BMC Psychiatry, 2017; 17: 279. https://doi.org/10.1186/s12888-017-1420-1 Crouse JJ, Carpenter JS, Song YJC, Hockey S, Naismith SL, Grunstein RR, Scott EM, Merikangas KR, Scott J & Hickie IB. Circadian rhythm sleep-wake disturbances and depression in young people: Implications for prevention and early intervention. Lancet Psychiatry, 2021; 8(9): 813-823. https://doi.org/10.1016/S2215-0366(21)00034-1
Gut microbiome: improving gut microbial function	The research team suggest collecting stool samples for: • Microbiome sequencing (e.g., 16S rRNA gene-based bacterial profiling) This would need to be done both before and after the dietary intervention, to allow the effect of the intervention on microbiome composition (taxonomy and abundance) to be assessed. Also, metabonomics (e.g., NMR profiling) would help identify appropriate metabolites such as GABA. Hooks K, Konsman J & O'Malley M. Microbiota-gut-brain research: A critical analysis. Behavioral and Brain Sciences, 2019; 42: E60. https://doi.org/10.1017/S0140525X18002133 Laudadio I, Fulci V, Palone F, Stronati L, Cucchiara S & Carissimi C. Quantitative assessment of shotgun metagenomics and 16S rDNA amplicon sequencing in the study of human gut microbiome. OMICS: A Journal of Integrative Biology, 2018; 22(4): 248-254. http://doi.org/10.1089/omi.2018.0013
Reduced levels of inflammation in the body	Inflammation is a complex mechanism, so multiple approaches could be used to assess it. There are several relevant immune markers available, including: • C-reactive protein (CRP) • Interferon gamma (IFN-γ) • Interleukin-1 beta (IL-1β) • Interleukin-2 (IL-2) • Interleukin-4 (IL-4) • Interleukin-6 (IL-6) • Interleukin-10 (IL-10) • Tumour necrosis factor alpha (TNF-α)

	However, the research team believe that to really capture the complexity of the immune system, a composite index based on multiple inflammatory markers would be the most insightful inflammatory marker for depression. This composite index would reflect the different components of the immune system and allow investigation into how the components interact.
Selective serotonin reuptake inhibitors: use of antidepressants	To assess efficacy and side effects of SSRIs (and other medications) it will be important to use scales and clinical interviews focused on symptoms and experiences developed together with young people, as well as patient-reported outcomes. To assess mechanisms and predictors of action, a combination of approaches incorporating neuroimaging, neuropsychological tests, fluid biomarkers, and emotional processing will be useful.

Cognitive and attentional skills

Affective awareness: knowing how one feels	The research team's suggested approach to measuring awareness of depression-related phenomena involves using: • Ecological momentary assessment (EMA) in combination with a self-report measure of affective awareness EMA allows individuals to repeatedly self-report their emotions and moods in real time as they go about their lives. To report these experiences, an individual must be aware of and able to label and communicate their emotions. Although EMA provides an indirect measure of emotional awareness, it has many advantages over traditional self-report methods (e.g., trait self-reports about emotional awareness): 1. EMA provides a fine-grained analysis of affective experiences across time – from momentary fluctuations to more stable or persistent moods. 2. Given that EMA can involve in-the-moment reporting, it has more ecological validity and reliability compared to static retrospective reports, which are subject to bias. 3. EMA has the added value of linking affective experiences to meaningful contextual information. 4. EMA monitoring can be delivered via smartphones, which are ubiquitous among young people. Smartphone-assisted delivery means that data collection can be relatively unobtrusive, and that more young people can be reached at any one time regardless of their location. Armey MF, Schatten HT, Haradhvala N & Miller IW. Ecological momentary assessment (EMA) of depression-related phenomena. Current Opinion in Psychology, 2015; 4: 21-25. https://doi.org/10.1016/j.copsyc.2015.01.002
Decentring: better able to shift perspective	Psychological decentring is complex, and comprises experiential, cognitive, and affective elements. The choice of measure should therefore be guided by its ability to capture these elements with robust validity and reliability, across the age range, while being easy to administer and sensitive to therapeutic change. The research team suggest the following as a gold-standard measure, which can then be supplemented by additional assessments to more deeply probe the decentring phenotype: • Experiences Questionnaire (EQ; Fresco et al., 2007) The EQ is a widely used self-report assessment, which includes 11 items that explore the tendency to psychologically decentre from difficult experiences in day-to-day life (e.g., 'I can observe unpleasant feelings without being drawn into them'). Moreover, the EQ is positively associated with other decentring-related constructs like experiential avoidance (a tendency to 'buy into' subjective experiences) and cognitive reappraisal (an ability to reconceptualise situations to modify their emotional impact). The measure is clinically sensitive, has been associated with anxiety and depression symptom severity, and found to improve following behavioural and cognitive therapies. Fresco DM, Moore MT, van Dulmen MHM, Segal ZV, Ma SH, Teasdale JD, & Williams JMG. Initial psychometric properties of the experiences questionnaire: Validation of a self-report measure of Decentring. Behavior Therapy 2007; 38(3): 234-246. https://doi.org/10.1016/j.beth.2006.08.003
Emotion regulation: improved management of emotions	Sarah Skeen and team: While ER can be measured as an outcome of interventions, we do not plan to measure ER as an outcome in our review. We are interested in it as a practice element or component of preventive interventions for depression and anxiety. This means that we are investigating interventions that use activities to build ER skills. To that end, we determine whether or not an intervention has ER skills-building as a part of its content and include or exclude the intervention accordingly. The measure that we use to determine whether or not an intervention seeks to build ER skills is defined in a previous publication by our group (Skeen et al., 2019), which defines interventions that include ER as those which build skills to 'effectively manage and respond to an emotional experience'. Skeen S, Laurenzi CA, Gordon SL, du Toit S, Tomlinson M, Dua T, Fleischmann A, Kohl K, Ross D, Servili C, Brand AS, Dowdall N, Lund C, van der Westhuizen C, Carvajal-Aguirre L, Eriksson de Carvalho C & Melendez-Torres GJ. Adolescent mental health program components and behavior risk reduction: A meta-analysis. Pediatrics, 2019; 144(2): e20183488. https://doi.org/10.1542/peds.2018-3488 Alexander Daros and team: The researchers believe that no one measure can comprehensively assess the broad range of ER skills included in their evidence synthesis. For this reason, they encourage researchers to use several measures, for example: • Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski & Kraaij, 2007) The CERQ assesses nine different ER skills within the same measure, whereas other measures typically only assess one or two skills. The CERQ allows us to look at the relative frequency of both engagement ER and disengagement ER skills, such as cognitive reappraisal, rumination, acceptance, and problem solving. • Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) The ERQ is a well-known measure of cognitive reappraisal and expressive suppression. These two ER skills are the most well defined and studied within the process model of ER (see Gross, 2015).

Finally, to assess more generalised ER skills deficits, the team suggest the:

- Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004)

The DERS follows a multidimensional model of emotion dysregulation whereby individuals are suggested to experience difficulties in accepting negative emotional experiences, have poor emotional awareness and clarity, difficulties accessing situationally appropriate ER strategies, and difficulties engaging in goal-directed and non-impulsive behaviours.

Garnefski N & Kraaij V. The Cognitive Emotion Regulation Questionnaire. European Journal of Psychological Assessment, 2007; 23(3): 141-149. https://doi.org/10.1027/1015-5759.23.3.141

Gratz KL & Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. Journal of Psychopathology and Behavioral Assessment, 2004; 26(1): 41-54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94

Gross JJ & John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology, 2003; 85(2): 348-362. https://doi.org/10.1037/0022-3514.85.2.348

Gross JJ. Emotion regulation: Current status and future prospects. Psychological Inquiry, 2015; 26(1): 1-26. https://doi.org/10.1080/1047840X.2014.940781

Helpful attentional and interpretational thinking patterns	The research team suggest using the: • Emotional Scrambled Sentences Task (Everaert et al., 2014) Participants rearrange a set of six words (e.g., I social most avoid occasions enjoy) into a sentence using five of the six words. Sentence selection and response time indexes bias in interpretational style (e.g., 'I avoid most social occasions' versus 'I enjoy most social occasions'), while concurrent eye movement data indexes bias in attention patterns. The research team believe that this measure has several advantages: 1. Interpretation and attention indices from this task are sensitive to changes following cognitive bias modification training in young people. Data also suggests they are reliable within the test and across time, thus accurately reflecting core component changes for a targeted intervention. 2. This task measures the additive effects and interplay between biased interpretational style and attention patterns when explaining therapeutic responses. 3. Two indexes of interpretation bias are provided: explicit selection of a negative/threatening sentence (tapping biases in strategic/voluntary processing) and time taken to make that selection (tapping biases in spontaneous/involuntary processing). 4. Two indexes of attention are provided: number of fixations towards negative/threatening target words (tapping biases in attention-orienting) and fixation duration on target words (tapping biases in attention-maintenance). Everaert J, Duyck W, & Koster EHW. Attention, interpretation, and memory biases in subclinical depression: A proof-of-principle test of the combined cognitive biases hypothesis. Emotion, 2014; 14(2): 331-340. https://doi.org/10.1037/a0035250
Hopefulness: learning to be more hopeful	The research team suggest measuring hopefulness using the: • Trait Hope Scale (THS; Snyder et al., 1991) This is a brief, well-validated measure, which captures hopefulness at a dispositional level. It was developed within the cognitive model of hopefulness, in which hopefulness is conceptualised as future-oriented cognition, comprising self-agency and pathways thinking. Unlike alternative models which conceive of hopefulness as spiritual or emotional in nature, cognitive hopefulness is applicable irrespective of spiritual beliefs, amenable to intervention, and less confounded with clinical symptoms of, for example, depression. Snyder CR, Sympson SC, Ybasco FC, Borders TF, Babyak MA & Higgins RL. Development and validation of the State Hope Scale. Journal of Personality and Social Psychology, 1996; 70(2): 321-335. https://doi.org/10.1037/0022-3514.70.2.321
Mental imagery: helpful use of emotional mental imagery	The research team suggest using the: • Prospective Imagery Task (PIT; Holmes et al., 2008; Stöber, 2000) The PIT measures vividness of future mental imagery for salient personal events, and is readily delivered in treatment contexts. Participants are asked to generate mental images to a set of scenarios (e.g., 'you will have a serious disagreement with your friend') and rate each for image vividness (i.e., clarity and detail) on a five-point scale. The team have adapted the PIT for young people and have demonstrated that it is acceptable, readily understood, easily adapted for different age groups, and shows good internal consistency, test-retest reliability, and correlates with other measures of imagery (e.g., Pile & Lau, 2020). Alternative measures in this age group are time-consuming and expensive (e.g., clinical interviews) or measure trait-like tendencies that are unlikely to change with intervention (e.g., spontaneous use of mental imagery). However, the PIT is a quick, inexpensive, and easy to administer task, which is well suited for use in clinical and/or school settings. Holmes EA, Lang TJ, Moulds ML & Steele AM. Prospective and positive mental imagery deficits in dysphoria. Behaviour Research and Therapy, 2008; 46(8): 976-981. https://doi.org/10.1016/j.brat.2008.04.009 Pile V & Lau JYF. Intrusive images of a distressing future: Links between prospective mental imagery, generalized anxiety and a tendency to suppress emotional experience in youth. Behaviour Research and Therapy, 2020; 124: 103508. https://doi.org/10.1016/j.brat.2019.103508 Stöber J. Prospective cognitions in anxiety and depression: Replication and methodological extension. Cognition and Emotion, 2000; 14(5): 725-729. https://doi.org/10.1080/02699930050117693
Perfectionism reduction	The research team suggest the following as the main outcome measure used in perfectionism treatment research: • Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003) The CPQ is a 12-item scale, which assesses striving to meet standards and effects on self-evaluation when standards are not met. It was designed to measure change in perfectionism and has been used in numerous studies examining the efficacy of treatment for perfectionism. The CPQ is most relevant for intervention research, as it is based on the cognitive-behavioural model of perfectionism (Shafran

	et al., 2002), which is the basis for treatment of perfectionism. The CPQ is brief to complete and has good reliability and validity in both adolescents and adults. Example items include: 'Have you been told that your standards are too high?' and 'Have you felt a failure as a person because you have not succeeded in meeting your goals?
	Other common measures of perfectionism suggested by the team include the: • Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) • Hewitt and Flett Multidimensional Perfectionism Scale (HMPS; Hewitt & Flett, 1991)
	Fairburn CG, Cooper Z & Shafran R. The Clinical Perfectionism Questionnaire. Oxford, 2003. Unpublished scale. Frost RO, Marten P, Lahart C & Rosenblate R. The dimensions of perfectionism. Cognitive Therapy and Research, 1990; 14: 449-468. https://doi.org/10.1007/BF01172967 Hewitt PL & Flett GL. Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. Journal of Personality and Social Psychology, 1991; 60(3): 456-470. https://doi.org/10.1037/0022-3514.60.3.456 Shafran R, Cooper Z & Fairburn CG. Clinical perfectionism: A cognitive-behavioural analysis. Behaviour Research and Therapy, 2002; 40(7): 773-791. https://doi.org/10.1016/S0005-7967(01)00059-6
Repetitive negative thinking reduction	The research team suggest the following two as the main measures for assessing repetitive negative thinking: • Perseverative Thinking Questionnaire (PTQ; Ehring et al., 2011) • Repetitive Thinking Questionnaire (RTQ; McEvoy et al., 2010) The PTQ is a 15-item, trait-based measure of the tendency to engage in repetitive negative thinking (e.g., 'I think about many problems without solving any of them'). The RTQ is a 10-item questionnaire which was developed to assess constructs related to repetitive negative thinking, such as cognitive avoidance, thought suppression, metacognitions, and thought control strategies (e.g., 'I had thoughts or images about the situation that occurred over and over again, that resulted in my feelings getting worse and worse').
	Ehring T, Zetsche U, Weidacker K, Wahl K, Schönfeld S & Ehlers A. The Perseverative Thinking Questionnaire (PTQ): Validation of a content-independent measure of repetitive negative thinking. Journal of Behavior Therapy and Experimental Psychiatry, 2011; 42(2): 225-232. https://doi.org/10.1016/j.jbtep.2010.12.003 McEvoy PM, Mahoney AEJ & Moulds ML. Are worry, rumination, and post-event processing one and the same?: Development of the repetitive thinking questionnaire. Journal of Anxiety Disorders, 2010; 24(5): 509-519. https://doi.org/10.1016/j.janxdis.2010.03.008
Self-compassion	The research team suggest using the: • Self-Compassion Scale (SCS; Neff, 2003) The SCS is is the most widely used measure of self-compassion. It consists of six subscales, three representing positive factors (self-kindness, common humanity, and mindfulness) and three representing negative factors (self-judgement, isolation, and over-identification). The measure has good convergent and discriminant validity, excellent test-retest reliability, and good internal consistency (Neff, 2003), including in adolescents (Cunha et al., 2016). Because the SCS is a multidimensional scale, subscale scores provide further insights into which dimensions of self-compassion are most closely connected to anxiety and depression in young people, as well as which are most amenable to change.
	Cunha M, Xavier A & Castilho P. Understanding self-compassion in adolescents: Validation study of the Self-Compassion Scale. Personality and Individual Differences, 2016; 93: 56-62. https://doi.org/10.1016/j.paid.2015.09.023 Neff KD. The development and validation of a scale to measure self-compassion. Self and Identity, 2003; 2(3): 223-250. https://doi.org/10.1080/15298860309027
Human connections	
Digital quality social connection	The research team suggest using the: • Closeness, Identity and common bond, Valued relationships, Involvement and Cared for and accepted (CIVIC) framework (Hare-Duke et al., 2019) This is one of the most robust measures for assessing social connectedness. It conceptualises 21 scales that measure aspects of social connectedness from 28 studies into five subjective dimensions: (i) closeness; (ii) identity and common bond; (iii) valued relationships; (iv) involvement; and (v) cared for and accepted. The consistency of the dimensions across the included scales, and the systematic approach taken to develop the framework, gives the team confidence in its use. According to the team, no other measure has captured the multifaceted aspects of social connectedness in mental health. Despite this, the framework covers non-specific and specific relationships but not the patient/service provider dyad; it is not yet validated; and it does not identify mechanisms and impact of quality social connection on mental health outcomes (i.e., depression/anxiety outcomes). For example, it does not consider user preferences, cultural differences, or methods in which the connection is made (non-digital/digital).
	Hare-Duke L, Dening T, de Oliveira D, Milner K & Slade M. Conceptual framework for social connectedness in mental disorders: Systematic review and narrative synthesis. Journal of Affective Disorders, 2019; 245: 188-199. https://doi.org/10.1016/J.JAD.2018.10.359
Loneliness reduction	The research team suggest that loneliness is measured using the: • Three-item Revised UCLA Loneliness Scale (Hughes et al., 2004) This scale asks respondents to rate how frequently (e.g., 'hardly ever or never', 'some of the time', or 'often') they lack companionship, feel left out, and feel isolated. The team suggest this measure because it has been recommended by the UK Office for National Statistics (ONS) to facilitate the collection of comparable data, including across national longitudinal studies. The ONS undertook a programme of scoping and consultation with experts, as well as further testing, and concluded that the three-item UCLA measure is valid, reliable, and suitable for use across a range of demographic groups. There are currently two versions of the measure, one for children (aged 10-15 years) and one for adults.

	Hughes ME, Waite LJ, Hawkley LC & Cacioppo JT. A short scale for measuring loneliness in large surveys: Results from two population-based studies. Research on Aging, 2004; 26(6): 655-672. https://doi.org/10.1177/0164027504268574 ONS guidance on measuring loneliness: https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/methodologies/measuringlonelinessguidanceforuseofthenationalindicatorsonsurveys
Neighbourhood cohesion: increased neighbourhood social connection	Neighbourhood cohesion has been measured in different ways across studies, with studies often adapting scales or using newly self-developed scales. Often, a general measure of neighbourhood cohesion is used, and studies do not usually look at the relative effect of the subcomponents of cohesion (e.g., safety, connection). An important element to distinguish in measuring neighbourhood social connection is whether it is measured and modelled at an individual or at a neighbourhood (community) level. Most often, neighbourhood factors (e.g., safety, connection) are assessed on an individual level and then aggregated. However, assessing a community construct on an individual level may introduce bias, as the evaluation of neighbourhood social connection might have been influenced by factors related to the person, not the environment (Donnelly et al., 2016; Duncan & Kawachi, 2018). To move towards improved methods of measurement, the research team recommend consistency and adapting measures that capture neighbourhood social connection at a community level. This could be achieved by, for instance, including multiple indicators which can be combined at an aggregate (neighbourhood) level. Below are some of the measures suggested by the team: • The Neighbourhood Social Cohesion Scale, as developed by the Canadian National Longitudinal Survey of Children and Youth (Canadian Research Centre Data Network) This measure has been used in a range of studies on the effects of perceived social cohesion on children and young people's mental health (Curtis et al., 2004; Kohen et al., 2002). It has good psychometric properties, with internal consistency ranging between α=0.86 and α=0.90. It is short, with only five items to be completed by the primary caregiver, making it easier to implement and administer than the longer scales that are available. • The Neighbourhood Collective Efficacy Measure (combination measure of cohesion and control) (Donnelly et al., 2016) This measure is comprised of nine items and has been used as a composite measure of neighbourhood collective efficacy, created by combining subscales on neighbourhood social cohesion (including social support) and neighbourhood social control. Donnelly L, McLanahan S, Brooks-Gunn J, Garfinkel I, Wagner BG, Jacobsen WC, Gold S & Gaydosh L. Cohesive neighborhoods where social expectations are shared may have positive impact on adolescent mental health. Health Affairs, 2016; 35(11): 2083-2091. https://doi.org/10.1377/hlthaff.2016.0721 Duncan DT & Kawachi I. Neighborhoods and Health. Oxford: Oxford University Press, 2018. https://doi.org/10.1093/oso/9780190843496.001.0001 Canadian Research Centre Data Network. National Longitudinal Survey of Children and Youth [Internet]. Available from: https://crdcn.org/datasets/nlscy-national-longitudinal-survey-children-and-youth Curtis LJ, Dooley MD & Phipps SA. Child well-being and neighbourhood quality: Evidence from the Canadian National Longitudinal Survey of Children and Youth. Social Science & Medicine, 2004; 58(10): 1917-1927. https://doi.org/10.1016/j.socscimed.2003.08.007 Kohen DE, Brooks-Gunn J, Leventhal T & Hertzman C. Neighborhood income and physical and social disorder in Canada: Associations with young children's competencies. Child Development, 2002; 73(6): 1844-1860. https://doi.org/10.1111/1467-8624.t01-1-00510
Social relationships: facilitating improvements in social relationships	The research team suggest using the: • Filia-Social Inclusion Measure (F-SIM; Filia et al., 2019) The F-SIM is a measure of social inclusion, developed following an identified need for novel, psychometrically sound, and consumer-driven measures of social participation, connectedness, and functioning. The F-SIM was developed with significant input from people with lived experience of mental ill-health (e.g., consumers, carers, and family members). It encompasses the important areas of social relationships, participation, and limitations, alongside other domains that facilitate and/or underpin such engagement (e.g., employment, education, finances, housing and neighbourhood, community services). Items with immediate specificity to social engagement include those regarding satisfaction with social life, quality of social relationships, enjoyment of social activities, and setbacks or limitations regarding ability to remain socially connected (including financial capacity). The F-SIM has sound psychometric properties and has been validated in a population of young people aged 18-25. It has also now been refined to a more practicable version, a 16-item measure that is currently undergoing psychometric evaluation. Filia KM, Jackson H, Cotton SM & Killackey E. Developing and testing the F-SIM, a measure of social inclusion for people with mental illness. Psychiatry Research, 2019; 279: 1-8. https://doi.org/10.1016/j.psychres.2019.06.038

Socioeconomic factors

Economic transfers: increased financial resources via cash transfers	The research team focused on poverty, alleviated by economic transfers. In their view, the most used and best measure of poverty in low-income settings is consumption. Specifically: • the goods and services which individuals consume during a certain period, for example in the preceding week Consumption is typically measured using a consumption module (i.e., a list of questions which asks people which goods and services they consumed, and what they spent on them), with responses then being aggregated at the individual or household level. Consumption is a useful measure, especially because income is often difficult to measure, particularly in low-income settings where people may not have regular pay checks and instead receive lumpy streams of income from various sources.

Urban access to green space	Based on their review of the literature, which included observational and experimental studies, the research team identified the following ways of measuring access to green space in urban settings. Ideally, these would be combined rather than relying on only one approach to measurement: • An objective measure of accessibility to green space from the home – based, for example, on Geographic Information System (GIS), combining measures of walkability (street patterns, mixed land uses) and/or a network analysis, which can measure the walking distance to green spaces, providing a more accurate measure of access (Houlden et al., 2018). • Physical characteristics and quality of green space (which can be measured objectively), including subjective perceptions of green space (e.g., safety, incivilities, quality) (Stessens et al., 2020). • Time spent (frequency and length of visits) and activities undertaken in green space (e.g., dog walking, meeting friends). While such data can be self-reported, objective measures of use, based on pedometer readings and GIS watches, are likely to be more reliable (Katapally et al., 2020). Houlden V, Weich S, Porto de Albuquerque J, Jarvis S & Rees K. The relationship between greenspace and the mental wellbeing of adults: A systematic review. PLoS One, 2018; 13(9): e0203000. https://doi.org/10.1371/journal.pone.0203000 Stessens P, Canters F, Huysmans M & Khan AZ. Urban green space qualities: An integrated approach towards GIS-based assessment reflecting user perception. Land Use Policy, 2020; 91: 104319. https://doi.org/10.1016/j.landusepol.2019.104319 Katapally TR, Bhawra J & Patel P. A systematic review of the evolution of GPS use in active living research: A state of the evidence for research, policy, and practice. Health & Place, 2020; 66: 102453. https://doi.org/10.1016/j.healthplace.2020.102453

Appendix 4: Further reading suggested by the review teams

Behaviours and activities

Behavioural activation: increasing engagement with positive activities

- Dimidjian S & McCauley E. Modular, scalable, and personalized: Priorities for behavioral interventions for adolescent depression. Clinical PsychologyScience and Practice, 2016; 23(1): 58-61. https://doi.org/10.1111/cpsp.12142

- Martin F & Oliver T. Behavioral activation for children and adolescents: A systematic review of progress and promise. European Child and Adolescent Psychiatry, 2019; 28(4): 427-441. https://doi.org/10.1007/s00787-018-1126-z

- Tindall L, Mikocka-Walus A, McMillan D, Wright B, Hewitt C & Gascoyne S. Is behavioural activation effective in the treatment of depression in young people?: A systematic review and meta-analysis. Psychology and Psychotherapy: Theory, Research and Practice, 2017; 90(4): 770-796. https://doi.org/10.1111/papt.12121

Engagement with the arts

- All-Party Parliamentary Group on Arts Health and Wellbeing. Creative Health: The Arts for health and Wellbeing. Inquiry report, 2nd edition, 2017. https://www.culturehealthandwellbeing.org.uk/appg-inquiry/

- Clift S, Phillips K & Pritchard S. The need for robust critique of research on social and health impacts of the arts. Cultural Trends, 2021; 1-18. https://doi.org/10.1080/09548963.2021.1910492

- Fancourt D & Finn S. What is the Evidence on the Role of the Arts in Improving Health and Well-Being?: A Scoping Review (Health Evidence Network synthesis report, No. 67). Copenhagen, Denmark: WHO Regional Office for Europe, 2019. https://www.euro.who.int/en/publications/abstracts/what-is-the-evidence-on-the-role-of-the-arts-in-improving-health-and-well-being-a-scoping-review-2019

Exposure: facing one's fears in a planned manner

- Creswell C, Waite P & Hudson J. Practitioner review: Anxiety disorders in children and young people –assessment and treatment. Journal of Child Psychology and Psychiatry, 2020; 61(6): 628-643. https://doi.org/10.1111/jcpp.13186

- Plaisted H, Waite P, Gordon K & Creswell C. Optimising exposure for children and adolescents with anxiety, OCD and PTSD: A systematic review. Clinical Child and Family Psychology Review, 2021; 24: 348-369. https://doi.org/10.1007/s10567-020-00335-z

- Whiteside S, Sim LA, Morrow AS, Farah WH, Hilliker DR, Murad MH & Wang Z. A meta-analysis to guide the enhancement of CBT for childhood anxiety: Exposure over anxiety management. Clinical Child and Family Psychology Review, 2020; 23(1): 102-121. https://doi.org/10.1007/s10567-019-00303-2

Physical activity: more bodily movement

- Biddle SJH, Ciaccioni S, Thomas G & Vergeer I. Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. Psychology of Sport and Exercise, 2019; 42: 146-155. https://doi.org/10.1016/j.psychsport.2018.08.011

- Parker AG, Trott E, Bourke M, Pogrmilovic BK, Dadswell K, Craike M, McLean SA, Dash S & Pascoe M. Young people's attitudes towards integrating physical activity as part of mental health treatment: A cross-sectional study in youth mental health services. Early Intervention in Psychiatry, 2021: 1-9. https://onlinelibrary.wiley.com/doi/full/10.1111/eip.13189

Problem solving

Further reading suggested by Daniel Michelson and team:

- Gonsalves PP, Hodgson ES, Bhat B, Sharma R, Jambhale A, Michelson D & Patel V. App-based guided problem-solving intervention for adolescent mental health: A pilot cohort study in Indian schools. Evidence-Based Mental Health, 2021; 24: 11-18. https://doi.org/10.1136/ebmental-2020-300194

- Michelson D, Malik K, Krishna M, Sharma R, Mathur S, Bhat B, Parikh R, Roy K, Joshi A, Sahu R, Chilhate B, Boustani M, Cuijpers P, Chorpita B, Fairburn CG & Patel V. Development of a transdiagnostic, low-intensity, psychological intervention for common adolescent mental health problems in Indian secondary schools. Behaviour Research and Therapy, 2020; 130: 103439. https://doi.org/10.1016/j.brat.2019.103439

- Michelson D, Malik K, Parikh R, Weiss HA, Doyle AM, Bhat B, Sahu R, Chilhate B, Mathur S, Krishna M, Sharma R, Sudhir P, King M, Cuijpers P, Chorpita B, Fairburn CG & Patel V. Effectiveness of a brief lay counsellor-delivered, problem-solving intervention for adolescent mental health problems in urban, low-income schools in India: A randomised controlled trial. Lancet Child & Adolescent Health, 2020; 4(8): 571-582. https://doi.org/10.1016/S2352-4642(20)30173-5

Further reading suggested by Robyn Mildon and team:

- Becker-Weidman EG, Jacobs RH, Reinecke MA, Silva SG & March JS. Social problem-solving among adolescents treated for depression. Behaviour Research and Therapy, 2010; 48(1): 11-18. https://doi.org/10.1016/j.brat.2009.08.006

- Chorpita BF & Daleiden EL. Mapping evidence-based treatments for children and adolescents: Application of the distillation and matching model to 615 treatments from 322 randomized trials. Journal of Consulting and Clinical Psychology, 2009; 77(3): 566-579. https://doi.org/10.1037/a0014565

- D'Zurilla TJ & Nezu AM. Problem-Solving Therapy: A Positive Approach to Clinical Intervention, 3rd edition. New York: Springer Publishing Company, 2006.

Further reading suggested by Karolin Krause and team:

- D'Zurilla TJ & Goldfried MR. Problem solving and behavior modification. Journal of Abnormal Psychology, 1971; 78(1): 107-126. https://doi.org/10.1037/h0031360

- Chang EC, D'Zurilla TJ & Sanna LJ, editors. Social Problem Solving: Theory, Research, and Training. Washington, DC: American Psychological Association, 2004. https://doi.org/10.1037/10805-000

- Cuijpers P, de Wit L, Kleiboer A, Karyotaki E & Ebert DD. Problem-solving therapy for adult depression: An updated meta-analysis. European Psychiatry, 2018; 48: 27-37. https://doi.org/10.1016/j.eurpsy.2017.11.006

Relaxation techniques: better stress response via relaxation

- Jorm AF, Morgan AJ & Hetrick SE. Relaxation for depression. Cochrane Database of Systematic Reviews, 2008; 4: CD007142. https://doi.org/10.1002/14651858.CD007142.pub2

- Manzoni GM, Pagnini F, Castelnuovo G & Molinari E. Relaxation training for anxiety: A ten-years systematic review with meta-analysis. BMC Psychiatry, 2008; 8: 41. https://doi.org/10.1186/1471-244X-8-41

- Payne RA. Chapter 26 - Measurement: Patient assessment and clinical audit. In Payne RA, editor. Relaxation Techniques, 3rd edition. Edinburgh: Churchill Livingstone, 2005. pp. 221-228. https://www.elsevier.com/books/relaxation-techniques/9780443074479

Beliefs and knowledge

Sense of mattering

- Flett GL, Burdo R & Nepon T. Mattering, insecure attachment, rumination, and self-criticism in distress among university students. International Journal of Mental Health and Addiction, 2021; 19: 1300–1313. https://doi.org/10.1007/s11469-020-00225-z

- Flett G, Khan A & Su C. Mattering and psychological well-being in college and university students: Review and recommendations for campus-based initiatives. International Journal of Mental Health and Addiction, 2019; 17: 667-680. https://doi.org/10.1007/s11469-019-00073-6

- Marshall SK & Tilton-Weaver L. Adolescents' perceived mattering to parents and friends: Testing cross-lagged associations with psychosocial well-being. International Journal of Behavioural Development, 2019; 43(6): 541-552. https://doi.org/10.1177/0165025419844019

Self-evaluation: improved view of self

- Harter S. Emerging self-processes during childhood and adolescence. In Leary MR & Tangney JP, editors, Handbook of Self and Identity. New York: Guilford Press, 2012. pp. 680-715.

- Orchard F, Pass L & Reynold S. 'I am worthless and kind'; the specificity of positive and negative self-evaluation in adolescent depression. British Journal of Clinical Psychology, 2019; 58(3): 260-273. https://doi.org/10.1111/bjc.12215

- Rickhi B, Kania-Richmond A, Morit S, Cohen J, Paccagnan P, Dennis C, Liu MF, Malhotra S, Steele P & Toews J. Evaluation of a spirituality informed e-mental health tool as an intervention for major depressive disorder in adolescents and young adults – a randomized controlled pilot trial. BMC Complementary and Alternative Medicine, 2015; 15: 450. https://doi.org/10.1186/s12906-015-0968-x

Brain/body functions

Circadian rhythms: better sleep-wake cycles

- Allada R & Bass J. Circadian mechanisms in medicine. New England Journal of Medicine, 2021; 384(6): 550-561. https://doi.org/10.1056/NEJMra1802337

- Carpenter JS, Crouse JJ, Scott EM, Naismith SL, Wilson C, Scott J, Merikangas KR & Hickie IB. Circadian depression: A mood disorder phenotype. Neuroscience and Biobehavioral Reviews, 2021; 126: 79-101. https://doi.org/10.1016/j.neubiorev.2021.02.045

- Hickie IB, Naismith SL, Robillard R, Scott EM & Hermens DF. Manipulating the sleep-wake cycle and circadian rhythms to improve clinical management of major depression. BMC Medicine, 2013; 11: 79. https://doi.org/10.1186/1741-7015-11-79

Gut microbiome: improving gut microbial function

- Gibson GR, Hutkins R, Sanders ME, Prescott SL, Reime RA, Salminen SJ, Scott K, Stanton C, Swanson KS, Cani PD, Verbeke K & Reid G. Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. Nature Reviews in Gastroenterology and Hepatology, 2017; 14(8): 491-502. https://doi.org/10.1038/nrgastro.2017.75

- Gill SK, Rossi M, Bajka B & Whelan K. Dietary fibre in gastrointestinal health and disease. Nature Reviews in Gastroenterology and Hepatology, 2021; 18(2): 101-116. https://doi.org/10.1038/s41575-020-00375-4

- Johnstone N, Milesi C, Burn O, van den Borgert T, Hart K, Sowden PT, Burnet PWJ & Cohen Kadosh K. Anxiolytic effects of a galacto-oligosaccharides prebiotic in healthy females (18-25 years) with corresponding changes in gut bacterial composition. Scientific Reports, 2021; 11: 8302. https://doi.org/10.1038/s41598-021-87865-w

Reduced levels of inflammation in the body

- Chu AL, Hickman M, Steel N, Jones PB, Smith GD & Khandaker GM. Inflammation and depression: A public health perspective. Brain, Behavior, and Immunity, 2021; 95: 1-3. https://doi.org/10.1016/j.bbi.2021.04.015

- Mac Giollabhui N, Ng TH, Ellman LM & Alloy LB. The longitudinal associations of inflammatory biomarkers and depression revisited: Systematic review, meta-analysis, and meta-regression. Molecular Psychiatry, 2020; 1-13. https://doi.org/10.1038/s41380-020-00867-4

- Milaneschi Y, Lamers F, Berk M & Penninx BWJH. Depression heterogeneity and its biological underpinnings: Toward immunometabolic depression. Biological Psychiatry, 2020; 88(5): 369-380. https://doi.org/10.1016/j.biopsych.2020.01.014

Selective serotonin reuptake inhibitors: use of antidepressants

- Capitão LP, Chapman R, Murphy SE, Harvey C-J, James A, Cowen PJ & Harmer CJ. A single dose of fluoxetine reduces neural limbic responses to anger in depressed adolescents. Translational Psychiatry, 2019; 9: 30. https://doi.org/10.1038/s41398-018-0332-2

- Krause KR, Bear HA, Edbrooke-Childs J & Wolpert M. Review: What outcomes count? Outcomes measured for adolescent depression between 2007 and 2017. Journal of the American Academy of Child and Adolescent Psychiatry, 2019; 58(1): 61-71. https://doi.org/10.1016/j.jaac.2018.07.893

- Zhou X, Teng T, Zhang Y, Del Giovane C, Furukawa TA, Weisz JR, Li X, Cuijpers P, Coghill D, Xiang Y, Hetrick SE, Leucht S, Qin M, Barth J, Ravindran AV, Yang L, Curry J, Fan L, Silva SG, Cipriani A & Xie P. Comparative efficacy and acceptability of antidepressants, psychotherapies, and their combination for acute treatment of children and adolescents with depressive disorder: A systematic review and network meta-analysis. Lancet Psychiatry, 2020; 7(7): 581-601. https://doi.org/10.1016/S2215-0366(20)30137-1

Cognitive and attentional skills

Affective awareness: knowing how one feels

- Kauer SD, Reid SC, Crooke AHD, Khor A, Hearps SJC, Jorm AF, Sanci L & Patton G. Self-monitoring using mobile phones in the early stages of adolescent depression: Randomized controlled trial. Journal of Medical Internet Research, 2012; 14(3): e67. https://doi.org/10.2196/jmir.1858

- Kranzler A, Young JF, Hankin BL, Abela JRZ, Elias MJ & Selby EA. Emotional awareness: A transdiagnostic predictor of depression and anxiety for children and adolescents. Journal of Clinical Child and Adolescent Psychology, 2016; 45(3): 262-269. https://doi.org/10.1080/15374416.2014.987379

- Sendzik L, Schäfer JÖ, Samson AC, Naumann E & Tuschen-Caffier B. Emotional awareness in depressive and anxiety symptoms in youth: A meta-analytic review. Journal of Youth and Adolescence, 2017; 46: 687-700. https://doi.org/10.1007/s10964-017-0629-0

Decentring: better able to shift perspective

- Ayduk Ö & Kross E. From a distance: Implications of spontaneous self-distancing for adaptive self-reflection. Journal of Personality and Social Psychology, 2010; 98(5): 809-829. https://doi.org/10.1037/a0019205

- Bennett MP, Knight R, Dunning DL, Archer-Boyd A, Blakemore SJ, Dalmaijer ES, Ford T, Kuyken W, So T, Lenaert B, Vairne M, Watson P, Williams JMS, the MRYAID team & Dalgleish T. Protocol for a randomized controlled trial investigating an intervention to boost Decentring in response to distressing mental experiences during adolescence: The Decentring in Adolescence Study (DECADES). OSF, 2021. https://doi.org/10.17605/OSF.IO/F9U45

- Bernstein A, Hadash Y, Lichtash Y, Tanay G, Shepherd K & Fresco DM. Decentring and related constructs: A critical review and metacognitive processes model. Perspectives on Psychological Science, 2015; 10(5): 599-617. https://doi.org/10.1177/1745691615594577

- Hayes-Skelton SA, Calloway A, Roemer L & Orsillo SM. Decentring as a potential common mechanism across two therapies for generalized anxiety disorder. Journal of Consulting and Clinical Psychology, 2015; 83(2): 395-404. https://doi.org/10.1037/a0038305

Emotion regulation: improving management of emotions

Further reading suggested by Sarah Skeen and team:

- Ahmed SP, Bittencourt-Hewitt A & Sebastian CL. Neurocognitive bases of emotion regulation development in adolescence. Developmental Cognitive Neuroscience, 2015; 15: 11-25. https://doi.org/10.1016/j.dcn.2015.07.006

Further reading suggested by Alexander Daros and team:

- Schäfer JÖ, Naumann E, Holmes EA, Tuschen-Caffier B & Samson AC. Emotion regulation strategies in depressive and anxiety symptoms in youth: A meta-analytic review. Journal of Youth and Adolescence, 2017; 46(2): 261-276. https://doi.org/10.1007/s10964-016-0585-0

- Moltrecht B, Deighton J, Patalay P & Edbrooke-Childs J. Effectiveness of current psychological interventions to improve emotion regulation in youth: A meta-analysis. European Child & Adolescent Psychiatry, 2021; 30(6): 829-848. https://doi.org/10.1007/s00787-020-01498-4

- Sloan E, Hall K, Moulding R, Bryce S, Mildred H & Staiger PK. Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. Clinical Psychology Review, 2017; 57: 141-163. https://doi.org/10.1016/j.cpr.2017.09.002

Helpful attentional and interpretational thinking patterns

- Hirsch CR, Krahé C, Whyte J, Bridge L, Loizou S, Norton S & Mathews A. Effects of modifying interpretation bias on transdiagnostic repetitive negative thinking. Journal of Consulting and Clinical Psychology, 2020; 88(3): 226-239. https://doi.apa.org/doi/10.1037/ccp0000455

- Lau JYF & Waters AM. Annual research review: An expanded account of information-processing mechanisms in risk for child and adolescent anxiety and depression. Journal of Child Psychology and Psychiatry, 2017; 58(4): 387-407. https://doi.org/10.1111/jcpp.12653

- Waters AM, Zimmer-Gembeck MJ, Craske MG, Pine DS, Bradley BP & Mogg K. Look for good and never give up: A novel attention training treatment for childhood anxiety disorders. Behaviour Research and Therapy, 2015; 73: 111-123. https://doi.org/10.1016/j.brat.2015.08.005

Hopefulness: learning to be more hopeful

- Snyder CR, Feldman DB, Taylor JD, Schroeder LL & Adams III VH. The roles of hopeful thinking in preventing problems and enhancing strengths. Applied and Preventive Psychology, 2000; 9(4): 249-269. https://doi.org/10.1016/S0962-1849(00)80003-7

- Jiang X, Otis KL, Weber M & Huebner ES. Hope and adolescent mental health. In Gallagher MW & Lopez SJ, editors, The Oxford Handbook of Hope. Oxford: Oxford University Press, 2018. pp. 299-312. https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199399314.001.0001/oxfordhb-9780199399314

- Hopeful Minds: https://hopefulminds.org/

Mental imagery: helpful use of emotional mental imagery

- Holmes EA, Blackwell SE, Burnett Heyes S, Renner F & Raes F. Mental imagery in depression: Phenomenology, potential mechanisms, and treatment implications. Annual Review of Clinical Psychology, 2016; 12: 249-280. https://doi.org/10.1146/annurev-clinpsy-021815-092925

- Morina N, Lancee J & Arntz A. Imagery rescripting as a clinical intervention for aversive memories: A meta-analysis. Journal of Behavior Therapy and Experimental Psychiatry, 2017; 55: 6-15. https://doi.org/10.1016/j.jbtep.2016.11.003

- Pile V, Smith P, Leamy M, Oliver A, Bennett E, Blackwell SE, Meiser-Stedman R, Stringer D, Dunn BD, Holmes EA & Lau JYF. A feasibility randomised controlled trial of a brief early intervention for adolescent depression that targets emotional mental images and memory specificity (IMAGINE). Behaviour Research and Therapy, 2021; 143: 103876. https://doi.org/10.1016/j.brat.2021.103876

Perfectionism reduction

- Curran T & Hill A. Perfectionism is increasing over time: A meta-analysis of birth cohort differences from 1989 to 2016. Psychological Bulletin, 2019; 145(4): 410-429. https://doi.org/10.1037/bul0000138

- Shafran R, Egan SJ & Wade TD. Overcoming Perfectionism, 2nd edition. London: Little, Brown Book Group, 2018.

- Suh H, Sohn H, Kim T & Lee D. A review and meta-analysis of perfectionism interventions: Comparing face-to-face with online modalities. Journal of Counseling Psychology, 2019; 66(4): 473-486. https://doi.org/10.1037/cou0000355

Repetitive negative thinking reduction

- Ehring T & Watkins ER. Repetitive negative thinking as a transdiagnostic process. International Journal of Cognitive Therapy, 2008; 1(3): 192-205. https://doi.org/10.1680/ijct.2008.1.3.192

- Monteregge S, Tsagkalidou A, Cuijpers P & Spinhoven P. The effects of different types of treatment for anxiety on repetitive negative thinking: A meta-analysis. Clinical Psychology: Science and Practice, 2020; 27(2): e12316. https://doi.org/10.1111/cpsp.12316

- Topper M, Emmelkamp PMG & Ehring T. Improving prevention of depression and anxiety disorders: Repetitive negative thinking as a promising target. Applied and Preventive Psychology, 2010; 14(1-4): 57-71. https://doi.org/10.1016/j.appsy.2012.03.001

Self-compassion

- Bluth K, Gaylord SA, Campo RA, Mullarkey MC & Hobbs L. Making friends with yourself: A mixed methods pilot study of a mindful self-compassion program for adolescents. Mindfulness, 2016; 7: 479-492. https://doi.org/10.1007/s12671-015-0476-6

- Ferrari M, Hunt C, Harrysunker A, Abbott MJ, Beath AP & Einstein DA. Self-compassion interventions and psychosocial outcomes: A meta-analysis of RCTs. Mindfulness, 2019; 10: 1455-1473. https://doi.org/10.1007/s12671-019-01134-6

- Marsh IC, Chan SWY & MacBeth A. Self-compassion and psychological distress in adolescents: A meta-analysis. Mindfulness, 2018; 9: 1011-1027. https://doi.org/10.1007/s12671-017-0850-7

Human connections

Digital quality social connection

- Okabe-Miyamoto K & Lyubomirsky S. Chapter 6: Social connection and well-being during COVID-19. In Helliwell JF, Layard R, Sachs J & De Neve J-E, editors, World Happiness Report. New York: Sustainable Development Solutions Network, 2021. https://worldhappiness.report/ed/2021/social-connection-and-well-being-during-covid-19/

- Nguyen MH, Gruber J, Marler W, Hunsaker A, Fuchs J & Hargittai E. Staying connected while physically apart: Digital communication when face-to-face interactions are limited. New Media & Society, 2021: 1-22. https://doi.org/10.1177/1461444820985442

Loneliness reduction

- Eccles AM & Qualter P. Review: Alleviating loneliness in young people – a meta-analysis of interventions. Child and Adolescent Mental Health, 2021; 26(1): 17-33. https://doi.org/10.1111/camh.12389

- Loades ME, Chatburn E, Higson-Sweeney N, Reynolds S, Shafran R, Brigden A, Linney C, McManus MN, Borwick C & Crawley E. Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. Journal of the American Academy of Child & Adolescent Psychiatry, 2020; 59(11): 1218-1239. https://doi.org/10.1016/j.jaac.2020.05.009

- Mann F, Bone JK, Lloyd-Evans B, Frerichs J, Pinfold V, Ma R, Wang J & Johnson S. A life less lonely: The state of the art in interventions to reduce loneliness in people with mental health problems. Social Psychiatry and Psychiatric Epidemiology, 2017; 52(6): 627-638. https://doi.org/10.1007/s00127-017-1392-y

Neighbourhood cohesion: increased neighbourhood social connection

- Solmi F, Colman I, Weeks M, Lewis G & Kirkbride JB. Trajectories of neighborhood cohesion in childhood, and psychotic and depressive symptoms at age 13 and 18 years. Journal of the American Academy of Child and Adolescent Psychiatry, 2017; 56(7): 570-577. https://doi.org/10.1016/j.jaac.2017.04.003

- Donnelly L, McLanahan S, Brooks-Gunn J, Garfinkel I, Wagner BG, Jacobsen WC, Gold S & Gaydosh L. Cohesive neighborhoods where social expectations are shared may have positive impact on adolescent mental health. Health Affairs, 2016; 35(11): 2083-2091. https://doi.org/10.1377/hlthaff.2016.0721

- Duncan DT & Kawachi I. Neighborhoods and Health. Oxford: Oxford University Press, 2018. https://doi.org/10.1093/oso/9780190843496.001.0001

Social relationships: facilitating improvements in social relationships

- Duffy F, Sharpe H & Schwannauer M. Review: The effectiveness of interpersonal psychotherapy for adolescents with depression – a systematic review and meta‐analysis. Child and Adolescent Mental Health, 2019; 24(4): 307-317. https://doi.org/10.1111/camh.12342

- Garrido S, Millington C, Cheers D, Boydell K, Schubert E, Meade T & Nguyen QV. What works and what doesn't work? A systematic review of digital mental health interventions for depression and anxiety in young people. Frontiers in Psychiatry, 2019; 10: 759. https://doi.org/10.3389/fpsyt.2019.00759

- Werner-Seidler A, Perry Y, Calear AL, Newby JM & Christensen H. School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. Clinical Psychology Review, 2017; 51: 30-47. https://doi.org/10.1016/j.cpr.2016.10.005

Socioeconomic factors

Economic transfers: increased financial resources via cash transfers

- Ridley M, Rao G, Schilbach F & Patel V. Poverty, depression, and anxiety: Causal evidence and mechanisms. Science, 2020; 370(6522): eaay0214. https://doi.org/10.1126/science.aay0214

- McGuire J, Bach-Mortensen AM & Kaiser C. The impact of cash transfers on subjective wellbeing and mental health in low- and middle-income countries: A systematic review and meta-analysis. Happier Lives Institute, Working paper, 2020. https://www.happierlivesinstitute.org/cash-transfers.html

Urban access to green space

- Vanakan G-J & Danckaerts M. Impact of green space exposure on children's and adolescents' mental health: A systematic review. International Journal of Environmental Research and Public Health, 2018; 15(2): 2668. https://doi.org/10.3390/ijerph15122668

- Zhang Y, Mavoa S, Zhao J, Raphael D & Smith M. The association between green space and adolescents' mental well-being: A systematic review. International Journal of Environmental Research and Public Health, 2020; 17(18): 6640. https://doi.org/10.3390/ijerph17186640

Wellcome supports science to solve the urgent health challenges facing everyone. We support discovery research into life, health and wellbeing, and we're taking on three worldwide health challenges: mental health, global heating and infectious diseases.