



A systematic review and meta-analysis of psychological interventions to improve mental wellbeing

Joep van Agteren^{1,2}✉, Matthew Iasiello^{1,2,3}, Laura Lo¹, Jonathan Bartholomaeus^{1,4,5},
Zoe Kopsaftis^{6,7,8}, Marissa Carey¹ and Michael Kyrios^{1,2,9}

Our current understanding of the efficacy of psychological interventions in improving mental states of wellbeing is incomplete. This study aimed to overcome limitations of previous reviews by examining the efficacy of distinct types of psychological interventions, irrespective of their theoretical underpinning, and the impact of various moderators, in a unified systematic review and meta-analysis. Four-hundred-and-nineteen randomized controlled trials from clinical and non-clinical populations ($n = 53,288$) were identified for inclusion. Mindfulness-based and multi-component positive psychological interventions demonstrated the greatest efficacy in both clinical and non-clinical populations. Meta-analyses also found that singular positive psychological interventions, cognitive and behavioural therapy-based, acceptance and commitment therapy-based, and reminiscence interventions were impactful. Effect sizes were moderate at best, but differed according to target population and moderator, most notably intervention intensity. The evidence quality was generally low to moderate. While the evidence requires further advancement, the review provides insight into how psychological interventions can be designed to improve mental wellbeing.

Literature investigating ‘positive’ states of mental health or states of mental wellbeing has proliferated¹. Traditionally, these subjective interpretations of wellbeing are placed in the context of ‘hedonic’ and ‘eudaimonic’ wellbeing, or the search for pleasure and happiness compared to striving for optimal psychological functioning and self-realization. These two aspects of wellbeing are operationalised by two streams of research. One stream focuses on subjective wellbeing², studying affect and life satisfaction; the other stream focuses on psychological wellbeing³, and includes areas such as meaning or purpose and positive relationships. More than 40 years of observational and interventional research has linked high mental wellbeing to improvements in health, development and longevity as well as other outcomes⁴.

For example, improvement in mental wellbeing over a 10-year period is associated with reducing the risk of developing mental illness by up to 8.2 times in people without mental illness^{5,6} and with improving the chance of recovery in people with mental illness^{7,8}. Similarly, good mental wellbeing is predictive of recovery from physical illnesses⁴—for instance, in the case of acute coronary syndrome, even when accounting for the impact of depression and anxiety⁹. This is notable in light of the growing body of scientific literature demonstrating that states of mental wellbeing can be seen as independent from states of mental illness, despite their overlap and interrelation. A recent scoping review¹⁰ identified more than 80 peer-reviewed studies that supported the notion that ‘indicators’ or ‘states’ of mental wellbeing can occur regardless of the presence or diagnosis of mental illness, that both constructs have common but

also differential antecedents, that both needed to be assessed using dedicated scales, and that psychological interventions can lead either to improvements in both mental wellbeing and indicators of illness, or to changes in only one of the domains. A visualization of this relationship is displayed in Fig. 1.

This evidence is first increasingly elevating mental wellbeing as a therapeutic route to disease prevention as well as clinical and personal recovery^{11,12}. Second, it points to the utility of addressing mental wellbeing in both clinical and non-clinical populations. This research direction paves the way for systematic implementation of interventions and therapeutic approaches that focus on (1) the promotion of mental wellbeing as its own essential outcome regardless of the presence of physical or mental illness; and (2) mental wellbeing as a complementary target when interventions that are based on traditional therapeutic approaches do not have the desired effect—for example, if they do not lead to clinically meaningful changes or do not resonate with the individual patient¹³. Interventions that target symptoms of mental illness and those that target mental wellbeing can focus on shared processes—for example, reducing rumination or building a sense of purpose—but can also focus on differential antecedents or target areas—for example, guilt or hopelessness for mental illness or personal growth for wellbeing. As a consequence, psychological or behavioural interventions, defined as activities or groups of activities aimed to change behaviours, feelings and emotional states¹⁴, can lead to improvements in either mental wellbeing or mental illness, or both. While existing evidence syntheses point to the potential utility of psychological interventions, our current

¹Wellbeing and Resilience Centre, Lifelong Health Theme, South Australian Health and Medical Research Institute, Adelaide, South Australia, Australia.

²Orama Institute for Mental Health and Wellbeing, Flinders University, Adelaide, South Australia, Australia. ³College of Nursing and Health Sciences, Flinders University, Adelaide, South Australia, Australia. ⁴School of Psychology, The University of Adelaide, Adelaide, South Australia, Australia. ⁵Registry of Senior Australians (ROSA), South Australian Health and Medical Research Institute, Adelaide, South Australia, Australia. ⁶Australian Centre for Precision Health, Division of Health Sciences, University of South Australia, Adelaide, South Australia, Australia. ⁷Respiratory Medicine Unit, The Queen Elizabeth Hospital, Central Adelaide Local Health Network, Woodville South, South Australia, Australia. ⁸Faculty of Health and Medical Sciences, The University of Adelaide, Adelaide, South Australia, Australia. ⁹College of Education, Psychology and Social Work, Flinders University, Adelaide, South Australia, Australia. ✉e-mail: Joep.vanagteren@sahmri.com

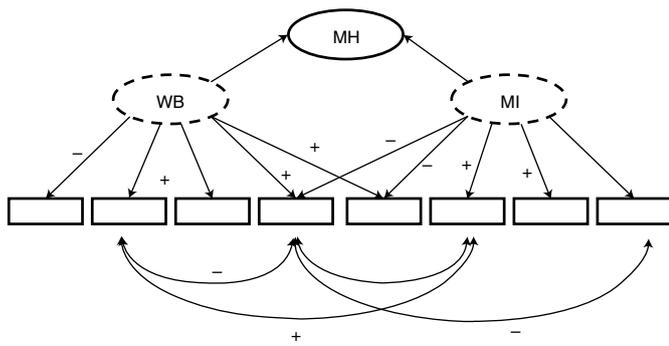


Fig. 1 | Simplified relationship between outcomes of mental health and indicators of illness and wellbeing. Schematic of the relationship between scores on outcomes measures of mental wellbeing (MW) and mental illness (MI) (represented by dashed ovals) that are influenced by distinct and shared factors (represented by the rectangles), jointly acting to determine the 'latent' mental health (MH) factor (represented by a solid oval). The + and - symbols represent hypothetical positive and negative relationships, respectively.

understanding of the impact of the complete landscape of psychological interventions has traditionally been obstructed for a number of reasons.

The first reason relates to the traditional separation of research on and practice in wellbeing and mental illness^{11,15,16}. The main body of research investigating the impact of psychological interventions on wellbeing stems from the field of positive psychology, and looks at positive psychological interventions (PPIs). These are defined as "treatment methods or intentional activities that aim to cultivate positive feelings, behaviours, or cognitions"¹⁷. Several systematic reviews have been conducted to determine the effects of PPIs on wellbeing and its sub-components, which show that PPIs typically have a small effect on outcomes of wellbeing^{17–21}. PPIs, however, comprise only a very limited subset of psychological approaches and typically do not address focus areas of traditional psychological interventions, such as rumination and worry. Although previous reviews investigating the efficacy of psychological interventions on wellbeing have included the evidence from other non-PPI interventions such as mindfulness and meditation^{18,22}, syntheses to date have largely ignored the ability of well-known or more traditional therapeutic approaches to improve wellbeing. A review by Weiss and colleagues¹⁸ is a notable exception, as they investigated the impact of psychological interventions in general on outcome measures of psychological wellbeing, but excluded the large body of studies that use popular subjective measures of wellbeing, such as the Satisfaction With Life Scale (SWLS) or measures of positive affect such as the Positive and Negative Affect Schedule (PANAS)^{23,24}.

As PPIs, by definition, traditionally neglect to focus on maladaptive behaviours and thoughts, there is a considerable evidence gap regarding the impact of other psychological interventions. For instance, the impact of interventions derived from cognitive therapy, cognitive behavioural therapy (CBT), acceptance and commitment therapy (ACT), those using individual techniques such as behavioural activation or interventions stemming from other psychological streams such as humanistic psychology have not yet been extensively mapped²⁵. Interventions stemming from different therapeutic paradigms can target a variety of underlying processes related to mental health and wellbeing. To use an analogy: cancer can be addressed using a variety of techniques—for example, surgery, chemotherapy, radiation therapy and hormone therapy, among others²⁶. Canvassing the state of scientific evidence on psychological interventions that target areas other than positive states is useful for

practitioners and developers of interventions who aim to look at diversifying their array of useful interventions or techniques.

Second, there has been considerably less focus on determining the impact of different types of psychological interventions in building mental wellbeing in clinical populations. There is a need to synthesize the research on the efficacy of psychological interventions to build wellbeing of populations that suffer from physical illness, both acute and chronic, as mental health status has an important role in disease management and treatment^{13,27}. Simply looking at relieving symptoms of depression or anxiety in those with a physical illness is inadequate as it ignores a substantial proportion of patients who do not have clinical symptoms of common mental disorder, but are having suboptimal mental health. Similarly, there is a need to look at the impact of interventions on patients who demonstrate symptoms of clinical mental illness. Recent research has again looked at the impact of PPIs in improving mental wellbeing in clinical mental health populations¹⁹, but systematic reviews on the impact on wellbeing by interventions based on more traditional paradigms such as CBT are limited; approaches that are far more readily used and accepted in clinical settings. These approaches have had their large empirical evidence base synthesized for mental illness—for example, the article by Hofmann and colleagues²⁸—but not yet for their impact on mental wellbeing. An exception is the work by Brown and colleagues²⁹, who explored the impact of ACT-based interventions in web-based formats, thereby leaving the impact of other modalities on mental wellbeing unanswered.

Third, interpreting results of existing independent syntheses poses challenges as a result of their methodological differences. For instance, as mental wellbeing is a broad concept with differing definitions³⁰, it is important to synthesize studies that have used similar subjective measurement methods to measure wellbeing³¹. The inclusion of psychological distress or generic quality-of-life scales as a proxy for mental wellbeing outcomes will lead to different conclusions than if only measures of mental wellbeing are included. Similarly, the use of differing search criteria and statistical procedures for meta-analysis leads to reviews on similar topics coming to different conclusions²¹. Finally, the use of differing criteria for study quality between reviews makes it difficult to assess the quality of different reviews and the overall quality of the evidence presented in meta-analyses. For instance, systematic reviews typically include a measure of study quality such as risk of bias³², but do not typically include quality estimates on the evidence of the overall meta-analysis³³. Not all meta-analyses are equal and the absence of quality estimates on meta-analyses can lead to inaccurate conclusions being made regarding the utility of interventions.

Expenditure on healthcare and mental healthcare is growing, posing serious challenges for governments around the world³⁴. Psychological interventions to build mental wellbeing can have a vital role in reducing the pressure and burden of illness via stepped or integrated care models, in addition to simply building the wellbeing of individuals (itself an important outcome)³⁵. Determining the state of the scientific literature on how varying psychological interventions can contribute to building wellbeing is a necessary step to start empowering stakeholders to implement much-needed reform. It can arm researchers and mental health advocates in their call for a larger focus and innovation in the prevention of mental illness to reduce the burden on mental healthcare systems^{36–38}. It can empower practitioners to explore a broader range of evidence-based treatment solutions depending on each client and their mental or physical health status, which can be a vehicle for treatment engagement³⁹. It can inform mental health policy makers to further explore mental wellbeing as an outcome and consider different psychological interventions into their policy. Finally, it can stimulate discussion and new research among the scientific and professional community, enabling greater sophistication in research to further understand how to improve mental wellbeing in an evidence-based manner.

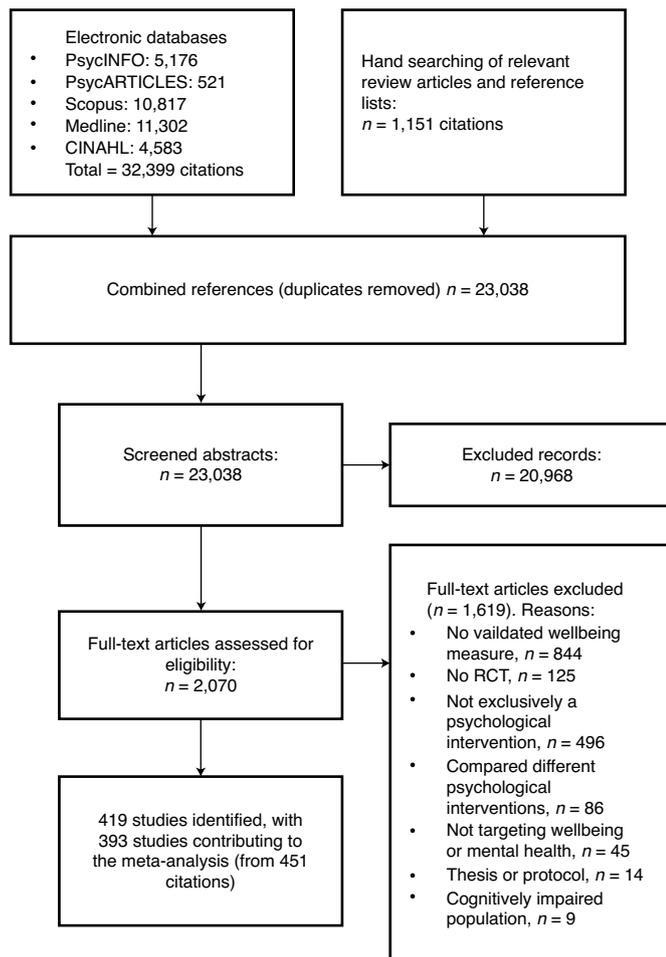


Fig. 2 | Study PRISMA flow diagram. PRISMA flow diagram describing the different phases of this systematic review.

This systematic review and meta-analysis aimed to create a clear synthesis of the impact of different types of psychological interventions on mental wellbeing, irrespective of their theoretical foundation, and establish the differential impact of these types of interventions in clinical and non-clinical populations. The primary outcome was the impact on mental wellbeing in general, with a secondary aim to explore differences in impact of psychological intervention types on outcomes of hedonic and eudaimonic wellbeing. It further considered the impact of various important methodological moderators. It considered intervention-specific moderators, including type of intervention, intensity of the intervention and mode of delivery. It considered study-specific moderators such as the impact of the control group, assessment follow-up and study quality. It also considered population-specific moderators by splitting the results for the general population, those with a mental illness and those with a physical illness. Finally, it aimed to shed light on the overall quality of the evidence provided in the meta-analyses and to discuss the implications of the evidence for future research and mental healthcare delivery in practice.

Results

Study sample and design characteristics. This review identified 419 studies that met the inclusion criteria, see Fig. 2 for the PRISMA flow diagram summarizing the study selection process. Out of these 419 studies, 393 provided sufficient information to be included in the final quantitative analysis. The total participant pool consisted

of a combined $n = 53,288$ participants, $n = 41,491$ from the general population (274 studies), $n = 5,712$ from populations with a mental illness (61 studies) and $n = 6,085$ from populations with a physical illness (58 studies). Sample sizes of studies ranged between $n = 13$ and $n = 3,070$. Most studies were conducted in the United States (120), Australia (33), the Netherlands (30), the UK (26), Iran (25) and China (21), with a total of 42 Western and non-Western countries contributing to the evidence base (Supplementary Information).

The majority of studies looked at multi-component PPIs followed by singular PPIs (singular intervention techniques or activities that stemmed from positive psychology), mindfulness-based interventions and interventions based on cognitive therapy or CBT principles. Table 1 provides an overview of the identified interventions; the grouping of studies is explained in the Methods. The interventions were delivered in a number of different formats of modality, the most prominent being technology-driven interventions ($n = 23,784$) followed by group settings ($n = 18,574$) and individual face-to-face delivery methods ($n = 9,031$), with the remainder using a combination of these formats. An overview of the exact outcome measures used in studies can be found in Table 2.

Risk of bias. The complete summary of risk of bias for each study is presented in Supplementary Fig. 4. Overall, we noted a high level of ‘unclear’ risk of bias, which was the result of insufficient reporting of randomization procedures and a failure to report whether randomization was conducted under blind and independent circumstances. Due to the nature of the interventions and/or the designs chosen (for example, waitlist-control conditions), blinding of personnel and participants was often not conducted or was not reported. Attrition was typically reported, but a moderate number of articles did not report adequate CONSORT statements or had uneven drop-out between groups. Furthermore, the large majority of studies did not publish a protocol or register the studies on trial registries, making it difficult to assess reporting bias. These relatively high rates of omission in methodology and high risk of bias led to downgrading of the evidence quality for the large majority of the included intervention types.

Impact of interventions on overall wellbeing. The impact of intervention type on overall mental wellbeing for each population type is presented in Fig. 3; specific effect sizes and other outcome data for the intervention types presented below are summarized in Table 3. Results are described below for the main intervention types included in the meta-analysis on overall wellbeing. Sub-analyses for subjective and psychological wellbeing are presented in Supplementary Figs. 1 and 2, and Supplementary Tables 3 and 4. Any distinct intervention type that could not be meta-analysed (for example, because there were insufficient studies available) is described in Supplementary Table 6.

ACT interventions. A significant positive small to moderate effect on overall wellbeing was found for ACT-based interventions compared with control groups in the general population alone. The evidence quality for ACT-based interventions in the general population population was downgraded to low as a result of the aforementioned problems with risk of bias, in addition to the wide confidence interval spans between a small and a moderate effect (g of 0.2 and 0.5), implying that the effect size estimate in the population differs from the one found in this review. No significant result was found for ACT-based interventions in physically ill populations. The evidence quality for this meta-analysis, however, was very low. This was the result of problems related to risk of bias, a wide confidence interval (ranging between no effect and a moderate effect) and the fact that the analysis was underpowered. There were insufficient studies available to be included in the meta-analysis for mentally ill populations.

Table 1 | Intervention types that were included in the systematic review, with studies being grouped with the different intervention types on the basis of the description of the intervention as provided in the original manuscripts

Intervention	Description of intervention	Studies
ACT interventions	Interventions based on ACT. The large majority of interventions involved multi-session interventions using ACT-based techniques, which typically focus on creating hope and building commitment to change, acceptance instead of control, and cognitive diffusion. Other interventions include ACT-based self-help books.	83-101
Compassion interventions	Interventions focusing on increasing compassion to others, for instance by interacting with another person in a supportive or considerate way. Typically, participants are asked to reflect on the compassionate behaviours at regular intervals. These can be single interventions or can be delivered as multi-component programmes that include loving kindness meditation.	102-113
Cognitive therapy or CBT interventions	Interventions based on CBT, which typically are multi-session and target maladaptive thinking patterns, developing coping skills, emotional regulation and cognitive reappraisal, as well as improvement of positive emotions and goal setting. Other formats include self-help books and websites. When offered in a physically ill population, focus is often placed on symptom or pain management and coping, together with addressing comorbid mental health symptoms.	114-162
Expressive writing	Participants are asked to write about trauma, adversity, stressful or negative events, typically over a period of time. Instructions may focus on how the event related to the life of the participant, what coping methods they used and whether these were successful.	95,108,154,163-175
Mindfulness interventions	Interventions that are solely focused on mindfulness or meditation. Interventions can be one-off or consist of multiple sessions. Techniques used include diaphragmatic breathing, mind-body scan and mindful imagery. Subtypes of interventions are mindfulness-based cognitive therapy, mindfulness-based stress reduction and mindful self-compassion.	91,106,120,123,133, 146,176-263
Multi-theoretical interventions	Interventions combining two or more clear psychological paradigms into one intervention, with no clear 'main' paradigm focus. Typically involves a cognitive therapy- or CBT-based focus with PPIs and/or mindfulness, but can include other paradigms such as ACT-based or interpersonal therapy-focused. Typically involves group interventions of higher intensity.	132,135,154,164,239, 254,264-311
PPIs, multi-component	A combined package of largely or solely positive psychology exercises, typically bundled into a programme delivered over an extended period of time. Includes positive psychotherapy, a clinical therapy that utilizes positive psychology interventions, such as focusing on using strengths, gratitude visits, active constructive response, counting blessings and savouring. Includes wellbeing therapy.	123,132,145,156, 184,198,241, 244,290-292, 312-372
PPI, singular	Individual activities or exercises stemming from positive psychology or interventions that focus only on building on positive construct—that is, not combining different positive psychological exercises. A number of key PPIs are described in more detail below.	
Best possible selves/ optimism	Participants are instructed to imagine a future life, and what it will ideally look like. They typically focus on different domains per period (for example, day or week) and often gain insight into the domains at the start of the intervention. Example domains are: love, hobbies, employment, physical and mental health. Other interventions focusing on optimism are grouped under this classifier.	42,104,373-394
Character strengths	Participants do a strengths assessment (for example, values in action character strengths) and use their top strengths in a new way, as a one-off or over a period of time. Suggestions are typically provided to explain how strengths can be used. Variations of this task are included (for example, set goals in relationship to best or preferred strengths).	42,113,340,360, 391,395-404
Gratitude	Participants are asked to reflect on experiences, events or people they are grateful for. May involve expressing gratitude to other people.	42,57,113,249,327,360,374, 376,382,383,390-393, 396,399,403,405-429
Pleasurable experiences	Participants are asked to reflect on or think about experiences that were fun, amusing or joyful, or that are bringing happiness to their life.	166,188,318,319,413
Three good things	Participants are asked to write or think about three good things that happened over a period (typically reflecting back on the same day) and reflect on why those things occurred. The activity is typically repeated for a number of days.	42,113,360,375, 378,381,391,396, 400,403,415,430-433
Other PPIs	A variety of different takes on the PPIs mentioned above were further tested, including acts of novelty and acts of kindness, gift of time, savouring interventions, meaning making, humour interventions and alternate forms of character strength interventions.	56,132,318,319,360, 374,384,396, 397,422,431-448
Reminiscence interventions	Interventions that focus on reviewing past experiences. Includes life review therapy focusing on integration of difficult life events from the past, development of agentic life stories and retrieval of specific positive memories.	169,172,305,400, 431,449-466
Other	A range of other interventions were tested which could not be added into the meta-analysis, as the review did not find sufficient studies to be included as a distinct type. Interventions include assertiveness training, behaviour activation, behavioural experiments, benefit-finding interventions, communication skills training, couples interventions, emotional awareness and expression therapy, forgiveness skills training, goal setting, interpersonal psychotherapy, narrative exposure therapy, parenting styles, emotion management, psychoeducation, rational emotive therapy, stimulus control training, social skill building, supportive group therapy, core transformation therapy, spiritual counselling, storytelling, positive memories, problem solving and self-affirmations.	118,126,128,137,144,164, 166,232,278,350,397, 398,431,432,434,436, 445,460,467-499

Table 2 | Outcome measures used to capture mental states of wellbeing by included studies

Wellbeing type	Measure	Studies
SWB	Satisfaction with Life Scale (SWLS) ²³	57,83,96,97,99,105-107,113,115-117,124,126,127,136,138,147,156,158-160,163, 168,170,172,179,183,187,188,192,195,197,201,208,209,216,218,221-223,230, 233,238,241,254,256-263,267,269,271,273,274,278,282,286,287,289, 291,292,295,298,306,308,310,322,323,325,329-331,336,339-341,344,353, 359,363,367,371,373-376,383,387,390,393,397,398,405-407,411,413-415,418,419, 426-428,431,435,437,438,440,441,446,451,454,461,468,479,480,487,489, 492-496,500
SWB	Satisfaction with Life Scale for Children (SWLS-C) ⁵⁰¹	140
SWB	Temporal Satisfaction with Life Scale (TSWLS) ⁵⁰²	389
SWB	Subjective Happiness Scale (SHS) ⁵⁰¹	102,106,198,241,249,262,320,322,327,365,383,384,388,414,418, 425,427,431,441,446,447,461,468,471,491,500
SWB	WHO-5 Wellbeing Index (WHO5) ⁵⁰³	91,94,146,151,161,199,237,239,244,245,248,253,254,265,275,285,296, 309,347,361,366,455,467,484,497
SWB	Authentic Happiness Index or Steen Happiness Index (AHI) ⁵⁰⁴	42,56,103,104,114,318,332,360,391,396,397,399,400,403,404,417,432,433,443
SWB	Life Satisfaction Index - A, Z, Third Age (LSIA) ⁵⁰⁵	125,134,305,449,450,453,455,458,464,466,470,474
SWB	Students Life Satisfaction Scale (SLSS) ⁵⁰⁶	131,231,313,333
SWB	Brief Multidimensional Students Life Satisfaction Scale (BMSLSS) ⁵⁰⁷	118,333,335,370,391,392,410,429
SWB	Subjective Wellbeing Scale (SWBS) ⁵⁰⁸	93,203
SWB	Personal Wellbeing Index—Adult Scale (PWI-A) ⁵⁰⁹	372,398
SWB	Affectometer 1 and 2 (AM1) ⁵¹⁰	144,175
SWB	Index of General Affect and Index of Wellbeing (IGA) ⁵¹¹	483
SWB	Life Satisfaction Questionnaire (LiSat9) ⁵¹²	212
SWB	Life Satisfaction Questionnaire (LiSat11) ⁵¹³	206,477
SWB	Memorial University of Newfoundland Scale of Happiness (MUNSH) ⁵¹⁴	456,460
SWB	Subjective Authentic-Durable Happiness Scale (SA-DHS) ⁵¹⁵	214,251
SWB	SPF-Index Level Scale (SPF-IL) ⁵¹⁶	270
SWB	Types of Positive Affect Scale (TPAS) ⁵¹⁷	165
SWB	Chinese Happiness Inventory (CHI)	518
PWB	Psychological Wellbeing Scale (PWBS) ³	84,93,109,116,136,200,211,218,220,229,238,243,246,271,279, 302,306,311,317,328,330,343,350,356,358,416,475,490,519,445
PWB	Oxford Happiness Inventory (OHI) ⁵²⁰	128,232,242,247,325,329,338,358,413,457,469,481,486,488
PWB	Flourishing Scale (FS) ⁵²¹	183,184,225,266,293,366,386,411,480,495
PWB	Questionario sul Benessere Psicologico (QBP) ⁵²²	314
PWB	The Eudemonic Wellbeing Scale (EWBS) ⁵²³	227
Affect	Positive and Negative Affect Scale (PANAS) ²⁴	90,101,105,108,111,112,116,120,123,126,129,130,132,133,137,139, 149,154,155,162,164,166-168,171-174,176-178,181-183,190,200, 204,205,222,226,228,233,235,236,240,245,250,252,255,258, 261,268,269,272,274,277,280,282,298,306,307,311,312,321, 325,330-332,334,336,341,346,349,353,359,362,365,367,368, 372,375,377,378,381,382,384,386,387,389,394,398,402,414,415, 418,422,423,427,430,436,437,444,452,461,471,473,482,487,489,490,495,498
Affect	Positive and Negative Affect Scale Extended (PANASX) ⁵²⁴	194,196,412,442,448
Affect	Positive and Negative Affect Scale-Child (PANAS-C) ⁵²⁵	333,335,370,392,410,429
Affect	Differential Emotions Scale (DES) ⁵²⁶	174,219,288,315,316,364,499

Continued

Table 2 | Outcome measures used to capture mental states of wellbeing by included studies (continued)

Wellbeing type	Measure	Studies
Affect	Differential Emotions Scale–Modified(mDES) ⁵²⁷	326,348,433,440
Affect	Scale of Positive and Negative Experience (SPANE) ⁵²¹	184,238,289,295,376,391,405,407,426,428,434,480
Affect	Bradburn Affect Balance Scale (BABS) ⁵²⁸	213,215,216,276,465,478
Affect	Derogatis Affects Balance Scale (DABS) ⁵²⁹	152,264
Affect	Affectivity Scale (AFFS) ⁵³⁰	363
Affect	Brief Mood Introspection Scale (BMIS) ⁵³¹	145
Affect	Chinese Affect Scale (CAS) ⁵³²	424
Affect	<i>Mehrdimensionaler Befindlichkeitsfragebogen (MB)</i> ⁵³³	207
Affect	Affect-Adjective Scale (AAS) ⁵³⁴	374,420
Affect	The Global Mood Scale (GMS) ⁵³⁵	193,210
Combined	Bradley's Wellbeing Questionnaire (BWBQ) ⁵³⁶	476
Combined	Mental Health Continuum—Short Form (MHC-SF) ⁵³⁷	85,86,88,89,95,96,98,111,132,143,169,202,212,234,265,300,319,342,349,351,354,355,357,361,391,421,459,462,463,538
Combined	Brief Inventory of Thriving (BIT) ⁵³⁹	401
Combined	Pemberton Happiness Index (PHI) ⁵⁴⁰	185
Combined	Wellbeing Manifestations Measure Scale (WBMMS) ⁵⁴¹	87
Combined	Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) ⁵⁴²	92,100,110,129,142,148,153,157,180,186,224,255,281,283,284,294,297,299,304,369,378,381,472,485
Combined	Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) ⁵⁴³	141,150,290,301,313,324,352
Combined	The PERMA Profiler (PERMA) ⁵⁴⁴	303
SWB	Life Satisfaction Questionnaire (LSQ) ⁵⁴⁵	93

SWB, scales that mainly measure subjective wellbeing; PWB, scales that measure mainly psychological wellbeing; combined, scales that combine subjective and psychological wellbeing constructs.

Compassion interventions. Compassion interventions just failed to find a significant small effect in the general population, as the *P*-value was 0.014, just above the threshold for significance of 0.01 for this review (Methods). This result is influenced by a diminished power of the meta-analysis, which was just below 0.80. The evidence quality was graded as low due to problematic risk of bias and wide confidence intervals. There were insufficient studies available to be included in the meta-analysis for mentally and physically ill populations.

Cognitive therapy- or CBT-based interventions. A significant *P*-value for CBT interventions was found for the general population, but the effect size estimate failed to meet the small-effect threshold. This indicates that on average, cognitive therapy- or CBT-based interventions do not reach a meaningfully beneficial effect on wellbeing in the general population. The evidence quality was rated as moderate, as the large sample increases the confidence of the effect size estimate. No significant impact of CBT was noted for the physically ill population. The evidence quality for this meta-analysis was rated as low. In populations with a mental illness, cognitive therapy- or CBT-based interventions led to clear significant improvements compared with control conditions, reaching a small-to-moderate effect. The evidence quality was moderate for the population with a mental illness.

Expressive writing. Wellbeing was not significantly improved by using expressive writing interventions in the general population, as the *P*-value was 0.019. The evidence quality was low due to issues with risk of bias and the presence of a wide confidence interval.

There were insufficient studies available to be included in the meta-analysis for mentally and physically ill populations.

Mindfulness-based interventions. Mindfulness-based interventions led to significant small-to-moderate improvements in the general and physically ill population and a moderate-to-large effect in cohorts with a mental illness. This demonstrates the significant utility of mindfulness-based interventions in both clinical and non-clinical populations. The evidence quality was high for the general population, as the confidence interval was narrow and the large study count and sample size warranted upgrade of evidence quality. The evidence quality was moderate and low for physically ill and mentally ill cohorts, respectively.

Multi-theoretical interventions. Interventions that deliberately combined multi-theoretical approaches significantly improved mental wellbeing in the general population and the physically ill population. The evidence quality for both meta-analyses was low as a result of imprecision due to wide confidence intervals spanning between no effect and a small effect, as well as the aforementioned risk of bias. There were insufficient studies available to be included in the meta-analysis for cohorts with a mental illness.

PPIs, multi-component. Multi-component PPIs significantly improved wellbeing in the general population, showing small effect sizes. This evidence was graded as high-quality evidence as a result of the large number of studies contributing to this analysis, which counters the limitations and subsequent downgrading related to risk of bias in the included studies. Multi-component PPIs also

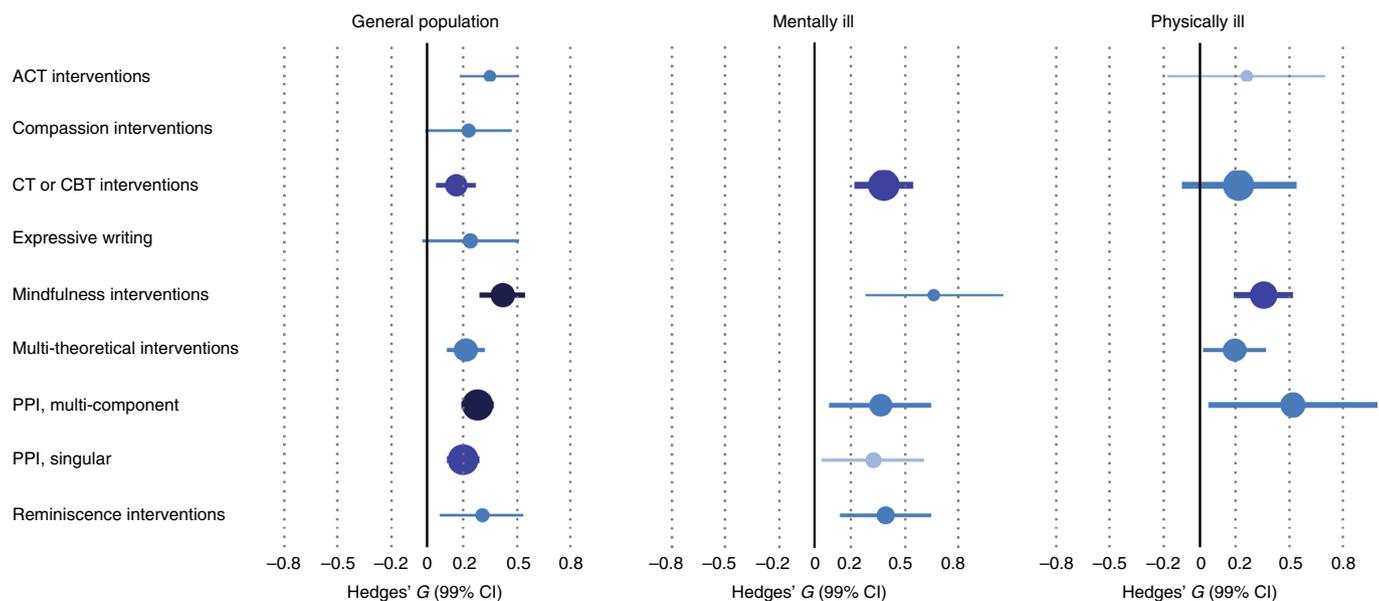


Fig. 3 | Forest plot visualizing the impact of each intervention type on overall wellbeing compared with control conditions split by population type. Horizontal bars show 99% confidence intervals, with interventions having a significant effect denoted by horizontal bars that do not touch the solid vertical line (the line of no effect). The dashed lines indicate small ($g=0.2$), moderate ($g=0.5$) or large ($g=0.8$) effects. Circle sizes reflect the weight of the overall study. The colours denote the evidence quality, based on grade recommendations³³ for high (dark purple), moderate (purple), low (blue) and very low (light blue) evidence quality. Only intervention types with more than four studies were included in the meta-analysis and were displayed in the forest plot. Specific effect sizes and other statistics applying to this forest plot are presented in Table 3. CT, cognitive therapy.

significantly improved wellbeing in the physically ill cohorts, showing moderate effect sizes. Effect sizes for the general and mentally ill population were small, but significant. However, the evidence quality was graded as low for both clinical populations.

PPIs, singular. The combined effect size of singular PPIs on wellbeing in the general population was small and significant. The total number of studies investigating PPIs in the general population was large and overall the evidence quality was graded as high. There were insufficient studies that investigated the impact of singular PPIs in physically ill populations. The impact of singular PPIs in cohorts with a mental illness was significant, but the evidence quality was very low. This was the result of risk of bias, imprecise effect size estimate and the fact that the analysis was underpowered due to a low combined sample size.

A number of distinct individual PPIs could furthermore be included into their own distinct meta-analyses, which are detailed in the Supplementary Fig. 3 and Supplementary Table 5. In brief, the following PPIs were included in distinct meta-analyses: three good things, best possible selves or other interventions focusing on building optimism, character strength interventions, gratitude interventions and interventions aimed at induces or experiencing pleasure (referred to as pleasurable activities). Only character strength interventions reached a significant positive effect that was meaningful. The evidence quality for all singular PPI meta-analyses was low.

Reminiscence interventions. A significant positive effect on mental wellbeing in the general population was found. Similarly, a small positive effect of reminiscence intervention in cohorts with a mental illness was found. The evidence quality for both outcomes was low as a result of risk of bias and wide confidence intervals.

Impact of moderators on intervention effect on wellbeing. Table 4 summarizes the effect sizes for each moderator of intervention effect on wellbeing. In the general population, all three types of

intervention intensity showed significant impact reaching a small effect size. A trend, however, could be observed showing that higher-intensity interventions led to higher effect sizes, particularly for mentally ill populations and the general population. No such difference was found for physically ill populations, where moderate and high-intensity interventions had similar effects. Low-intensity interventions were not tested in clinical populations.

Group-based interventions reached the highest effect size compared with individual and technology-based interventions in the general and mentally ill populations. For those with a physical illness, interventions delivered using an individual format reached the highest effect size. Whereas the effect size confidence intervals between group formats and the other two formats in the general population did not overlap by much, this was not the case for both clinical populations. This means that the impact of modality in both clinical populations is less clear compared with the general population.

Study-specific moderators. Time to follow-up was associated with an effect on wellbeing scores in the general population, with overall effect sizes decreasing over time for all population types. The significant effect sizes were maintained at the 3-month follow-up period compared to afterwards, before dropping below $g=0.2$ by the 6-month follow-up. A similar trend could be observed for both clinical populations.

Looking at comparator groups, effect sizes were larger when studies used a waitlist-control or assessment-only design. When studies used a control group that included some form of interaction (for example, a placebo control group), effect sizes were much lower, with effect sizes in the general population dropping below the threshold for a small effect.

Impact of interventions on sub-domains of mental wellbeing. Separate meta-analyses were conducted for hedonic and eudaimonic wellbeing, and are presented in detail in the Supplementary

Table 3 | Outcome of meta-analyses grouped by intervention type across the general and clinical population

Population	Intervention type	Hedges' G	99% CI	P value	Int n	Con n	Total n**	Q	I ²	K	Grade	PB	Pow
General population	ACT interventions	0.348	0.18 0.51	0.000	508	365	990	4.84	0.00	7	2	–	0.98
	Compassion interventions	0.230	–0.01 0.47	0.014	538	559	1,097	8.44	5.22	9	2	–	0.76
	Cognitive therapy- or CBT-based	0.162	0.05 0.27	0.000	2,085	2,071	4,156	8.49	0.00	10	3	No	0.97
	Expressive writing	0.240	–0.03 0.51	0.019	703	521	1,274	7.81	0.00	9	2	–	0.87
	Mindfulness interventions	0.420	0.29 0.55	0.000	2,703	2,606	5,613	55.62	0.00	56	4	No	1
	Multi-theoretical interventions	0.215	0.11 0.32	0.000	2,811	2,830	5,714	32.61	0.00	36	2	Yes	1
	PPI, multi-component	0.280	0.19 0.37	0.000	6,354	5,985	12,412	65.16	3.31	64	4	No	1
	PPI, singular	0.200	0.11 0.29	0.000	7,420	4,118	11,935	89.35	18.29	74	3	No	1
	Reminiscence interventions	0.307	0.07 0.54	0.001	575	508	1,083	10.48	0.00	12	2	Yes	0.96
Mentally ill	Cognitive therapy or CBT interventions	0.382	0.22 0.55	0.000	1,121	1,033	2,154	16.81	4.84	17	3	No	1.00
	Mindfulness interventions	0.664	0.28 1.05	0.000	113	136	249	5.09	1.76	6	2	–	0.97
	PPI, multi-component	0.365	0.08 0.65	0.001	426	411	837	13.14	8.66	13	2	Yes	0.98
	PPI, singular	0.325	0.04 0.61	0.004	177	143	320	3.01	0.00	5	1	–	0.47
	Reminiscence interventions	0.392	0.14 0.65	0.000	225	197	422	3.92	0.00	5	2	–	0.82
Physically ill	ACT interventions	0.263	–0.18 0.70	0.121	204	190	394	5.235	23.60	5	1	Yes	0.37
	Cognitive therapy or CBT interventions	0.217	–0.10 0.54	0.078	771	700	1,606	10.55	14.73	9	2	–	0.88
	Mindfulness interventions	0.357	0.19 0.52	0.000	589	590	1,179	13.06	0.47	14	3	No	1.00
	Multi-theoretical interventions	0.196	0.02 0.37	0.000	410	453	863	5.77	0.00	9	2	–	0.46
	PPI, multi-component	0.521	0.05 0.99	0.004	547	441	988	10.85	0.00	15	2	Yes	1

Meta-analysis output corresponding to Fig. 2. Q is Cochran's Q, a measure of heterogeneity; I² is a measure of heterogeneity; K is number of studies contributing to the meta-analysis; grade is a measure of evidence quality, with 1 indicating very low quality evidence, 2 indicating low quality evidence, 3 indicating moderate quality evidence and 4 indicating high-quality evidence; PB indicates presence of publication bias (yes or no; calculated only where there are 10 studies or more); Int n is intervention sample size; Con n is control group sample size; Pow is a power calculation for meta-analysis. **Total n can deviate from group n as a result of the specific analyses performed and the availability of per-group data; 99% CI, 99% confidence interval.

Information (Supplementary Figs. 1 and 2, and Supplementary Tables 3 and 4). In brief, the large majority of studies used subjective wellbeing outcome measures, with psychological wellbeing outcome measures being used considerably less often. In general, results for subjective (hedonic) wellbeing mirrored the findings for the general mental wellbeing scores, with mindfulness and multi-component PPIs showing the highest significant effect sizes across populations (g ranging between 0.35 and 0.65 for mindfulness and 0.36 and 0.62 for multi-component PPIs, all $P=0.000$). Other multi-theoretical interventions ($g=0.26$, $P=0.000$), singular PPIs ($g=0.20$, $P=0.000$) and reminiscence interventions ($g=0.34$, $P=0.000$) also significantly improved subjective wellbeing in the general population. Cognitive therapy- or CBT-based interventions only led to significant improvements in wellbeing for cohorts with mental illness ($g=0.40$, $P=0.000$). Multi-theoretical interventions were efficacious in the physically ill populations ($g=0.24$, $P=0.002$). While evidence for the efficacy of mindfulness and both types of PPI was high in the general population, the majority of studies were judged

to have low or very low evidence quality. Psychological wellbeing could only be included in a meta-analysis examining the impact of multi-component PPIs, showing a small-to-moderate significant effect ($g=0.44$, $P=0.002$). No other interventions were tested in sufficient numbers to allow a robust meta-analysis to be conducted.

Discussion

This systematic review aimed to synthesize the current scientific evidence on distinct psychological interventions in both clinical and non-clinical populations in improving mental states of wellbeing, and found that mental wellbeing can be significantly improved using a variety of psychological interventions. Two types of interventions were consistently associated with positive findings across populations, specifically multi-component PPIs and mindfulness-based interventions. Meta-analyses also found that ACT-based interventions, cognitive therapy- or CBT-based interventions, singular PPIs, and interventions focusing on reminiscence were effective. The significance and effect sizes for interventions differed among the

Table 4 | Impact of moderators of intervention impact on overall wellbeing, split into the general population and the two clinical populations (cohorts with a mental illness and those with a physical illness)

Moderator	General population					Mentally ill					Physically ill					
	Time	g	99% CI		K	N	g	99% CI		K	N	g	99% CI		K	N
Post		0.276	0.23	0.32	274	41,491	0.440	0.30	0.58	58	6,085	0.352	0.21	0.50	61	5,712
3 month		0.234	0.13	0.33	61	14,237	0.385	0.16	0.61	13	2,303	0.218	0.05	0.39	19	1,532
6 month		0.151	0.06	0.24	38	9,070	0.098	-0.15	0.35	5	686	0.155	0.04	0.27	20	1,968
12 month		0.103	-0.07	0.28	12	4,101	-	-	-	-	-	0.023	-0.17	0.21	5	1,133
Intensity																
Low		0.198	0.13	0.27	80	12,877	-	-	-	-	-	-	-	-	-	-
Moderate		0.294	0.19	0.40	63	7,100	0.261	0.00	0.53	12	1,061	0.397	0.183	0.611	6	333
High		0.321	0.26	0.39	128	21,001	0.551	0.36	0.74	42	4,219	0.367	0.243	0.492	51	5,045
Comparator																
Assessment only		0.342	0.28	0.40	161	25,200	0.462	0.38	0.54	43	4,669	0.418	0.18	0.66	30	3,270
Active or passive comparator		0.184	0.12	0.24	114	16,845	0.228	0.03	0.43	15	1,449	0.248	0.14	0.36	29	2,202
Modality																
Individual		0.238	0.14	0.34	63	6,878	0.421	0.18	0.66	24	1,389	0.422	0.18	0.66	16	764
Online		0.222	0.16	0.28	103	20,263	0.333	0.20	0.47	11	1,470	0.343	0.06	0.63	14	2,051
Group		0.362	0.28	0.44	97	13,730	0.539	0.22	0.85	19	2,004	0.319	0.10	0.54	29	2,840
Quality																
High		0.296	0.18	0.41	38	8,228	0.398	0.21	0.59	18	2,142	0.246	0.09	0.41	17	2,266
Low		0.274	0.23	0.32	239	34,027	0.462	0.27	0.66	40	3,943	0.394	0.19	0.59	44	3,446

Mean effect sizes and range of values are shown. Low intensity refers to interventions that lasted less than a week; moderate-intensity interventions lasted between a week and a month, and high-intensity interventions lasted more than a month. Dashes (-) indicate that insufficient studies were found that contributed evidence for this moderator subgroup.

specific target populations and outcomes studied, while the overall degree of overlap in confidence intervals between intervention types meant no conclusive judgement could be made about the superiority of one type over the other.

The results describing the impact of interventions that originate from positive psychology, tested here with a large number of studies, concur with previous reviews, which have demonstrated positive results from global studies on wellbeing^{18-20,40}. We found that PPIs led to small effect sizes, regardless of whether they were tested in clinical or non-clinical populations. The PPIs were used in various different settings such as workforces, schools, the general community and clinical settings, and were offered in various different formats and intensities. This review deliberately split PPIs into multi-component and singular PPIs, to provide better insight into different intervention formats. In this way, the effects of individual building blocks (individual activities and exercises) could be compared with those of complete programmes of PPIs. In line with previous research⁴¹, multi-component PPIs generally showed larger effect sizes compared with singular PPIs, which reached a small effect size at best. This finding is important, as positive psychologists often promote the use of simple, easy-to-perform PPIs as impactful in improving wellbeing^{42,43}, whereas the results of our review support the use of higher-intensity multi-component programmes over singular activities and exercises. In addition, effect sizes differed amongst singular PPIs. This demonstrates that not all individual PPIs are equal and that attention needs to be paid to which exact singular PPIs should be included as part of multi-component interventions.

The review highlighted that non-PPIs can also significantly improve states of positive mental health. Previous reviews, except the one conducted by Weiss and colleagues¹⁸, generally excluded non-PPIs from their inclusion criteria. The significant impact of

non-PPIs is promising for health professionals and other stakeholders who are seeking and proposing new therapeutic avenues to build mental wellbeing. ACT-based interventions were effective in the general population, and the closely related mindfulness-based interventions were effective in the general and mentally ill population, strengthening their appeal for clinicians who wish to offer interventions that focus on building wellbeing in addition to being able to positively impact symptoms of psychological distress⁴⁴. That cognitive therapy- and CBT-based interventions were impactful in improving wellbeing in mentally ill populations, but not in the non-clinical population, adds to the existing evidence base supporting the utility of cognitive therapy and CBT approaches in building mental capacity in the mental healthcare setting, and strengthens the case for CBT models of wellbeing and resilience in clinical populations⁴⁵. As CBT is currently the most empirically supported and practised therapeutic approach⁴⁶, these results support practitioners to start looking at implementing wellbeing interventions for their patients using familiar paradigms and therapeutic methods.

Our moderator analysis indicated that improvement in mental wellbeing seems to be related to effort. While the review did not find a clear linear dose-response effect, with more exposure leading simply to better treatment outcomes⁴⁷, the results do indicate that more intense interventions seem to lead to more pronounced changes, particularly in the general and mentally ill populations. These results need to be placed in the context of the overlap in confidence intervals between intensities, which means that it is not possible to definitively state that higher-intensity interventions provide superior results. The difference in impact of higher-intensity interventions may also be explained by the way the higher-intensity interventions are structured. They are typically complex, combining a multitude of psychological and behaviour-change elements⁴⁸. Similar to the conclusions by Weiss, et al.¹⁸ in their review on

interventions to build psychological wellbeing, our evidence is consistent with the use of higher-intensity psychological interventions to facilitate the reinforcement of practices in everyday life.

Overall effect sizes were often larger in mentally ill and physically ill populations. The ability of psychological interventions to exert more influence when symptoms of problematic mental health are more severe (that is, surpass sub-clinical levels) is supported⁴⁹, but it is important to note that the effect on wellbeing in these populations cannot solely be attributed to severity of clinical distress symptoms, as wellbeing is a state that appears in the absence of psychological distress^{10,12}. For instance, recent evidence suggests that most people improve in either wellbeing or psychological distress after receiving psychological interventions that target both outcomes⁵⁰. The difference in effect size found between clinical and non-clinical populations points to a more complex interrelationship between clinical symptoms, distress and levels of wellbeing, as well as their unique and common predictors, and the role of other moderators such as intervention intensity^{10,51}. Similarly, the review showed differences in effect sizes between different intervention types within clinical versus non-clinical populations, for example, cognitive therapy- and CBT-based interventions. This highlights the need to further explore the utility of using common therapies to underpin interventions in the general population. Further research on dual-factor models such as the one posited by Corey Keyes¹¹ and recovery frameworks such as CHIME⁵² may in future help to untangle the exact interplay between wellbeing and clinical symptoms and its treatment.

Although the evidence presented in this review includes non-Western populations (mostly from Asia), and includes youth and adult populations, the majority of studies identified in this review come from Western adult populations; a well-documented phenomenon in research, including wellbeing research⁵³. Though the evidence may have application in different cultures and ages^{40,54}, generalizations of the evidence impact beyond the Western and Asian context should be considered with caution. Similarly, the application of interventions in practice will still require further nuancing. The review points to the utility of different interventions at the population level, but it does not determine which individuals benefit most from each intervention, and which conditions need to be met to make them work optimally. Researchers are increasingly calling for personalized approaches to intervention delivery⁵⁵—first, to optimize the impact of the interventions, and second, to determine which factors impact at the individual level as opposed to the group level. Technological advances and maturing of the field of wellbeing science should lead to more traction in the upcoming decade^{56–58}.

The field of wellbeing science and the evidence quality in syntheses of studies in the field will benefit from improvements in rigour. Factors contributing to the downgrading of the quality of evidence included high rates of unclear and high risk of bias, small sample sizes, lack of published protocols or trial registries, and inconsistent reporting between studies, with a large proportion of studies failing to adhere to standard reporting guidelines such as the CONSORT statement⁵⁹. This made it challenging at times to determine the precise components or the theoretical background of the intervention being studied, or to assess quality indicators such as implementation fidelity. Nevertheless, by taking a rigorous approach to inclusion in our meta-analyses, the review provides considerable high-quality evidence to suggest that application of mindfulness-based interventions and PPIs in particular can be reliably judged to be beneficial in clinical and non-clinical populations.

This systematic review took a broad approach in aiming to synthesize the evidence of all psychological interventions, which involved going through over 23,000 citations and assessing close to 2,000 full-text articles. The search that was constructed for this review was designed to be broad, picking up on any article that made reference to wellbeing, interventions (or synonyms) and mentioned the word 'random' to pick up on randomized controlled designs.

Specific search terms related to intervention types were also used, based on words used in articles identified before starting the review. These terms were not accompanied by an extensive list of synonyms or related constructs, which might have had a small effect on identification of relevant studies. Scanning of existing reviews and reference lists would have helped mitigate against missing studies.

The magnitude of the search was influenced by the incoherent nomenclature surrounding wellbeing^{30,60} and mental health research. Findings from this review are closely related to the quality of the current state of the wellbeing literature. This is the most important limitation of this work, as reporting standards varied widely, particularly in writing of titles and abstracts; the first step in screening for reviews. This may have led to relevant studies being excluded, although this was minimized by the screening of studies included in the reference lists. Furthermore, the review was limited by the pragmatic necessity to exclude Masters or PhD theses and grey literature, which can include references to unpublished work, and could therefore potentially result in publication bias.

Nonetheless, the review used a combination of rigorous methodological approaches used in systematic reviewing and meta-analyses, including the use of quality indicators for individual studies, indicators for quality of overall effect of meta-analyses, statistical methods to infer heterogeneity and random effects analysis to counter methodological heterogeneity, drawing on accepted standards in both psychological and medical research methods. By taking a strict approach to inclusion of studies, restricting study designs to randomized control trials, using validated scales of only positive states of mental health to determine (mental) states of wellbeing, excluding all studies with additional components other than psychological interventions and using only peer-reviewed research, the identified evidence base was coherent. Intervention types fell largely within existing classifications or therapeutic approaches, delivery formats were fairly similar and, while heterogeneity in results was present, it was lower than expected.

This review did not include studies that investigated head-to-head comparisons of different types of psychological interventions, which has implications for its conclusions. For instance, studies that simply compare interventions with waitlist-control groups may overestimate effect sizes⁶¹—this has to be taken into account when interpreting the findings. However, the exclusion of direct comparisons does not affect the meta-analytic results specifically, as data belonging to these studies could not be added to the pool of data. This leaves the investigation of direct comparisons as an opportunity for future evidence syntheses.

It could be argued that the categorization of psychological interventions is not beneficial for deliberations on the effect psychological interventions on wellbeing. Various authors have pointed to problems in distinguishing between positive and negative interventions or outcomes in mental health¹⁶. They argue that any positive traits can be also be negative and vice versa, and that positive interventions can have a negative impact if specific preconditions have not been met. Similarly, psychological interventions are typically complex⁴⁸ and often borrow techniques from other therapeutic paradigms, which makes it difficult to categorize 'pure' interventions and their subsequent impact on outcomes. We used classification of interventions based on their overarching therapeutic background and the description of their components as a necessary starting point to map the breadth of different interventions that can be used to build wellbeing.

Despite current estimates of the burden of mental illness being gross underestimates⁶², mental illness is projected to become the largest contributor of disease by 2030. Integration of evidence-based positive mental health interventions within established models of care can be an innovative and cost-effective consideration⁶³, and can help improve chances of recovery or prevent people from needing care for their mental illness down the line^{6,64}. This review points to

various effective psychological interventions that practitioners can consider if they want to address mental states of wellbeing in their care provision. Implementing these interventions can be done safely without interfering with future therapist approaches, can be delivered in group format or via online or telehealth solutions and does not (necessarily) require the need for a clinical or registered psychologist, making it a potentially cost-effective addition to current referral pathways and treatment modalities. It is important to stress the importance of intensity and giving the specific building blocks to interventions considerable thought, as not all intervention components have the same impact. Future research can further stimulate the uptake of these interventions, particularly when it begins to focus more on moderators and preconditions that influence intervention efficacy, which will need to be done in well-powered studies with high reporting standards⁴³. For many of the interventions studied here, the evidence quality is in need of improvement, which is particularly important in light of the replication crisis⁶⁵. However, several intervention types (PPIs and mindfulness in particular) are captured well and the need to conduct new (pilot) studies is limited if the sole aim is to determine whether the interventions have an impact. Researchers need to look further to answer important questions, for example, to determine person-to-intervention fit⁶⁶ or to improve fidelity of interventions.

Determining the effect of pooled psychological interventions should be only the precursor to determining which intervention components are effective, and in which contexts⁶⁷. Psychological interventions are complex and consist of a lot of different elements, as can for instance be seen in the case of multi-component PPIs, which often include different combinations of individual PPIs. A possible next step is to disentangle interventions into their building blocks, to begin to determine which combination of techniques leads to optimal outcomes. One way to achieve this is by coding interventions via behaviour-change taxonomies, which outline effective components to psychological interventions^{68,69}. Although the approach of coding according to taxonomies has its own limitations^{70,71}, it can bring us a step closer to more effective personalized delivery of wellbeing intervention.

Methods

This systematic review was registered in the PROSPERO International prospective register of systematic reviews with number [CRD42018109059](https://doi.org/10.1186/1745-6215-109059). A detailed protocol of the review is provided in the Supplementary Information, with the main methodological considerations discussed below.

Study selection criteria. Studies were eligible for inclusion in this review according to five criteria. First, the studies needed to evaluate a psychological or behavioural intervention only. Second, only experimental studies using a randomized controlled design, including cluster and crossover designs, were eligible for inclusion. Interventions could be compared to (1) assessment only or waitlist, (2) a passive or active control group as long as the control group does not focus on trying to improve mental health, and (3) treatment-as-usual in the case of physical or mental illness. Comparing different psychological interventions types head-to-head was not the focus of this review, as the principle aim was to establish the impact of the independent variable: being in receipt of different types of psychological intervention. Therefore, studies comparing psychological interventions to one another were excluded from the current review. Third, measurement of at least one validated measure of mental wellbeing was required. Studies using single-item wellbeing measures were excluded. Accepted measures for mental wellbeing and psychological distress are presented in Table 2. Fourth, articles written in any language other than English were excluded. Finally, studies investigating populations with cognitive impairment were excluded, as the application of generic intervention psychological interventions in this population was not deemed equivalent; that is, the degree of adaptation was expected to be too high.

Search strategy, study selection and data extraction. The data sources for the current meta-analysis were peer-reviewed journal articles published up to July 2020, as sourced via PsycINFO, PsycARTICLES, Scopus, Medline and CINAHL. The search, constructed by professional research librarians, is current up to July 2020. It was designed to be broad, so it could pick up any psychological intervention or treatment looking at outcomes of positive mental health studied via a randomized control trial; the full search is described in the Supplementary Information part 2,

pages 6 to 10, and an overview of the measures is described in Table 2. In order to pick up any missed studies, existing systematic reviews that arose from the search on related interventions or topics, as well as reference lists of included studies were also screened. Two authors independently screened all titles and abstracts returned from the database search for eligibility and performed the subsequent full-text screen. Disagreements between review authors were resolved through discussion. Inter-rater reliability was calculated for the full-text screen, resulting in a Kappa of 0.85, which indicates very high overall agreement⁷². No contact was made with study authors. Four reviewers extracted data to a custom, standardized form in Microsoft Excel, based on formats used by the authors in previously completed reviews. All extracted data were independently checked by co-authors.

Data synthesis and analysis. Outcome data were standardized to Hedges' *G* (ref. ⁷³), their 99% confidence intervals, as well as their associated *P*-values, using Comprehensive Meta-Analysis software⁷⁴ version 3. Meta-analysis was conducted only in cases where five studies or more were included. Hedges' *G* of 0.2 indicated a small effect, 0.5 indicated a moderate effect and 0.8 indicated a large effect. Effect sizes were deemed significant at the 0.01 level and were conducted using two-tailed tests. A 0.01 level was chosen based on the recommendations of Borenstein et al.⁷⁵ to correct for meta-analysis multiplicity⁷⁶. In other words, a correction was applied to compensate for the increased probability of a type II error (falsely rejecting the null hypothesis) by performing a large number of meta-analyses within one study. Where individual studies caused considerable heterogeneity in a meta-analysis (that is, they were an outlier), they were removed from the analysis.

For each of the meta-analyses, a power calculation was performed⁷⁷. An overall effect size on mental wellbeing was calculated for the meta-analysis, as research points to the existence of an overarching wellbeing factor⁷⁸. In order to compare results to previous reviews^{17,18,20} and to provide intervention designers with insight into the performance of individual psychological interventions on aspects of hedonic versus eudaimonic aspects of wellbeing, separate scores for subjective and psychological wellbeing were calculated. Table 2 outlines all measures used in the present study and whether they were counted as measures of subjective or psychological wellbeing.

Intervention types were not collapsed into an overarching 'psychological interventions' category, but rather were added as subgroups. Due to the common use of complex multi-component interventions, a posteriori categorization of included interventions was conducted, as described in Table 1. Studies were classified according to the descriptions provided in the papers and the supplementary material to the papers. Interventions were grouped into distinct categories if there was a minimum of two studies for each category. Singular studies were grouped in an 'other' category. Interventions that largely contained techniques or components stemming from a specific therapy (for example, cognitive behavioural therapy) were allocated under the description of that therapeutic approach. Interventions that specifically focused on testing a specific method (for example, goal setting or expressive writing) were classified as interventions based on that type of method. A specific group called 'multi-theoretical interventions' was created for interventions that deliberately combined therapeutic elements or did not provide sufficient information to distinguish between categories.

Interventions were analysed and presented per population group (non-clinical, mentally ill and physically ill). This analysis per intervention was done to justify the considerable differences between intervention implementation for general versus clinical populations and the differences between the psychological interventions.

As it was unlikely that the studies were functionally equivalent (for example, due to differences in exact formats used), the overall effect size was calculated using random effect models⁷⁹. Where multiple intervention or control groups existed within a single study, which would fall within one category of study types as laid out in Table 1, a combined weighted mean effect size was calculated^{80,81}.

Quality of effect size estimate and included studies. The quality of evidence provided in each meta-analysis was assessed using the five GRADE considerations⁸². GRADE provides an estimate of the quality of combined meta-analyses, as opposed to individual studies. Each meta-analysis is graded for five considerations, with downgrades being made when one of the five considerations has not been adequately met. In brief, the considerations focus on general study limitations (for example, presence of confounders), consistency of effect (that is, heterogeneity in results), imprecision (for example, wide confidence intervals), indirectness (for example, very different populations tested) and publication bias. Based on the considerations, the evidence quality for each meta-analysis can range from very low to high. Forest plots were coloured to reflect the evidence quality showing red (very low quality), orange (low quality), yellow (moderate quality) and green (high quality) colours. In addition to GRADE, the Cochrane risk of bias assessment⁸³ was used to determine the risk of bias for the included studies. The *I*² statistic and Cochran's *Q* were calculated to determine the heterogeneity of the results.

Methodological moderators or subgroup analyses. A central aim of the review was to examine the influence of various universal moderators on the effect size of interventions⁸². The first type of moderator was intervention-specific moderators. These included the type of intervention (Table 1) and were used as subgroups to

investigate their differential effect. Furthermore, the review examined the mode of delivery and intensity of the intervention. Delivery mode was split into individual, technology-based and group formats. Intensity was split into interventions lasting up to a week (low-intensity interventions), those lasting between a week and a month (moderate-intensity interventions), and those that lasted more than a month (high-intensity interventions), in line with previous review categorizations⁵⁰. The second type of moderator included study-specific moderators such as the impact of different control group types, assessment follow-up and study quality. Control groups were divided into assessment-only, waitlist-versus-passive or active-comparison groups. Length of follow-up looked at post-intervention (up to one month after the intervention), between 1 and 3 months, between 3 and 6 months, between 6 and 12 months and between 12 and 24 month after the intervention. Study quality was based on risk of bias, where studies scoring four or more low-risk-of-bias categories were deemed high quality. It considered population-specific moderators by splitting the results for the general population, those with a mental illness and those with a physical illness. Finally, it rated the overall quality of the evidence provided and aimed to discuss the implications of the evidence for future research and mental healthcare delivery in practice.

Reporting summary. Further information on research design is available in the Nature Research Reporting Summary linked to this article.

Data availability

The datasets that were used in this review are available from the corresponding author on reasonable request.

Received: 6 January 2020; Accepted: 5 March 2021;

Published online: 19 April 2021

References

- Rusk, R. D. & Waters, L. E. Tracing the size, reach, impact, and breadth of positive psychology. *J. Posit. Psychol.* **8**, 207–221 (2013).
- Diener, E. Subjective wellbeing. *Psychological Bull.* **95**, 542–575 (1984).
- Ryff, C. D. Happiness is everything, or is it? Explorations on the meaning of psychological wellbeing. *J. Pers. Soc. Psychol.* **57**, 1069–1081 (1989).
- Diener, E., Pressman, S. D., Hunter, J. & Delgado-García, D. If, why, and when subjective well-being influences health, and future needed research. *Appl. Psychol. Health Well Being* **9**, 133–167 (2017).
- Keyes, C. L. M., Dhingra, S. S. & Simoes, E. J. Change in level of positive mental health as a predictor of future risk of mental illness. *Am. J. Public Health* **100**, 2366–2371 (2010).
- Wood, A. M. & Joseph, S. The absence of positive psychological (eudemonic) wellbeing as a risk factor for depression: a ten year cohort study. *J. Affect. Disord.* **122**, 213–217 (2010).
- Iasello, M., van Agteren, J., Keyes, C. L. M. & Cochrane, E. M. Positive mental health as a predictor of recovery from mental illness. *J. Affect. Disord.* **251**, 227–230 (2019).
- Schotanus-Dijkstra, M., Keyes, C. L. M., de Graaf, R. & ten Have, M. Recovery from mood and anxiety disorders: The influence of positive mental health. *J. Affect. Disord.* **252**, 107–113 (2019).
- Sin, N. L. The protective role of positive wellbeing in cardiovascular disease: review of current evidence, mechanisms, and clinical implications. *Curr. Cardiol. Rep.* **18**, 106 (2016).
- Iasello, M., van Agteren, J. & Muir-Cochrane, E. Mental health and/or mental illness: a scoping review of the evidence and implications of the dual-continua model of mental health. *Evid. Base* **2020**, 1–45 (2020).
- Keyes, C. L. M. Promoting and protecting mental health as flourishing: a complementary strategy for improving national mental health. *Am. Psychol.* **62**, 95–108 (2007).
- Keyes, C. L. M. Mental illness and/or mental health? Investigating axioms of the complete state model of health. *J. Consult. Clin. Psychol.* **73**, 539–548 (2005).
- Slade, M. Mental illness and wellbeing: the central importance of positive psychology and recovery approaches. *BMC Health Serv. Res.* **10**, 26 (2010).
- Hodges, L. J. et al. What is a psychological intervention? A metareview and practical proposal. *Psycho-Oncol.* **20**, 470–478 (2011).
- Seligman, M. E. P. & Csikszentmihalyi, M. in *Flow and the Foundations of Positive Psychology* 279–298 (Springer, 2014).
- Wood, A. M. & Tarrier, N. Positive clinical psychology: a new vision and strategy for integrated research and practice. *Clin. Psychol. Rev.* **30**, 819–829 (2010).
- Sin, N. L. & Lyubomirsky, S. Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis. *J. Clin. Psychol.* **65**, 467–487 (2009).
- Weiss, L. A., Westerhof, G. J. & Bohlmeijer, E. T. Can we increase psychological wellbeing? The effects of interventions on psychological wellbeing: A meta-analysis of randomized controlled trials. *PLoS ONE* **11**, e0158092 (2016).
- Chakhssi, F., Kraiss, J. T., Sommers-Spijkerman, M. & Bohlmeijer, E. T. The effect of positive psychology interventions on wellbeing and distress in clinical samples with psychiatric or somatic disorders: a systematic review and meta-analysis. *BMC Psychiatry* **18**, 211 (2018).
- Bolier, L. et al. Positive psychology interventions: a meta-analysis of randomized controlled studies. *BMC Public Health* **13**, 119 (2013).
- White, C. A., Uttl, B. & Holder, M. D. Meta-analyses of positive psychology interventions: the effects are much smaller than previously reported. *PLoS ONE* **14**, e0216588 (2019).
- Gu, J., Strauss, C., Bond, R. & Cavanagh, K. How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clin. Psychol. Rev.* **37**, 1–12 (2015).
- Diener, E. D., Emmons, R. A., Larsen, R. J. & Griffin, S. The satisfaction with life scale. *J. Pers. Assess.* **49**, 71–75 (1985).
- Watson, D., Clark, L. A. & Tellegen, A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J. Pers. Soc. Psychol.* **54**, 1063–1070 (1988).
- Schueller, S., Kashdan, T. & Parks, A. Synthesizing positive psychological interventions: Suggestions for conducting and interpreting meta-analyses. *Int. J. Wellbeing* **4**, 91–98 (2014).
- Schirrmacher, V. From chemotherapy to biological therapy: a review of novel concepts to reduce the side effects of systemic cancer treatment. *Int. J. Oncol.* **54**, 407–419 (2019).
- Lamers, S. M. A., Bolier, L., Westerhof, G. J., Smit, F. & Bohlmeijer, E. T. The impact of emotional wellbeing on long-term recovery and survival in physical illness: a meta-analysis. *J. Behav. Med.* **35**, 538–547 (2012).
- Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T. & Fang, A. The efficacy of cognitive behavioral therapy: a review of meta-analyses. *Cogn. Ther. Res.* **36**, 427–440 (2012).
- Brown, M., Glendenning, A. C., Hoon, A. E. & John, A. Effectiveness of web-delivered acceptance and commitment therapy in relation to mental health and wellbeing: a systematic review and meta-analysis. *J. Med. Internet Res.* **18**, e221 (2016).
- Dodge, R., Daly, A. P., Huyton, J. & Sanders, L. D. The challenge of defining wellbeing. *Int. J. Wellbeing* **2**, 222–235 (2012).
- Hone, L. C., Jarden, A., Schofield, G. M. & Duncan, S. Measuring flourishing: the impact of operational definitions on the prevalence of high levels of wellbeing. *Int. J. Wellbeing* **4**, 62–90 (2014).
- Higgins, J. P. T. et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ* **343**, d5928 (2011).
- Guyatt, G. H. et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* **336**, 924–926 (2008).
- Patel, V. et al. The Lancet Commission on global mental health and sustainable development. *Lancet* **392**, 1553–1598 (2018).
- Slade, M. *Personal Recovery and Mental Illness: A Guide for Mental Health Professionals* (Cambridge Univ. Press, 2009).
- Crowe, J. Reform, revolution and disruption in mental health care: a consumer's perspective. *Public Health Res. Pract.* **27**, 2721711 (2017).
- Mokdad, A. H. et al. The state of US health, 1990–2016: burden of diseases, injuries, and risk factors among US states. *JAMA* **319**, 1444–1472 (2018).
- McGorry, P. Prevention, innovation and implementation science in mental health: the next wave of reform. *Br. J. Psychiatry* **202**, s3–s4 (2013).
- Dixon, L. B., Holoshitz, Y. & Nossel, I. Treatment engagement of individuals experiencing mental illness: review and update. *World Psychiatry* **15**, 13–20 (2016).
- Hendriks, T. et al. The efficacy of positive psychological interventions from non-western countries: a systematic review and meta-analysis. *Int. J. Wellbeing* **8**, 711 (2018).
- Hendriks, T., Schotanus-Dijkstra, M., Hassankhan, A., De Jong, J. & Bohlmeijer, E. The efficacy of multi-component positive psychology interventions: a systematic review and meta-analysis of randomized controlled trials. *J. Happiness Stud.* **21**, 357–390 (2020).
- Seligman, M. E. P., Steen, T. A., Park, N. & Peterson, C. Positive psychology progress: empirical validation of interventions. *Am. Psychol.* **60**, 410–421 (2005).
- Lyubomirsky, S. & Layous, K. How do simple positive activities increase wellbeing? *Curr. Dir. Psychol. Sci.* **22**, 57–62 (2013).
- Creswell, J. D. Mindfulness interventions. *Annu. Rev. Psychol.* **68**, 491–516 (2017).
- Padesky, C. A. & Mooney, K. A. Strengths-based cognitive-behavioural therapy: a four-step model to build resilience. *Clin. Psychol. Psychother.* **19**, 283–290 (2012).
- David, D., Cristea, I. & Hofmann, S. G. Why cognitive behavioral therapy is the current gold standard of psychotherapy. *Front. Psychiatry* **9**, 4 (2018).
- Stulz, N., Lutz, W., Kopta, S. M., Minami, T. & Saunders, S. M. Dose–effect relationship in routine outpatient psychotherapy: does treatment duration matter?. *J. Couns. Psychol.* **60**, 593–600 (2013).

48. Craig, P. et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* **337**, a1655 (2008).
49. Driessen, E., Cuijpers, P., Hollon, S. D. & Dekker, J. J. M. Does pretreatment severity moderate the efficacy of psychological treatment of adult outpatient depression? A meta-analysis. *J. Consult. Clin. Psychol.* **78**, 668–680 (2010).
50. Trompetter, H., Lamers, S., Westerhof, G., Fledderus, M. & Bohlmeijer, E. Both positive mental health and psychopathology should be monitored in psychotherapy: confirmation for the dual-factor model in acceptance and commitment therapy. *Behav. Res. Ther.* **91**, 58–63 (2017).
51. Van Agteren, J. & Iasiello, M. Advancing our understanding of mental wellbeing and mental health: the call to embrace complexity over simplification. *Aust. Psychologist* **55**, 307–316 (2020).
52. Leamy, M., Bird, V., Le Boutillier, C., Williams, J. & Slade, M. Conceptual framework for personal recovery in mental health: systematic review and narrative synthesis. *Br. J. Psychiatry* **199**, 445–452 (2011).
53. Hendriks, T. et al. How WEIRD are positive psychology interventions? A bibliometric analysis of randomized controlled trials on the science of wellbeing. *J. Posit. Psychol.* **14**, 489–501 (2019).
54. Chowdhary, N. et al. The methods and outcomes of cultural adaptations of psychological treatments for depressive disorders: a systematic review. *Psychol. Med.* **44**, 1131–1146 (2014).
55. Ng, M. Y. & Weisz, J. R. Annual research review: building a science of personalized intervention for youth mental health. *J. Child Psychol. Psychiatry* **57**, 216–236 (2016).
56. Wellenzohn, S., Proyer, R. T. & Ruch, W. How do positive psychology interventions work? A short-term placebo-controlled humor-based study on the role of the time focus. *Pers. Individ. Differ.* **96**, 1–6 (2016).
57. Rash, J. A., Matsuba, M. K. & Prkachin, K. M. Gratitude and well-being: who benefits the most from a gratitude intervention? *Appl. Psychol. Health Well-Being* **3**, 350–369 (2011).
58. Parks, A. C. A case for the advancement of the design and study of online positive psychological interventions. *J. Posit. Psychol.* **9**, 502–508 (2014).
59. Grant, S. P., Mayo-Wilson, E., Melendez-Torres, G. J. & Montgomery, P. Reporting quality of social and psychological intervention trials: a systematic review of reporting guidelines and trial publications. *PLoS ONE* **8**, e65442 (2013).
60. La Placa, V., McNaught, A. & Knight, A. Discourse on wellbeing in research and practice. *Int. J. Wellbeing* **3**, 116–125 (2013).
61. Cunningham, J. A., Kypri, K. & McCambridge, J. Exploratory randomized controlled trial evaluating the impact of a waiting list control design. *BMC Med. Res. Methodol.* **13**, 150 (2013).
62. Vigo, D., Thornicroft, G. & Atun, R. Estimating the true global burden of mental illness. *Lancet Psychiatry* **3**, 171–178 (2016).
63. Slade, M., Oades, L. & Jarden, A. *Wellbeing, Recovery and Mental Health* (Cambridge Univ. Press, 2017).
64. Grant, F., Guille, C. & Sen, S. Wellbeing and the risk of depression under stress. *PLoS ONE* **8**, e67395 (2013).
65. Maxwell, S. E., Lau, M. Y. & Howard, G. S. Is psychology suffering from a replication crisis? What does 'failure to replicate' really mean? *Am. Psychologist* **70**, 487 (2015).
66. Proyer, R. T., Wellenzohn, S., Gander, F. & Ruch, W. Toward a better understanding of what makes positive psychology interventions work: predicting happiness and depression from the person × intervention fit in a follow-up after 3.5 years. *Appl. Psychol. Health Well-Being* **7**, 108–128 (2015).
67. Welton, N. J., Caldwell, D. M., Adamopoulos, E. & Vedhara, K. Mixed treatment comparison meta-analysis of complex interventions: psychological interventions in coronary heart disease. *Am. J. Epidemiol.* **169**, 1158–1165 (2009).
68. Kok, G. et al. A taxonomy of behaviour change methods: an intervention mapping approach. *Health Psychol. Rev.* **10**, 297–312 (2016).
69. Michie, S. et al. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Ann. Behav. Med.* **46**, 81–95 (2013).
70. Michie, S., West, R., Sheals, K. & Godinho, C. A. Evaluating the effectiveness of behavior change techniques in health-related behavior: a scoping review of methods used. *Transl. Behav. Med.* **8**, 212–224 (2018).
71. Peters, G.-J. Y., De Bruin, M. & Crutzen, R. Everything should be as simple as possible, but no simpler: towards a protocol for accumulating evidence regarding the active content of health behaviour change interventions. *Health Psychol. Rev.* **9**, 1–14 (2015).
72. McHugh, M. L. Interrater reliability: the kappa statistic. *Biochemia Med.* **22**, 276–282 (2012).
73. Hedges, L. V. Distribution theory for Glass's estimator of effect size and related estimators. *J. Educ. Stat.* **6**, 107–128 (1981).
74. Borenstein, M., Hedges, L., Higgins, J. & Rothstein, H. *Comprehensive Meta-Analysis Version 3*. <https://www.meta-analysis.com/> (Biostat, 2013).
75. Borenstein, M., Hedges, L. V., Higgins, J. P. T. & Rothstein, H. R. *Introduction to Meta-Analysis* (Wiley, 2011).
76. Polanin, J. R. & Pigott, T. D. The use of meta-analytic statistical significance testing. *Res. Synth. Methods* **6**, 63–73 (2015).
77. Valentine, J. C., Pigott, T. D. & Rothstein, H. R. How many studies do you need? A primer on statistical power for meta-analysis. *J. Educ. Behav. Stat.* **35**, 215–247 (2010).
78. Disabato, D. J., Goodman, F. R., Kashdan, T. B., Short, J. L. & Jarden, A. Different types of wellbeing? A cross-cultural examination of hedonic and eudaimonic wellbeing. *Psychol. Assess.* **28**, 471 (2016).
79. Borenstein, M., Hedges, L. V., Higgins, J. P. T. & Rothstein, H. R. A basic introduction to fixed-effect and random-effects models for meta-analysis. *Res. Synth. Methods* **1**, 97–111 (2010).
80. Higgins, J. P. T. & Green, S., eds. *Cochrane Handbook for Systematic Reviews of Interventions* (Wiley, 2008).
81. Scammacca, N., Roberts, G. & Stuebing, K. K. Meta-analysis with complex research designs: dealing with dependence from multiple measures and multiple group comparisons. *Rev. Educ. Res.* **84**, 328–364 (2014).
82. Tanniou, J., Van Der Tweel, I., Teerenstra, S. & Roes, K. C. B. Subgroup analyses in confirmatory clinical trials: time to be specific about their purposes. *BMC Med. Res. Methodol.* **16**, 20 (2016).
83. Ataie Moghanloo, V., Ataie Moghanloo, R. & Moazezi, M. Effectiveness of acceptance and commitment therapy for depression, psychological wellbeing and feeling of guilt in 7–15 years old diabetic children. *Iran. J. Pediatr.* **25**, e2436 (2015).
84. Azkosh, M., Farhoudian, A., Saadati, H., Shoaee, F. & Lashani, L. Comparing acceptance and commitment group therapy and 12-steps narcotics anonymous in addict's rehabilitation process: a randomized controlled trial. *Iran. J. Psychiatry* **11**, 244–249 (2016).
85. Fledderus, M., Bohlmeijer, E. T., Smit, F. & Westerhof, G. J. Mental health promotion as a new goal in public mental health care: a randomized controlled trial of an intervention enhancing psychological flexibility. *Am. J. Public Health* **100**, 2372–2378 (2010).
86. Fledderus, M., Bohlmeijer, E. T., Pieterse, M. E. & Schreurs, K. M. G. Acceptance and commitment therapy as guided self-help for psychological distress and positive mental health: a randomized controlled trial. *Psychol. Med.* **42**, 485–495 (2012).
87. Gregoire, S., Lachance, L., Bouffard, T. & Dionne, F. The use of acceptance and commitment therapy to promote mental health and school engagement in university students: a multisite randomized controlled trial. *Behav. Ther.* **49**, 360–372 (2018).
88. Rasanen, P., Lappalainen, P., Muotka, J., Tolvanen, A. & Lappalainen, R. An online guided ACT intervention for enhancing the psychological wellbeing of university students: a randomized controlled clinical trial. *Behav. Res. Ther.* **78**, 30–42 (2016).
89. Krafft, J., Potts, S., Schoendorff, B. & Levin, M. E. A Randomized controlled trial of multiple versions of an acceptance and commitment therapy matrix app for wellbeing. *Behav. Modif.* **43**, 246–272 (2019).
90. Mani, A. et al. The effectiveness of group acceptance and commitment psychotherapy on psychological wellbeing of breast cancer patients in Shiraz, Iran. *Middle East J. Cancer* **10**, 231–238 (2019).
91. Juul, L., Pallesen, K. J., Bjerggaard, M., Nielsen, C. & Fjorback, L. O. A pilot randomised trial comparing a mindfulness-based stress reduction course, a locally-developed stress reduction intervention and a waiting list control group in a real-life municipal health care setting. *BMC Public Health* **20**, 409 (2020).
92. McConachie, D. A. J., McKenzie, K., Morris, P. G. & Walley, R. M. Acceptance and mindfulness-based stress management for support staff caring for individuals with intellectual disabilities. *Res. Dev. Disabil.* **35**, 1216–1227 (2014).
93. Puolakanaho, A., Tolvanen, A., Kinnunen, S. M. & Lappalainen, R. A psychological flexibility-based intervention for burnout: a randomized controlled trial. *J. Contextual Behav. Sci.* **15**, 52–67 (2020).
94. Tol, W. A. et al. Guided self-help to reduce psychological distress in South Sudanese female refugees in Uganda: a cluster randomised trial. *Lancet Glob. Health* **8**, e254–e263 (2020).
95. Trompetter, H. R., Bohlmeijer, E. T., Lamers, S. & Schreurs, K. M. Positive psychological wellbeing is required for online self-help acceptance and commitment therapy for chronic pain to be effective. *Front. Psychol.* **7**, 353 (2014).
96. Viskovich, S. & Pakenham, K. I. Randomized controlled trial of a web-based acceptance and commitment therapy (ACT) program to promote mental health in university students. *J. Clin. Psychol.* **76**, 929–951 (2020).
97. Wicksell, R. K., Ahlqvist, J., Bring, A., Melin, L. & Olsson, G. L. Can exposure and acceptance strategies improve functioning and life satisfaction in people with chronic pain and whiplash-associated disorders (WAD)? A randomized controlled trial. *Cogn. Behav. Ther.* **37**, 169–182 (2008).

98. Hofer, P. D. et al. Self-help for stress and burnout without therapist contact: an online randomised controlled trial. *Work Stress* **32**, 189–208 (2018).
99. Johnston, M., Foster, M., Shennan, J., Starkey, N. J. & Johnson, A. The effectiveness of an acceptance and commitment therapy self-help intervention for chronic pain. *Clin. J. Pain.* **26**, 393–402 (2010).
100. Majumdar, S. & Morris, R. Brief group-based acceptance and commitment therapy for stroke survivors. *Br. J. Clin. Psychol.* **58**, 70–90 (2019).
101. Sewart, A. R. et al. Examining positive and negative affect as outcomes and moderators of cognitive-behavioral therapy and acceptance and commitment therapy for social anxiety disorder. *Behav. Ther.* **50**, 1112–1124 (2019).
102. Jazaieri, H. et al. A randomized controlled trial of compassion cultivation training: Effects on mindfulness, affect, and emotion regulation. *Motiv. Emot.* **38**, 23–35 (2014).
103. Mongrain, M., Chin, J. M. & Shapira, L. B. Practicing compassion increases happiness and self-esteem. *J. Happiness Stud.* **12**, 963–981 (2011).
104. Shapira, L. B. & Mongrain, M. The benefits of self-compassion and optimism exercises for individuals vulnerable to depression. *J. Posit. Psychol.* **5**, 377–389 (2010).
105. Smeets, E., Neff, K., Alberts, H. & Peters, M. Meeting suffering with kindness: effects of a brief self-compassion intervention for female college students. *J. Clin. Psychol.* **70**, 794–807 (2014).
106. Neff, K. D. & Germer, C. K. A pilot study and randomized controlled trial of the mindful self-compassion program. *J. Clin. Psychol.* **69**, 28–44 (2013).
107. Krieger, T. et al. An internet-based compassion-focused intervention for increased self-criticism: a randomized controlled trial. *Behav. Ther.* **50**, 430–445 (2019).
108. Ziemer, K. S., Lamphere, B. R., Raque-Bogdan, T. L. & Schmidt, C. K. A randomized controlled study of writing interventions on college women's positive body image. *Mindfulness* **10**, 66–77 (2019).
109. Alireza Afshani, S., Abooei, A. & Mohamad Abdoli, A. Self-compassion training and psychological wellbeing of infertile female. *Int. J. Repr. Biomedicine* **17**, 757–762 (2019).
110. Gammer, I., Hartley-Jones, C. & Jones, F. W. A randomized controlled trial of an online, compassion-based intervention for maternal psychological wellbeing in the first year postpartum. *Mindfulness* **11**, 928–939 (2020).
111. Sommers-Spijkerman, M., Trompetter, H., Schreurs, K. & Bohlmeijer, E. Compassion-focused therapy as guided self-help for enhancing public mental health: a randomized controlled trial. *J. Consult. Clin. Psychol.* **86**, 101–115 (2018).
112. Wong, C. C. & Mak, W. W. Writing can heal: effects of self-compassion writing among Hong Kong Chinese college students. *Asian Am. J. Psychol.* **7**, 74–82 (2016).
113. Barnes, C. & Mongrain, M. A three-factor model of personality predicts changes in depression and subjective wellbeing following positive psychology interventions. *J. Posit. Psychol.* **15**, 556–568 (2020).
114. Abbott, J.-A., Klein, B., Hamilton, C. & Rosenthal, A. The impact of online resilience training for sales managers on wellbeing and performance. *E-J. Appl. Psychol.* **5**, 89–95 (2009).
115. Beukes, E. W., Baguley, D. M., Allen, P. M., Manchaiah, V. & Andersson, G. Audiologist-guided internet-based cognitive behavior therapy for adults with tinnitus in the United Kingdom: a randomized controlled trial. *Ear Hearing* **39**, 423–433 (2018).
116. Green, L., Oades, L. & Grant, A. Cognitive-behavioral, solution-focused life coaching: enhancing goal striving, wellbeing, and hope. *J. Posit. Psychol.* **1**, 142–149 (2006).
117. Arango-Lasprilla, J. C. et al. Evaluation of a group cognitive-behavioral dementia caregiver intervention in Latin America. *Am. J. Alzheimers Dis. Other Dement.* **29**, 548–555 (2014).
118. Rose, K., Hawes, D. J. & Hunt, C. J. Randomized controlled trial of a friendship skills intervention on adolescent depressive symptoms. *J. Consult. Clin. Psychol.* **82**, 510–520 (2014).
119. Chambers, S. K., Ferguson, M., Gardiner, R. A., Aitken, J. & Occhipinti, S. Intervening to improve psychological outcomes for men with prostate cancer. *Psychooncology* **22**, 1025–1034 (2013).
120. Cho, H., Ryu, S., Noh, J. & Lee, J. The effectiveness of daily mindful breathing practices on test anxiety of students. *PLoS ONE* **11**, e0164822 (2016).
121. Diab, M., Peltonen, K., Qouta, S. R., Palosaari, E. & Punamaki, R.-L. Effectiveness of psychosocial intervention enhancing resilience among war-affected children and the moderating role of family factors. *Child Abuse Negl.* **40**, 24–35 (2015).
122. Eimontas, J. et al. The role of therapist support on effectiveness of an internet-based modular self-help intervention for adjustment disorder: a randomized controlled trial. *Anxiety Stress Coping* **31**, 146–158 (2018).
123. Garland, E. L., Roberts-Lewis, A., Tronnier, C. D., Graves, R. & Kelley, K. Mindfulness-oriented recovery enhancement versus CBT for co-occurring substance dependence, traumatic stress, and psychiatric disorders: proximal outcomes from a pragmatic randomized trial. *Behav. Res. Ther.* **77**, 7–16 (2016).
124. Hoifodt, R. S. et al. The clinical effectiveness of web-based cognitive behavioral therapy with face-to-face therapist support for depressed primary care patients: randomized controlled trial. *J. Med. Internet Res.* **15**, e153 (2013).
125. Hyer, L., Yeager, C. A., Hilton, N. & Sacks, A. Group, individual, and staff therapy: an efficient and effective cognitive behavioral therapy in long-term care. *Am. J. Alzheimers Dis. Other Dement.* **23**, 528–539 (2008).
126. Lumley, M. A. et al. Emotional awareness and expression therapy, cognitive behavioral therapy, and education for fibromyalgia: a cluster-randomized controlled trial. *Pain* **158**, 2354–2363 (2017).
127. Oei, T. P. S., Raylu, N. & Lai, W. W. Effectiveness of a self help cognitive behavioural treatment program for problem gamblers: a randomised controlled trial. *J. Gamb. Stud.* **34**, 581–595 (2018).
128. Rezvan, S., Baghban, L., Bahrami, F. & Abedi, M. A comparison of cognitive-behavior therapy with interpersonal and cognitive behavior therapy in the treatment of generalized anxiety disorder. *Counselling Psychol. Q.* **21**, 309–321 (2008).
129. Ruppert, J. C. & Eiroa-Orosa, F. J. Positive visual reframing: A randomised controlled trial using drawn visual imagery to defuse the intensity of negative experiences and regulate emotions in healthy adults. *An. de Psiol.* **34**, 368–377 (2018).
130. Strachowski, D. et al. The effects of cognitive behavior therapy on depression in older patients with cardiovascular risk. *Depress. Anxiety* **25**, E1–E10 (2008).
131. Tak, Y. R., Kleinjan, M., Lichtwarck-Aschoff, A. & Engels, R. C. M. E. Secondary outcomes of a school-based universal resiliency training for adolescents: a cluster randomized controlled trial. *BMC Public Health* **14**, 1171 (2014).
132. Walker, J. V. III & Lampropoulos, G. K. A comparison of self-help (homework) activities for mood enhancement: results from a brief randomized controlled trial. *J. Psychother. Integr.* **24**, 46–64 (2014).
133. Zautra, A. J. et al. Comparison of cognitive behavioral and mindfulness meditation interventions on adaptation to rheumatoid arthritis for patients with and without history of recurrent depression. *J. Consult. Clin. Psychol.* **76**, 408–421 (2008).
134. Zhang, B. et al. Effect of group cognitive-behavioral therapy on the quality of life and social functioning of patients with mild depression. *Shanghai Arch. Psychiatry* **28**, 18–27 (2016).
135. Garland, E. L., Hanley, A. W., Goldin, P. R. & Gross, J. J. Testing the mindfulness-to-meaning theory: evidence for mindful positive emotion regulation from a reanalysis of longitudinal data. *PLoS ONE* **12**, e0187727 (2017).
136. Spence, G. B. & Grant, A. M. Professional and peer life coaching and the enhancement of goal striving and wellbeing: an exploratory study. *J. Posit. Psychol.* **2**, 185–194 (2007).
137. Smith, G. C., Strieder, F., Greenberg, P., Hayslip, B. Jr. & Montoro-Rodriguez, J. Patterns of enrollment and engagement of custodial grandmothers in a randomized clinical trial of psychoeducational interventions. *Fam. Relat.* **65**, 369–386 (2016).
138. Brodbeck, J., Berger, T., Biesold, N., Rockstroh, F. & Znoj, H. J. Evaluation of a guided internet-based self-help intervention for older adults after spousal bereavement or separation/divorce: a randomised controlled trial. *J. Affect. Disord.* **252**, 440–449 (2019).
139. Wilner Tirpak, J. et al. Changes in positive affect in cognitive-behavioral treatment of anxiety disorders. *Gen. Hosp. Psychiatry* **61**, 111–115 (2019).
140. García-Escalera, J., Valiente, R. M., Sandín, B., Ehrenreich-May, J. & Chorot, P. Educational and wellbeing outcomes of an anxiety and depression prevention program for adolescents. *Rev. de Psicodidáctica* <https://doi.org/10.1016/j.psicod.2020.05.001> (2020).
141. Knapstad, M., Lervik, L. V., Saether, S. M. M., Aaro, L. E. & Smith, O. R. F. Effectiveness of prompt mental health care, the norwegian version of improving access to psychological therapies: a randomized controlled trial. *Psychother. Psychosom.* **89**, 90–105 (2020).
142. Loucas, C. E., Sclare, I., Stahl, D. & Michelson, D. Feasibility randomized controlled trial of a one-day CBT workshop ('DISCOVER') for 15- to 18-year-olds with anxiety and/or depression in clinic settings. *Behav. Cogn. Psychother.* **48**, 142–159 (2020).
143. Punamäki, R.-L., Peltonen, K., Diab, M. & Qouta, S. R. Psychosocial interventions and emotion regulation among war-affected children: randomized control trial effects. *Traumatology* **20**, 241 (2014).
144. Lichter, S., Haye, K. & Kammann, R. Increasing happiness through cognitive retraining. *NZ J. Psychol.* **9**, 57–64 (1980).
145. Peters, M. L. et al. Happy despite pain: a randomized controlled trial of an 8-week internet-delivered positive psychology intervention for enhancing wellbeing in patients with chronic pain. *Clin. J. Pain.* **33**, 962–975 (2017).
146. Tovote, K. A. et al. Individual mindfulness-based cognitive therapy and cognitive behavior therapy for treating depressive symptoms in patients with diabetes: results of a randomized controlled trial. *Diabetes Care* **37**, 2427–2434 (2014).

147. Casey, L. M. et al. Internet-based delivery of cognitive behaviour therapy compared to monitoring, feedback and support for problem gambling: a randomised controlled trial. *J. Gambl. Stud.* **33**, 993–1010 (2017).
148. Freeman, D. et al. An early Phase II randomised controlled trial testing the effect on persecutory delusions of using CBT to reduce negative cognitions about the self: the potential benefits of enhancing self confidence. *Schizophrenia Res.* **160**, 186–192 (2014).
149. Graziano, F., Calandri, E., Borghi, M. & Bonino, S. The effects of a group-based cognitive behavioral therapy on people with multiple sclerosis: a randomized controlled trial. *Clin. Rehabil.* **28**, 264–274 (2014).
150. Hazell, C. M., Hayward, M., Cavanagh, K., Jones, A.-M. & Strauss, C. Guided self-help cognitive-behaviour Intervention for VoicEs (GiVE): Results from a pilot randomised controlled trial in a transdiagnostic sample. *Schizophrenia Res.* **195**, 441–447 (2018).
151. Hermanns, N. et al. The effect of a diabetes-specific cognitive behavioral treatment program (dianos) for patients with diabetes and subclinical depression: results of a randomized controlled trial. *Diabetes Care* **38**, 551–560 (2015).
152. Jensen, S. E. et al. Cognitive-behavioral stress management and psychological well-being in HIV+ racial/ethnic minority women with human papillomavirus. *Health Psychol.* **32**, 227–230 (2013).
153. Lokman, S. et al. Complaint-directed mini-interventions for depressive complaints: a randomized controlled trial of unguided web-based self-help interventions. *J. Med. Internet Res.* **19**, e4 (2017).
154. Lu, Q. & Stanton, A. L. How benefits of expressive writing vary as a function of writing instructions, ethnicity and ambivalence over emotional expression. *Psychol. Health* **25**, 669–684 (2010).
155. Nahlen Bose, C. et al. Evaluation of a coping effectiveness training intervention in patients with chronic heart failure - a randomized controlled trial. *Eur. J. Cardiovascular Nurs.* **15**, 537–548 (2016).
156. Parks, A. C. & Szanto, R. K. Assessing the efficacy and effectiveness of a positive psychology-based self-help book. *Posit. Psychol.* **31**, 141–149 (2013).
157. Powell, J. et al. Effectiveness of a web-based cognitive-behavioral tool to improve mental wellbeing in the general population: randomized controlled trial. *J. Med. Internet Res.* **15**, 3–19 (2013).
158. Seligman, M. E. P., Schulman, P. & Tryon, A. M. Group prevention of depression and anxiety symptoms. *Behav. Res. Ther.* **45**, 1111–1126 (2007).
159. Terides, M. D. et al. Increased skills usage statistically mediates symptom reduction in self-guided internet-delivered cognitive-behavioural therapy for depression and anxiety: a randomised controlled trial. *Cogn. Behav. Ther.* **47**, 43–61 (2018).
160. Nwobi, U. A. et al. A stress management intervention for adults living with HIV in Nigerian community settings: an effects study. *Medicine* **97**, e12801 (2018).
161. Eimontas, J., Rimsaite, Z., Gegieckaite, G., Zelviene, P. & Kazlauskas, E. Internet-based self-help intervention for ICD-11 adjustment disorder: preliminary findings. *Psychiatr. Q.* **89**, 451–460 (2018).
162. Peters, E. et al. A randomised controlled trial of cognitive behaviour therapy for psychosis in a routine clinical service. *Acta Psychiatr. Scandinavica* **122**, 302–318 (2010).
163. Barclay, L. J. & Skarlicki, D. P. Healing the wounds of organizational injustice: examining the benefits of expressive writing. *J. Appl. Psychol.* **94**, 511–523 (2009).
164. Tavakoli, S., Lumley, M. A., Hijazi, A. M., Slavin-Spenny, O. M. & Parris, G. P. Effects of assertiveness training and expressive writing on acculturative stress in international students: a randomized trial. *J. Couns. Psychol.* **56**, 590–596 (2009).
165. Troop, N. A., Chilcot, J., Hutchings, L. & Varnaite, G. Expressive writing, self-criticism, and self-reassurance. *Psychol. Psychother.* **86**, 374–386 (2013).
166. Wing, J. F., Schutte, N. S. & Byrne, B. The effect of positive writing on emotional intelligence and life satisfaction. *J. Clin. Psychol.* **62**, 1291–1302 (2006).
167. Francis, M. E. & Pennebaker, J. W. Putting stress into words: the impact of writing on physiological, absentee, and self-reported emotional wellbeing measures. *Am. J. Health Promot.* **6**, 280–287 (1992).
168. Koenig Kellas, J., Horstman, H. K., Willer, E. K. & Carr, K. The benefits and risks of telling and listening to stories of difficulty over time: experimentally testing the expressive writing paradigm in the context of interpersonal communication between friends. *Health Commun.* **30**, 843–858 (2015).
169. Lamers, S. M. A., Bohlmeijer, E. T., Korte, J. & Westerhof, G. J. The efficacy of life-review as online-guided self-help for adults: a randomized trial. *J. Gerontol. B* **70**, 24–34 (2015).
170. Baker, F. A. et al. A therapeutic songwriting intervention to promote reconstruction of self-concept and enhance wellbeing following brain or spinal cord injury: pilot randomized controlled trial. *Clin. Rehabil.* **33**, 1045–1055 (2019).
171. Miao, M. & Gan, Y. How does meaning in life predict proactive coping? The self-regulatory mechanism on emotion and cognition. *J. Pers.* **87**, 579–592 (2019).
172. Lyubomirsky, S., Sousa, L. & Dickerhoof, R. The costs and benefits of writing, talking, and thinking about life's triumphs and defeats. *J. Pers. Soc. Psychol.* **90**, 692 (2006).
173. Rubin, M., Hawkins, B., Cobb, A. & Telch, M. J. Emotional reactivity to grief-related expressive writing. *Death Stud.* **44**, 552–560 (2020).
174. Fernandez, I. & Paez, D. The benefits of expressive writing after the Madrid terrorist attack: implications for emotional activation and positive affect. *Br. J. Health Psychol.* **13**, 31–34 (2008).
175. Rivkin, I. D. & Taylor, S. E. The effects of mental simulation on coping with controllable stressful events. *Pers. Soc. Psychol. Bull.* **25**, 1451–1462 (1999).
176. Bhayee, S. et al. Attentional and affective consequences of technology supported mindfulness training: a randomised, active control, efficacy trial. *BMC Psychol.* **4**, 60 (2016).
177. Bower, J. E. et al. Mindfulness meditation for younger breast cancer survivors: a randomized controlled trial. *Cancer* **121**, 1231–1240 (2015).
178. Cole, B. S. et al. A randomised clinical trial of the effects of spiritually focused meditation for people with metastatic melanoma. *Ment. Health Relig. Cult.* **15**, 161–174 (2012).
179. Dvořáková, K. et al. Promoting healthy transition to college through mindfulness training with first-year college students: pilot randomized controlled trial. *J. Am. Coll. Health* **65**, 259–267 (2017).
180. Galante, J. et al. A mindfulness-based intervention to increase resilience to stress in university students (the Mindful Student Study): a pragmatic randomised controlled trial. *Lancet Public Health* **3**, e72–e81 (2018).
181. Gambrel, L. E. & Piercy, F. P. Mindfulness-based relationship education for couples expecting their first child—part 1: a randomized mixed-methods program evaluation. *J. Marital Fam. Ther.* **41**, 5–24 (2015).
182. Glück, T. M. & Maercker, A. A randomized controlled pilot study of a brief web-based mindfulness training. *BMC Psychiatry* **11**, 175 (2011).
183. Howells, A., Ivtzan, I. & Eiroa-Orosa, F. J. Putting the 'app' in happiness: a randomised controlled trial of a smartphone-based mindfulness intervention to enhance wellbeing. *J. Happiness Stud.* **17**, 163–185 (2016).
184. Hwang, K., Kwon, A. & Hong, C. A preliminary study of new positive psychology interventions: neurofeedback-aided meditation therapy and modified positive psychotherapy. *Curr. Psychol.* **36**, 683–695 (2017).
185. Ivtzan, I. et al. Integrating mindfulness into positive psychology: a randomised controlled trial of an online positive mindfulness program. *Mindfulness* **7**, 1396–1407 (2016).
186. Johnson, C., Burke, C., Brinkman, S. & Wade, T. Effectiveness of a school-based mindfulness program for transdiagnostic prevention in young adolescents. *Behav. Res. Ther.* **81**, 1–11 (2016).
187. Mi Ra, Y., Misoon, S., Kyung-Hae, J., Yu, B. J. & Kyung Jae, L. The effects of mind subtraction meditation on breast cancer survivors' psychological and spiritual wellbeing and sleep quality: a randomized controlled trial in South Korea. *Cancer Nurs.* **40**, 377–385 (2017).
188. Mongrain, M., Komeylian, Z. & Barnhart, R. Happiness vs. mindfulness exercises for individuals vulnerable to depression. *J. Posit. Psychol.* **11**, 366–377 (2016).
189. Nakamura, S. et al. Effect of management training in organizational justice: a randomized controlled trial. *Ind. Health* **54**, 263–271 (2016).
190. Oken, B. S. et al. Meditation in stressed older adults: improvements in self-rated mental health not paralleled by improvements in cognitive function or physiological measures. *Mindfulness* **8**, 627–638 (2017).
191. Perez-Blasco, J., Sales, A., Meléndez, J. C. & Mayordomo, T. The effects of mindfulness and self-compassion on improving the capacity to adapt to stress situations in elderly people living in the community. *Clin. Gerontologist* **39**, 90–103 (2016).
192. Pinniger, R., Brown, R. F., Thorsteinsson, E. B. & McKinley, P. Argentine tango dance compared to mindfulness meditation and a waiting-list control: a randomised trial for treating depression. *Complement. Ther. Med.* **20**, 377–384 (2012).
193. Spek, A. A., van Ham, N. C. & Nyklicek, I. Mindfulness-based therapy in adults with an autism spectrum disorder: a randomized controlled trial. *Res. Dev. Disabil.* **34**, 246–253 (2013).
194. Vieten, C. & Astin, J. Effects of a mindfulness-based intervention during pregnancy on prenatal stress and mood: results of a pilot study. *Arch. Womens Ment. Health* **11**, 67–74 (2008).
195. Waelde, L. C., Meyer, H., Thompson, J. M., Thompson, L. & Gallagher-Thompson, D. Randomized controlled trial of inner resources meditation for family dementia caregivers. *J. Clin. Psychol.* **73**, 1629–1641 (2017).
196. Cousin, G. & Crane, C. Changes in disengagement coping mediate changes in affect following mindfulness-based cognitive therapy in a non-clinical sample. *Br. J. Psychol.* **107**, 434–447 (2016).
197. Dowd, H. et al. Comparison of an online mindfulness-based cognitive therapy intervention with online pain management psychoeducation: a randomized controlled study. *Clin. J. Pain.* **31**, 517–527 (2015).
198. Huffman, J. C. et al. Development of a positive psychology intervention for patients with acute cardiovascular disease. *Heart Int.* **6**, e14 (2011).

199. Johannsen, M. et al. Efficacy of mindfulness-based cognitive therapy on late post-treatment pain in women treated for primary breast cancer: a randomized controlled trial. *J. Clin. Oncol.* **34**, 3390–3399 (2016).
200. Lee, W. K. & Bang, H. J. The effects of mindfulness-based group intervention on the mental health of middle-aged Korean women in community. *Stress Health* **26**, 341–348 (2010).
201. Lever Taylor, B., Strauss, C., Cavanagh, K. & Jones, F. The effectiveness of self-help mindfulness-based cognitive therapy in a student sample: a randomised controlled trial. *Behav. Res. Ther.* **63**, 63–69 (2014).
202. Pots, W. T., Meulenbeek, P. A., Veehof, M. M., Klungers, J. & Bohlmeijer, E. T. The efficacy of mindfulness-based cognitive therapy as a public mental health intervention for adults with mild to moderate depressive symptomatology: a randomized controlled trial. *PLoS ONE* **9**, e109789 (2014).
203. de Vibe, M. et al. Mindfulness training for stress management: a randomised controlled study of medical and psychology students. *BMC Med. Educ.* **13**, 107 (2013).
204. Gallegos, A. M., Hoerger, M., Talbot, N. L., Moynihan, J. A. & Duberstein, P. R. Emotional benefits of mindfulness-based stress reduction in older adults: the moderating roles of age and depressive symptom severity. *Aging Ment. Health* **17**, 823–829 (2013).
205. Gayner, B. et al. A randomized controlled trial of mindfulness-based stress reduction to manage affective symptoms and improve quality of life in gay men living with HIV. *J. Behav. Med.* **35**, 272–285 (2012).
206. Henriksson, J., Wasara, E. & Ronnlund, M. Effects of eight-week-web-based mindfulness training on pain intensity, pain acceptance, and life satisfaction in individuals with chronic pain. *Psychol. Rep.* **119**, 586–607 (2016).
207. Jansen, P., Dahmen-Zimmer, K., Kudielka, B. M. & Schulz, A. Effects of karate training versus mindfulness training on Emotional wellbeing and cognitive performance in later Life. *Res. Aging* **39**, 1118–1144 (2017).
208. Mackenzie, C. S., Poulin, P. A. & Seidman-Carlson, R. A brief mindfulness-based stress reduction intervention for nurses and nurse aides. *Appl. Nurs. Res.* **19**, 105–109 (2006).
209. Neece, C. L. Mindfulness-based stress reduction for parents of young children with developmental delays: implications for parental mental health and child behavior problems. *J. Appl. Res. Intellect. Disabil.* **27**, 174–186 (2014).
210. Nyklicek, I. & Kuijpers, K. F. Effects of mindfulness-based stress reduction intervention on psychological wellbeing and quality of life: is increased mindfulness indeed the mechanism? *Ann. Behav. Med.* **35**, 331–340 (2008).
211. Pradhan, E. K. et al. Effect of mindfulness-based stress reduction in rheumatoid arthritis patients. *Arthritis Rheum.* **57**, 1134–1142 (2007).
212. van Dijk, I. et al. Effects of mindfulness-based stress reduction on the mental health of clinical clerkship students: a cluster-randomized controlled trial. *Academic Med.* **92**, 1012–1021 (2017).
213. Zolnierczyk-Zreda, D., Sanderson, M. & Bedynska, S. Mindfulness-based stress reduction for managers: a randomized controlled study. *Occup. Med.* **66**, 630–635 (2016).
214. Dambun, M. When the dissolution of perceived body boundaries elicits happiness: the effect of selflessness induced by a body scan meditation. *Conscious. Cogn.* **46**, 89–98 (2016).
215. Peters, R. K., Benson, H. & Porter, D. Daily relaxation response breaks in a working population: I. Effects on self-reported measures of health, performance, and wellbeing. *Am. J. Public Health* **67**, 946–953 (1977).
216. Reig-Ferrer, A. et al. A relaxation technique enhances psychological wellbeing and immune parameters in elderly people from a nursing home: a randomized controlled study. *BMC Complement. Altern. Med.* **14**, 311 (2014).
217. Roche, L. T., Barrachina, M. T. M., Fernández, I. I. & Betancort, M. YOGA and self-regulation in management of essential arterial hypertension and associated emotional symptomatology: a randomized controlled trial. *Complementary Ther. Clin. Pract.* **29**, 153–161 (2017).
218. Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J. & Finkel, S. M. Open hearts build lives: positive emotions, induced through loving-kindness meditation, build consequential personal resources. *J. Pers. Soc. Psychol.* **95**, 1045–1062 (2008).
219. Hecht, F. M. et al. A randomized, controlled trial of mindfulness-based stress reduction in HIV infection. *Brain Behav. Immun.* **73**, 331–339 (2018).
220. Innes, K. E., Selfe, T. K., Khalsa, D. S. & Kandati, S. Effects of meditation versus music listening on perceived stress, mood, sleep, and quality of life in adults with early memory loss: a pilot randomized controlled trial. *J. Alzheimers Dis.* **52**, 1277–1298 (2016).
221. Kögler, M. et al. Mindfulness in informal caregivers of palliative patients. *Palliat. Support. Care* **13**, 11–18 (2015).
222. Zilcha-Mano, S. & Langer, E. Mindful attention to variability intervention and successful pregnancy outcomes. *J. Clin. Psychol.* **72**, 897–907 (2016).
223. Shapiro, S. L., Astin, J. A., Bishop, S. R. & Cordova, M. Mindfulness-based stress reduction for health care professionals: results from a randomized trial. *Int. J. Stress Manag.* **12**, 164 (2005).
224. Bostock, S., Crosswell, A. D., Prather, A. A. & Steptoe, A. Mindfulness on-the-go: effects of a mindfulness meditation app on work stress and wellbeing. *J. Occup. Health Psychol.* **24**, 127–138 (2019).
225. Flett, J. A. M., Hayne, H., Riordan, B. C., Thompson, L. M. & Conner, T. S. Mobile mindfulness meditation: a randomised controlled trial of the effect of two popular apps on mental health. *Mindfulness* **10**, 863–876 (2019).
226. Ivtzan, I. et al. Mindfulness based flourishing program: a cross-cultural study of Hong Kong Chinese and British participants. *J. Happiness Stud.* **19**, 2205–2223 (2018).
227. Jarukasemthawee, S., Halford, W. K. & McLean, J. P. When East meets West: a randomized controlled trial and pre- to postprogram evaluation replication of the effects of insight-based mindfulness on psychological wellbeing. *J. Psychother. Integr.* **29**, 307–323 (2019).
228. Lin, L., He, G., Yan, J., Gu, C. & Xie, J. The effects of a modified mindfulness-based stress reduction program for nurses: A randomized controlled trial. *Workplace Health Saf.* **67**, 111–122 (2019).
229. Zemestani, M. & Fazeli Nikoo, Z. Effectiveness of mindfulness-based cognitive therapy for comorbid depression and anxiety in pregnancy: a randomized controlled trial. *Arch. Womens Ment. Health* **23**, 207–214 (2020).
230. Zeng, X., Wang, R., Oei, T. P. S. & Leung, F. Y. K. Heart of joy: a randomized controlled trial evaluating the effect of an appreciative joy meditation training on subjective wellbeing and attitudes. *Mindfulness* **10**, 506–515 (2019).
231. Ahmad, F. et al. An eight-week, web-based mindfulness virtual community intervention for students' mental health: randomized controlled trial. *JMIR Ment. Health* **7**, e15520 (2020).
232. Bostani, S., Rambod, M., Irani, P. S. & Torabizadeh, C. Comparing the effect of progressive muscle relaxation exercise and support group therapy on the happiness of nursing students: a randomized clinical trial study. *Int. J. Afr. Nurs. Sci.* **13**, 100218 (2020).
233. Cejudo, J. et al. Using a mindfulness-based intervention to promote subjective wellbeing, trait emotional intelligence, mental health, and resilience in women with fibromyalgia. *Front. Psychol.* **10**, 2541 (2019).
234. Cerna, C., Garcia, F. E. & Tellez, A. Brief mindfulness, mental health, and cognitive processes: a randomized controlled trial. *Psych. J.* **9**, 359–369 (2020).
235. Donald, G. et al. Positively mindful: a mixed method feasibility study of mindfulness meditation for people living with HIV in the UK. *Eur. J. Integr. Med.* **37**, 101088 (2020).
236. Hirschberg, M. J., Flook, L., Enright, R. D. & Davidson, R. J. Integrating mindfulness and connection practices into preservice teacher education improves classroom practices. *Learn. Instr.* **66**, 101298 (2020).
237. Lo, H. H. M. et al. The effects of family-based mindfulness intervention on ADHD symptomatology in young children and their parents: a randomized control trial. *J. Atten. Disord.* **24**, 667–680 (2020).
238. Maccougall, H., O'Halloran, P., Sherry, E. & Shields, N. A pilot randomised controlled trial to enhance wellbeing and performance of athletes in para sports. *Eur. J. Adapted Phys. Act.* **12**, 7 (2019).
239. Mistretta, E. G. et al. Resilience training for work-related stress among health care workers: results of a randomized clinical trial comparing in-person and smartphone-delivered interventions. *J. Occup. Environ. Med.* **60**, 559–568 (2018).
240. Nadler, R., Carswell, J. J. & Minda, J. P. Online mindfulness training increases wellbeing, trait emotional intelligence, and workplace competency ratings: a randomized waitlist-controlled trial. *Front. Psychol.* **11**, 255 (2020).
241. Weytens, E., Luminet, O., Verhofstadt, L. L. & Mikolajczak, M. An integrative theory-driven positive emotion regulation intervention. *PLoS ONE* **9**, e95677 (2014).
242. Zarifanaiey, N., Jamalian, K., Bazrafcan, L., Keshavarzy, F. & Shahraki, H. R. The effects of mindfulness training on the level of happiness and blood sugar in diabetes patients. *J. Diabetes Metab. Disord.* **19**, 311–317 (2020).
243. Maddock, A., Hevey, D., D'Alton, P. & Kirby, B. A randomized trial of mindfulness-based cognitive therapy with psoriasis patients. *Mindfulness* **10**, 2606–2619 (2019).
244. Dandan, P., Ruch, W. & Pang, D. Fusing character strengths and mindfulness interventions: benefits for job satisfaction and performance. *J. Occup. Health Psychol.* **24**, 150–162 (2019).
245. Nakamura, Y., Lipschitz, D. L., Kuhn, R., Kinney, A. Y. & Donaldson, G. W. Investigating efficacy of two brief mind-body intervention programs for managing sleep disturbance in cancer survivors: a pilot randomized controlled trial. *J. Cancer Surviv.* **7**, 165–182 (2013).
246. Norouzi, E. et al. Implementation of a mindfulness-based stress reduction (MBSR) program to reduce stress, anxiety, and depression and to improve psychological wellbeing among retired Iranian football players. *Psychol. Sport Exerc.* **47**, 101636 (2020).
247. Boryri, T., Navidian, A. & Marghzari, N. Comparison of the effect of muscle relaxation and guided imagery on happiness and fear of childbirth in primiparous women admitted to health care centers. *Int. J. Womens Health Reprod. Sci.* **7**, 490–495 (2019).

248. Guo, L., Zhang, J., Mu, L. & Ye, Z. Preventing postpartum depression with mindful self-compassion intervention: a randomized control study. *J. Nerv. Ment. Dis.* **208**, 101–107 (2020).
249. O’Leary, K. & Dockray, S. The effects of two novel gratitude and mindfulness interventions on wellbeing. *J. Altern. Complement. Med.* **21**, 243–245 (2015).
250. Black, D. S. & Amaro, H. Moment-by-Moment in Women’s Recovery (MMWR): mindfulness-based intervention effects on residential substance use disorder treatment retention in a randomized controlled trial. *Behav. Res. Ther.* **120**, 103437 (2019).
251. Dambrun, M. et al. Unified consciousness and the effect of body scan meditation on happiness: alteration of inner-body experience and feeling of harmony as central processes. *Mindfulness* **10**, 1530–1544 (2019).
252. Davis, M. C. & Zautra, A. J. An online mindfulness intervention targeting socioemotional regulation in fibromyalgia: results of a randomized controlled trial. *Ann. Behav. Med.* **46**, 273–284 (2013).
253. Hoffman, C. J. et al. Effectiveness of mindfulness-based stress reduction in mood, breast- and endocrine-related quality of life, and wellbeing in stage 0 to III breast cancer: a randomized, controlled trial. *J. Clin. Oncol.* **30**, 1335–1342 (2012).
254. Mak, W. W. S., Chan, A. T. Y., Cheung, E. Y. L., Lin, C. L. Y. & Ngai, K. C. S. Enhancing web-based mindfulness training for mental health promotion with the health action process approach: randomized controlled trial. *J. Med. Internet Res.* **17**, e8 (2015).
255. Noone, C. & Hogan, M. J. A randomised active-controlled trial to examine the effects of an online mindfulness intervention on executive control, critical thinking and key thinking dispositions in a university student sample. *BMC Psychol.* **6**, 13 (2018).
256. Oman, D., Hedberg, J. & Thoresen, C. E. Passage meditation reduces perceived stress in health professionals: a randomized, controlled trial. *J. Consult. Clin. Psychol.* **74**, 714–719 (2006).
257. Pinniger, R., Brown, R. F., Thorsteinsson, E. B. & McKinley, P. Tango programme for individuals with age-related macular degeneration. *Br. J. Vis. Impair.* **31**, 47–59 (2013).
258. Shapiro, S. L., Brown, K. W., Thoresen, C. & Plante, T. G. The moderation of mindfulness-based stress reduction effects by trait mindfulness: results from a randomized controlled trial. *J. Clin. Psychol.* **67**, 267–277 (2011).
259. Thompson, N. J. et al. Expanding the efficacy of project UPLIFT: distance delivery of mindfulness-based depression prevention to people with epilepsy. *J. Consult. Clin. Psychol.* **83**, 304–313 (2015).
260. Chambers, S. K. et al. A randomised controlled trial of a mindfulness intervention for men with advanced prostate cancer. *BMC Cancer* **13**, 89 (2013).
261. Liu, C., Chen, H., Liu, C. Y., Lin, R. T. & Chiou, W. K. The effect of loving-kindness meditation on flight attendants’ spirituality, mindfulness and subjective wellbeing. *Healthcare* **8**, 16 (2020).
262. Perez-Blasco, J., Viguier, P. & Rodrigo, M. F. Effects of a mindfulness-based intervention on psychological distress, wellbeing, and maternal self-efficacy in breast-feeding mothers: results of a pilot study. *Arch. Womens Ment. Health* **16**, 227–236 (2013).
263. Champion, L., Economides, M. & Chandler, C. The efficacy of a brief app-based mindfulness intervention on psychosocial outcomes in healthy adults: a pilot randomised controlled trial. *PLoS ONE* **13**, e0209482 (2018).
264. Antoni, M. H. et al. How stress management improves quality of life after treatment for breast cancer. *J. Consult. Clin. Psychol.* **74**, 1143–1152 (2006).
265. Bolier, L. et al. Workplace mental health promotion online to enhance wellbeing of nurses and allied health professionals: a cluster-randomized controlled trial. *Internet Interv.* **1**, 196–204 (2014).
266. Burckhardt, R., Manicavasagar, V., Batterham, P. J. & Hadzi-Pavlovic, D. A randomized controlled trial of strong minds: a school-based mental health program combining acceptance and commitment therapy and positive psychology. *J. Sch. Psychol.* **57**, 41–52 (2016).
267. Castro, C. A., Adler, A. B., McGurk, D. & Bliese, P. D. Mental health training with soldiers four months after returning from Iraq: randomization by platoon. *J. Trauma. Stress* **25**, 376–383 (2012).
268. Di, S., Wen, G. & Feng-Lin, C. Brief psychological intervention in patients with cervical cancer: a randomized controlled trial. *Health Psychol.* **35**, 1383–1391 (2016).
269. Fegg, M. J. et al. Existential behavioural therapy for informal caregivers of palliative patients: a randomised controlled trial. *Psychooncology* **22**, 2079–2086 (2013).
270. Frieswijk, N., Steverink, N., Buunk, B. P. & Slaets, J. P. J. The effectiveness of a bibliotherapy in increasing the self-management ability of slightly to moderately frail older people. *Patient Educ. Counsel.* **61**, 219–227 (2006).
271. Gigantesco, A. et al. A universal mental health promotion programme for young people in Italy. *BioMed. Res. Int.* **2015**, 345926 (2015).
272. Kemeny, M. E. et al. Contemplative/emotion training reduces negative emotional behavior and promotes prosocial responses. *Emotion* **12**, 338–350 (2012).
273. Kotsou, I., Nelis, D., Gregoire, J. & Mikolajczak, M. Emotional plasticity: conditions and effects of improving emotional competence in adulthood. *J. Appl. Psychol.* **96**, 827–839 (2011).
274. LeBlanc, S., Uzun, B., Pourseied, K. & Mohiyeddini, C. Effect of an emotion regulation training program on mental wellbeing. *Int. J. Group Psychother.* **67**, 108–123 (2017).
275. Maatouk, I. et al. Healthy ageing at work- Efficacy of group interventions on the mental health of nurses aged 45 and older: results of a randomised, controlled trial. *PLoS ONE* **13**, e0191000 (2018).
276. Reich, J. W. & Zautra, A. J. A perceived control intervention for at-risk older adults. *Psychol. Aging* **4**, 415–424 (1989).
277. Rini, C. et al. Automated internet-based pain coping skills training to manage osteoarthritis pain: a randomized controlled trial. *Pain* **156**, 837–848 (2015).
278. Roepke, A. M. et al. Randomized controlled trial of superbetter, a smartphone-based/internet-based self-help tool to reduce depressive symptoms. *Games Health J.* **4**, 235–246 (2015).
279. Ruini, C. et al. School intervention for promoting psychological wellbeing in adolescence. *J. Behav. Ther. Exp. Psychiatry* **40**, 522–532 (2009).
280. Steinhart, M. & Dolbier, C. Evaluation of a resilience intervention to enhance coping strategies and protective factors and decrease symptomatology. *J. Am. Coll. Health* **56**, 445–453 (2008).
281. Tunariu, A. D., Tribe, R., Frings, D. & Albery, I. P. The iNEAR programme: an existential positive psychology intervention for resilience and emotional wellbeing. *Int. Rev. Psychiatry* **29**, 362–372 (2017).
282. Drozd, F., Skeie, L. G., Kraft, P. & Kvale, D. A web-based intervention trial for depressive symptoms and subjective wellbeing in patients with chronic HIV infection. *AIDS Care* **26**, 1080–1089 (2014).
283. Dowling, K., Simpkin, A. J. & Barry, M. M. A cluster randomized-controlled trial of the mindout social and emotional learning program for disadvantaged post-primary school students. *J. Youth Adoles.* **48**, 1245–1263 (2019).
284. Bateman, A. & Fonagy, P. A randomized controlled trial of a mentalization-based intervention (MBT-FACTS) for families of people with borderline personality disorder. *Pers. Disord.* **10**, 70–79 (2019).
285. Behrndt, E.-M. et al. Brief telephone counselling is effective for caregivers who do not experience any major life events—caregiver-related outcomes of the German day-care study. *BMC Health Serv. Res.* **19**, 20 (2019).
286. Coker, J. et al. Re-inventing yourself after spinal cord injury: a site-specific randomized clinical trial. *Spinal Cord.* **57**, 282–292 (2019).
287. Shirani, M., Kheirabadi, G., Sharifrad, G. & Keshvari, M. The effect of education program on health promotion behavior on successful aging. *Iran. J. Nurs. Midwifery Res.* **24**, 234–238 (2019).
288. Carrico, A. W. et al. Pilot randomized controlled trial of an integrative intervention with methamphetamine-using men who have sex with men. *Arch. Sex. Behav.* **44**, 1861–1867 (2015).
289. Heintzelman, S. J. et al. ENHANCE: evidence for the efficacy of a comprehensive intervention program to promote subjective wellbeing. *J. Exp. Psychol. Appl.* **26**, 360–383 (2020).
290. Keeman, A., Naswall, K., Malinen, S. & Kuntz, J. Employee wellbeing: evaluating a wellbeing intervention in two settings. *Front. Psychol.* **8**, 2135 (2017).
291. Kovacs, A. H. et al. Feasibility and outcomes in a pilot randomized controlled trial of a psychosocial intervention for adults with congenital heart disease. *Can. J. Cardiol.* **34**, 766–773 (2018).
292. Matvienko-Sikar, K. & Dockray, S. Effects of a novel positive psychological intervention on prenatal stress and wellbeing: a pilot randomised controlled trial. *Women Birth* **30**, e111–e118 (2017).
293. Miller, V. A., Silva, K., Friedrich, E., Robles, R. & Ford, C. A. Efficacy of a primary care-based intervention to promote parent-teen communication and wellbeing: a randomized controlled trial. *J. Pediatr.* **222**, 200–206 (2020).
294. Sanchez-Hernandez, O., Mendez, F. X., Ato, M. & Garber, J. Prevention of depressive symptoms and promotion of wellbeing in adolescents: a randomized controlled trial of the Smile Program. *An. de Psihologia* **35**, 300–313 (2019).
295. Schoeps, K., de la Barrera, U. & Montoya-Castilla, I. Impact of emotional development intervention program on subjective wellbeing of university students. *High. Educ.* **79**, 711–729 (2020).
296. Wang, C. et al. Effects of a mutual recovery intervention on mental health in depressed elderly community-dwelling adults: a pilot study. *BMC Public Health* **17**, 4 (2017).
297. Weber, S., Lorenz, C. & Hemmings, N. Improving stress and positive mental health at work via an app-based intervention: a large-scale multi-centre randomised control trial. *Front. Psychol.* **10**, 2745 (2019).
298. Cejudo, J., Losada, L. & Feltrero, R. Promoting social and emotional learning and subjective wellbeing: impact of the ‘Aislados’ intervention program in adolescents. *Int. J. Environ. Res. Public Health* **17**, 609 (2020).

299. Miller, K. E. et al. Supporting Syrian families displaced by armed conflict: a pilot randomized controlled trial of the Caregiver Support Intervention. *Child Abus. Negl.* **106**, 104512 (2020).
300. Monteiro, F., Pereira, M., Canavarro, M. C. & Fonseca, A. Be a mom's efficacy in enhancing positive mental health among postpartum women presenting low risk for postpartum depression: results from a pilot randomized trial. *Int. J. Environ. Res. Public Health* **17**, 29 (2020).
301. O'Dea, B. et al. A randomised controlled trial of a relationship-focussed mobile phone application for improving adolescents' mental health. *J. Child Psychol. Psychiatry* **19**, 899–913 (2020).
302. Sodani, M., Mehregan, S. B. & Honarmand, M. M. An investigation into the effectiveness of group life skills training on life expectancy and psychological wellbeing of female students. *Prensa Méd. Argent.* **105**, 710–719 (2019).
303. Wingert, J. R., Jones, J. C., Swoap, R. A. & Wingert, H. M. Mindfulness-based strengths practice improves wellbeing and retention in undergraduates: a preliminary randomized controlled trial. *J. Am. Coll. Health* <https://doi.org/10.1080/07448481.2020.1764005> (2020).
304. Calear, A. L. et al. Cluster randomised controlled trial of the e-couch Anxiety and Worry program in schools. *J. Affect. Disord.* **196**, 210–217 (2016).
305. Chiang, K., Lu, R., Chu, H., Chang, Y. & Chou, K. Evaluation of the effect of a life review group program on self-esteem and life satisfaction in the elderly. *Int. J. Geriatr. Psychiatry* **23**, 7–10 (2008).
306. Goldstein, E. D. Sacred moments: Implications on well being and stress. *J. Clin. Psychol.* **63**, 1001–1019 (2007).
307. Jennings, P. A., Frank, J. L., Snowberg, K. E., Coccia, M. A. & Greenberg, M. T. Improving classroom learning environments by Cultivating Awareness and Resilience in Education (CARE): results of a randomized controlled trial. *Sch. Psychol. Q.* **28**, 374–390 (2013).
308. Karimi, Z., Rezaee, N., Shakiba, M. & Navidian, A. The effect of group counseling based on quality of life therapy on stress and life satisfaction in family caregivers of individuals with substance use problem: a randomized controlled trial. *Issues Ment. Health Nurs.* **40**, 1012–1018 (2019).
309. Stallman, H. M. Efficacy of the My Coping Plan mobile application in reducing distress: a randomised controlled trial. *Clin. Psychologist* **23**, 206–212 (2019).
310. Schoeps, K., Tamarit, A., de la Barrera, U. & Gonzalez Barron, R. Effects of emotional skills training to prevent burnout syndrome in schoolteachers. *Ansiedad y Estres* **25**, 7–13 (2019).
311. Nikrahan, G. R. et al. Randomized controlled trial of a wellbeing intervention in cardiac patients. *Gen. Hospital Psychiatry* **61**, 116–124 (2019).
312. Boselie, J. J. L. M., Vanclief, L. M. G. & Peters, M. L. Filling the glass: effects of a positive psychology intervention on executive task performance in chronic pain patients. *Eur. J. Pain* **22**, 1268–1280 (2018).
313. Burckhardt, R. et al. A web-based adolescent positive psychology program in schools: randomized controlled trial. *J. Med. Internet Res.* **17**, e187 (2015).
314. Cantarella, A., Borella, E., Marigo, C. & De Beni, R. Benefits of wellbeing training in healthy older adults. *Appl. Psychol. Health Wellbeing* **9**, 261–284 (2017).
315. Cheung, E. O. et al. A randomized pilot trial of a positive affect skill intervention (lessons in linking affect and coping) for women with metastatic breast cancer. *Psychooncology* **26**, 2101–2108 (2017).
316. Cohn, M. A., Pietrucha, M. E., Saslow, L. R., Hult, J. R. & Moskowitz, J. T. An online positive affect skills intervention reduces depression in adults with type 2 diabetes. *J. Posit. Psychol.* **9**, 523–534 (2014).
317. Deane, F. P., Marshall, S., Crowe, T., White, A. & Kavanagh, D. A randomized controlled trial of a correspondence-based intervention for carers of relatives with psychosis. *Clin. Psychol. Psychother.* **22**, 142–152 (2015).
318. Gander, F., Proyer, R. T. & Ruch, W. Positive psychology interventions addressing pleasure, engagement, meaning, positive relationships, and accomplishment increase wellbeing and ameliorate depressive symptoms: a randomized, placebo-controlled online study. *Front. Psychol.* **7**, 686 (2016).
319. Giannopoulos, V. L. & Vella-Brodrick, D. A. Effects of positive interventions and orientations to happiness on subjective wellbeing. *J. Posit. Psychol.* **6**, 95–105 (2011).
320. Ho, H. C. Y. et al. Happy Family Kitchen II: a cluster randomized controlled trial of a community-based family intervention for enhancing family communication and wellbeing in Hong Kong. *Front. Psychol.* **7**, 638 (2016).
321. Jaser, S. S., Patel, N., Rothman, R. L., Choi, L. & Whittemore, R. Check it! A randomized pilot of a positive psychology intervention to improve adherence in adolescents with type 1 diabetes. *Diabetes Educ.* **40**, 659–667 (2014).
322. Koydemir, S. & Sun-Selisik, Z. Wellbeing on campus: testing the effectiveness of an online strengths-based intervention for first year college students. *Br. J. Guid. Counsell.* **44**, 434–446 (2016).
323. Kwok, S. Y. C. L., Gu, M. & Kit, K. T. K. Positive psychology intervention to alleviate child depression and increase life satisfaction. *Res. Soc. Work Pract.* **26**, 350–361 (2016).
324. Manicavasagar, V. et al. Feasibility and effectiveness of a web-based positive psychology program for youth mental health: randomized controlled trial. *J. Med. Internet Res.* **16**, e140 (2014).
325. Mohammadi, N. et al. A randomized trial of an optimism training intervention in patients with heart disease. *Gen. Hospital Psychiatry* **51**, 46–53 (2018).
326. Moskowitz, J. T. et al. Randomized controlled trial of a positive affect intervention for people newly diagnosed with HIV. *J. Consult. Clin. Psychol.* **85**, 409–423 (2017).
327. Neumeier, L. M., Brook, L., Ditchburn, G. & Sckopke, P. Delivering your daily dose of wellbeing to the workplace: a randomized controlled trial of an online wellbeing programme for employees. *Eur. J. Work Organ. Psychol.* **26**, 555–573 (2017).
328. Moeenizadeh, M. & Zarif, H. The efficacy of wellbeing therapy for depression in infertile women. *Int. J. Fertil. Steril.* **10**, 363–370 (2017).
329. Nikrahan, G. R. et al. Positive psychology interventions for patients with heart disease: a preliminary randomized trial. *Psychosomatics* **57**, 348–358 (2016).
330. Page, K. M. & Vella-Brodrick, D. A. The working for wellness program: RCT of an employee wellbeing intervention. *J. Happiness Stud.* **14**, 1007–1031 (2013).
331. Pietrowsky, R. & Mikutta, J. Effects of positive psychology interventions in depressive patients—a randomized control study. *Psychology* **3**, 1067–1073 (2012).
332. Proyer, R. T., Gander, F., Wellenzohn, S. & Ruch, W. Addressing the role of personality, ability, and positive and negative affect in positive psychology interventions: findings from a randomized intervention based on the authentic happiness theory and extensions. *J. Posit. Psychol.* **11**, 609–621 (2016).
333. Roth, R. A., Suldo, S. M. & Ferron, J. M. Improving middle school students' subjective wellbeing: efficacy of a multicomponent positive psychology intervention targeting small groups of youth. *Sch. Psychol. Rev.* **46**, 21–41 (2017).
334. Sanjuan, P. et al. A randomised trial of a positive intervention to promote wellbeing in cardiac patients. *Appl. Psychol. Health Wellbeing* **8**, 64–84 (2016).
335. Suldo, S. M., Savage, J. A. & Mercer, S. H. Increasing middle school students' life satisfaction: efficacy of a positive psychology group intervention. *J. Happiness Stud.* **15**, 19–42 (2014).
336. Taylor, C. T., Lyubomirsky, S. & Stein, M. B. Upregulating the positive affect system in anxiety and depression: outcomes of a positive activity intervention. *Depress. anxiety* **34**, 267–280 (2017).
337. Asl, S. T. et al. Effect of group positive psychotherapy on improvement of life satisfaction and the quality of life in infertile woman. *Int. J. Fertil. Steril.* **10**, 105–112 (2016).
338. Dowlatabadi, M. M. et al. The effectiveness of group positive psychotherapy on depression and happiness in breast cancer patients: a randomized controlled trial. *Electron. Physician* **8**, 2175–2180 (2016).
339. Seligman, M. E., Rashid, T. & Parks, A. C. Positive psychotherapy. *Am. Psychol.* **61**, 774 (2006).
340. Proyer, R. T., Ruch, W. & Buschor, C. Testing strengths-based interventions: a preliminary study on the effectiveness of a program targeting curiosity, gratitude, hope, humor, and zest for enhancing life satisfaction. *J. Happiness Stud.* **14**, 275–292 (2013).
341. Shoshani, A., Steinmetz, S. & Kanat-Maymon, Y. Effects of the Maytiv positive psychology school program on early adolescents' wellbeing, engagement, and achievement. *J. Sch. Psychol.* **57**, 73–92 (2016).
342. Kloos, N., Drossaert, C. H. C., Bohlmeijer, E. T. & Westerhof, G. J. Online positive psychology intervention for nursing home staff: a cluster-randomized controlled feasibility trial of effectiveness and acceptability. *Int. J. Nurs. Stud.* **98**, 48–56 (2019).
343. Xu, Y. Y., Wu, T., Yu, Y. J. & Li, M. A randomized controlled trial of wellbeing therapy to promote adaptation and alleviate emotional distress among medical freshmen. *BMC Med. Educ.* **19**, 182 (2019).
344. Antoine, P., Andreotti, E. & Congard, A. Positive psychology intervention for couples: a pilot study. *Stress Health* **36**, 179–190 (2020).
345. Carrico, A. W. et al. Randomized controlled trial of a positive affect intervention to reduce HIV viral load among sexual minority men who use methamphetamine. *J. Int. AIDS Soc.* **22**, e25436 (2019).
346. Celano, C. M. et al. A positive psychology intervention for patients with bipolar depression: a randomized pilot trial. *J. Ment. Health* **29**, 60–68 (2020).
347. Coelho, C. C. et al. A new mental health mobile app for wellbeing and stress reduction in working women: randomized controlled trial. *J. Med. Internet Res.* **21**, e14269 (2019).
348. Greer, S. et al. Use of the chatbot 'Vivibot' to deliver positive psychology skills and promote wellbeing among young people after cancer treatment: randomized controlled feasibility trial. *JMIR Mhealth Uhealth* **7**, e15018 (2019).

349. Hendriks, T. et al. Resilience and wellbeing in the Caribbean: findings from a randomized controlled trial of a culturally adapted multi-component positive psychology intervention. *J. Posit. Psychol.* **15**, 238–253 (2020).
350. Mazlomi Barm Sabz, A., Asgari, P., Makvandi, B., Ehteshamzadeh, P. & Bakhtiyar Pour, S. Comparison of the effectiveness of positive psychology and emotion regulation training interventions in promoting the psychological wellbeing in nar-anon group. *Int. J. Ment. Health Addiction* <https://doi.org/10.1007/s11469-020-00284-2> (2020).
351. Murdoch, K. C. et al. The efficacy of the strength, hope and resourcefulness program for people with Parkinson's disease (SHARP-PWP): a mixed methods study. *Parkinsonism Relat. Disord.* **70**, 7–12 (2020).
352. Osborn, T. L. et al. Single-session digital intervention for adolescent depression, anxiety, and wellbeing: outcomes of a randomized controlled trial with Kenyan adolescents. *J. Consult. Clin. Psychol.* **88**, 657–668 (2020).
353. Poole, A. E. & Malouff, J. M. Preliminary experimental evaluation of a behavioral-cognitive method of increasing life excitement. *J. Posit. Psychol. Wellbeing* **3**, 26–44 (2019).
354. Radstaak, M., Huning, L. & Bohlmeijer, E. T. Wellbeing therapy as rehabilitation therapy for posttraumatic stress disorder symptoms: a randomized controlled trial. *J. Trauma. Stress* **33**, 813–823 (2020).
355. Schotanus-Dijkstra, M. et al. An early intervention to promote wellbeing and flourishing and reduce anxiety and depression: a randomized controlled trial. *Internet Intervent.* **9**, 15–24 (2017).
356. Shaghghi, F., Abedian, Z., Forouhar, M., Esmaily, H. & Eskandarnia, E. Effect of positive psychology interventions on psychological wellbeing of midwives: a randomized clinical trial. *J. Educ. Health Promot.* **8**, 160 (2019).
357. Weiss, L. A., Oude Voshaar, M. A., Bohlmeijer, E. T. & Westerhof, G. J. The long and winding road to happiness: a randomized controlled trial and cost-effectiveness analysis of a positive psychology intervention for lonely people with health problems and a low socio-economic status. *Health Qual. Life Outcomes* **18**, 162 (2020).
358. Taghvaenia, A. & Alamdari, N. Effect of positive psychotherapy on psychological wellbeing, happiness, life expectancy and depression among retired teachers with depression: a randomized controlled trial. *Commun. Ment. Health J.* **56**, 229–237 (2020).
359. Hausmann, L. R. et al. Effect of a positive psychological intervention on pain and functional difficulty among adults with osteoarthritis: a randomized clinical trial. *JAMA Netw. Open* **1**, e182533 (2018).
360. Gander, F., Proyer, R. T., Ruch, W. & Wyss, T. Strength-based positive interventions: further evidence for their potential in enhancing wellbeing and alleviating depression. *J. Happiness Stud.* **14**, 1241–1259 (2013).
361. Bolier, L. et al. An Internet-based intervention to promote mental fitness for mildly depressed adults: randomized controlled trial. *J. Med. Internet Res.* **15**, e200 (2013).
362. Celano, C. M. et al. Psychological interventions to reduce suicidality in high-risk patients with major depression: a randomized controlled trial. *Psychol. Med.* **47**, 810–821 (2017).
363. Cerezo, M. V., Ortiz-Tallo, M., Cardenal, V. & de la Torre-Luque, A. Positive psychology group intervention for breast cancer patients: a randomised trial. *Psychol. Rep.* **115**, 44–64 (2014).
364. Dowling, G. A. et al. Life enhancing activities for family caregivers of people with frontotemporal dementia. *Alzheimer Dis. Assoc. Disord.* **28**, 175–181 (2014).
365. Drozd, F., Mork, L., Nielsen, B., Raeder, S. & Bjorkli, C. A. Better days—a randomized controlled trial of an internet-based positive psychology intervention. *J. Posit. Psychol.* **9**, 377–388 (2014).
366. Feicht, T. et al. Evaluation of a seven-week web-based happiness training to improve psychological wellbeing, reduce stress, and enhance mindfulness and flourishing: a randomized controlled occupational health study. *Evid. Based Complement. Alternat. Med.* **2013**, 676953 (2013).
367. Hausmann, L. R. et al. Testing a positive psychological intervention for osteoarthritis. *Pain. Med.* **18**, 1908–1920 (2017).
368. Lü, W., Wang, Z. & Liu, Y. A pilot study on changes of cardiac vagal tone in individuals with low trait positive affect: the effect of positive psychotherapy. *Int. J. Psychophysiol.* **88**, 213–217 (2013).
369. Schrank, B. et al. Evaluation of a positive psychotherapy group intervention for people with psychosis: pilot randomised controlled trial. *Epidemiol. Psychiatr. Sci.* **25**, 235–246 (2016).
370. Shoshani, A. & Slone, M. Positive education for young children: effects of a positive psychology intervention for preschool children on subjective wellbeing and learning behaviors. *Front. Psychol.* **8**, 1866 (2017).
371. Seyedi Asl, S. T. et al. Effect of group positive psychotherapy on improvement of life satisfaction and the quality of life in infertile woman. *Int. J. Fertil. Steril.* **10**, 105–112 (2016).
372. Muller, R. et al. Effects of a tailored positive psychology intervention on wellbeing and pain in individuals with chronic pain and a physical disability: a feasibility trial. *Clin. J. Pain.* **32**, 32–44 (2016).
373. King, L. A. The health benefits of writing about life goals. *Pers. Soc. Psychol. Bull.* **27**, 798–807 (2001).
374. Layous, K., Nelson, S., Kurtz, J. L. & Lyubomirsky, S. What triggers prosocial effort? A positive feedback loop between positive activities, kindness, and wellbeing. *J. Posit. Psychol.* **12**, 385–398 (2017).
375. Littman-Ovadia, H. & Nir, D. Looking forward to tomorrow: The buffering effect of a daily optimism intervention. *J. Posit. Psychol.* **9**, 122–136 (2014).
376. Manthey, L., Vehreschild, V. & Renner, K.-H. Effectiveness of two cognitive interventions promoting happiness with video-based online instructions. *J. Happiness Stud.* **17**, 319–339 (2016).
377. Molinari, G. et al. The power of visualization: Back to the future for pain management in fibromyalgia syndrome. *Pain. Med.* **19**, 1451–1468 (2017).
378. Odou, N. & Vella-Brodrick, D. A. The efficacy of positive psychology interventions to increase wellbeing and the role of mental imagery ability. *Soc. Indic. Res.* **110**, 111–129 (2013).
379. Peters, M. L., Flink, I. K., Boersma, K. & Linton, S. J. Manipulating optimism: can imagining a best possible self be used to increase positive future expectancies? *J. Posit. Psychol.* **5**, 204–211 (2010).
380. Quoidbach, J. & Dunn, E. W. Give it up: a strategy for combating hedonic adaptation. *Soc. Psychological Pers. Sci.* **4**, 563–568 (2013).
381. Seear, K. H. & Vella-Brodrick, D. A. Efficacy of positive psychology interventions to increase wellbeing: examining the role of dispositional mindfulness. *Soc. Indic. Res.* **114**, 1125–1141 (2013).
382. Sheldon, K. M. & Lyubomirsky, S. How to increase and sustain positive emotion: the effects of expressing gratitude and visualizing best possible selves. *J. Posit. Psychol.* **1**, 73–82 (2006).
383. Lyubomirsky, S., Dickerhoof, R., Boehm, J. K. & Sheldon, K. M. Becoming happier takes both a will and a proper way: an experimental longitudinal intervention to boost wellbeing. *Emotion* **11**, 391–402 (2011).
384. Ng, W. Use of positive interventions: does neuroticism moderate the sustainability of their effects on happiness? *J. Posit. Psychol.* **11**, 51–61 (2016).
385. Enrique Roig, A. et al. Implementation of a positive technology application in patients with eating disorders: a pilot randomized control trial. *Front. Psychol.* **9**, 934 (2018).
386. Auyeung, L. & Mo, P. K. H. The efficacy and mechanism of online positive psychological intervention (PPI) on improving wellbeing among Chinese university students: a pilot study of the best possible self (BPS) intervention. *J. Happiness Stud.* **20**, 2525–2550 (2019).
387. Heckerens, J. B., Eid, M. & Heinitz, K. Dealing with conflict: reducing goal ambivalence using the best-possible-self intervention. *J. Posit. Psychol.* **15**, 325–337 (2020).
388. Quoidbach, J., Wood, A. M. & Hansenne, M. Back to the future: the effect of daily practice of mental time travel into the future on happiness and anxiety. *J. Posit. Psychol.* **4**, 349–355 (2009).
389. Carrillo, A., Etchemendy, E. & Baños, R. M. My best self in the past, present or future: results of two randomized controlled trials. *J. Happiness Stud.* **22**, 955–980 (2021).
390. Boehm, J. K., Lyubomirsky, S. & Sheldon, K. M. A longitudinal experimental study comparing the effectiveness of happiness-enhancing strategies in Anglo Americans and Asian Americans. *Cognition Emot.* **25**, 1263–1272 (2011).
391. Khanna, P. & Singh, K. Do all positive psychology exercises work for everyone? replication of Seligman et al.'s (2005) interventions among adolescents. *Psychol. Stud.* **64**, <https://doi.org/10.1007/s12646-019-00477-3> (2019).
392. Owens, R. L. & Patterson, M. M. Positive psychological interventions for children: a comparison of gratitude and best possible selves approaches. *J. Genet. Psychol.* **174**, 403–428 (2013).
393. Peters, M. L., Meevissen, Y. M. C. & Hanssen, M. M. Specificity of the best possible self intervention for increasing optimism: comparison with a gratitude intervention. *Posit. Psychol.* **31**, 93–100 (2013).
394. Enrique, A., Bretón-López, J., Molinari, G., Baños, R. M. & Botella, C. Efficacy of an adaptation of the best possible self intervention implemented through positive technology: a randomized control trial. *Appl. Res. Qual. Life* **13**, 671–689 (2018).
395. Duan, W., Ho, S. M. Y., Tang, X., Li, T. & Zhang, Y. Character strength-based intervention to promote satisfaction with life in the Chinese university context. *J. Happiness Stud.* **15**, 1347–1361 (2014).
396. Proyer, R. T., Gander, F., Wellenzohn, S. & Ruch, W. Positive psychology interventions in people aged 50–79 years: long-term effects of placebo-controlled online interventions on wellbeing and depression. *Aging Ment. Health* **18**, 997–1005 (2014).
397. Proyer, R. T., Gander, F., Wellenzohn, S. & Ruch, W. Strengths-based positive psychology interventions: a randomized placebo-controlled online trial on long-term effects for a signature strengths- vs. a lesser strengths-intervention. *Front. Psychol.* **6**, 456 (2015).
398. Mitchell, J., Stanimirovic, R., Klein, B. & Vella-Brodrick, D. A randomised controlled trial of a self-guided internet intervention promoting wellbeing. *Comput. Hum. Behav.* **25**, 749–760 (2009).

399. Senf, K. & Liao, A. K. The effects of positive interventions on happiness and depressive symptoms, with an examination of personality as a moderator. *J. Happiness Stud.* **14**, 591–612 (2013).
400. Mongrain, M. & Anselmo-Matthews, T. Do positive psychology exercises work? A replication of Seligman et al. (2005). *J. Clin. Psychol.* **68**, 382–389 (2012).
401. Duan, W. & Bu, H. Randomized trial investigating of a single-session character-strength-based cognitive intervention on freshman's adaptability. *Res. Soc. Work Pract.* **29**, 82–92 (2019).
402. Dolev-Amit, T., Rubin, A. & Zilcha-Mano, S. Is awareness of strengths intervention sufficient to cultivate wellbeing and other positive outcomes? *J. Happiness Stud.* **22**, 645–666 (2021).
403. Woodworth, R. J., O'Brien-Malone, A., Diamond, M. R. & Schuz, B. Web-based positive psychology interventions: a reexamination of effectiveness. *J. Clin. Psychol.* **73**, 218–232 (2017).
404. Chérif, L., Wood, V. M. & Watier, C. Testing the effectiveness of a strengths-based intervention targeting all 24 strengths: results from a randomized controlled trial. *Psychol. Rep.* 0033294120937441 (2020).
405. Al-Seheel, A. Y. & Noor, N. M. Effects of an Islamic-based gratitude strategy on Muslim students' level of happiness. *Ment. Health Relig. Cult.* **19**, 686–703 (2016).
406. Algoe, S. B. & Zhaoyang, R. Positive psychology in context: effects of expressing gratitude in ongoing relationships depend on perceptions of enactor responsiveness. *J. Posit. Psychol.* **11**, 399–415 (2016).
407. Deng, Y. et al. Counting blessings and sharing gratitude in a Chinese prisoner sample: effects of gratitude-based interventions on subjective wellbeing and aggression. *J. Posit. Psychol.* **14**, 303–311 (2019).
408. Froh, J. J., Sefick, W. J. & Emmons, R. A. Counting blessings in early adolescents: an experimental study of gratitude and subjective wellbeing. *J. Sch. Psychol.* **46**, 213–233 (2008).
409. Froh, J. J., Kashdan, T. B., Ozimkowski, K. M. & Miller, N. Who benefits the most from a gratitude intervention in children and adolescents? Examining positive affect as a moderator. *J. Posit. Psychol.* **4**, 408–422 (2009).
410. Froh, J. J. et al. Nice thinking! An educational intervention that teaches children to think gratefully. *Sch. Psychol. Rev.* **43**, 132–152 (2014).
411. Jackowska, M., Brown, J., Ronaldson, A. & Steptoe, A. The impact of a brief gratitude intervention on subjective wellbeing, biology and sleep. *J. Health Psychol.* **21**, 2207–2217 (2016).
412. Krentzman, A. R. et al. Feasibility, acceptability, and impact of a web-based gratitude exercise among individuals in outpatient treatment for alcohol use disorder. *J. Posit. Psychol.* **10**, 477–488 (2015).
413. Miller, R. W. & Duncan, E. A pilot randomised controlled trial comparing two positive psychology interventions for their capacity to increase subjective wellbeing. *Counsell. Psychol. Rev.* **30**, 36–46 (2015).
414. Otsuka, Y., Hori, M. & Kawahito, J. Improving wellbeing with a gratitude exercise in Japanese workers: a randomized controlled trial. *Int. J. Psychol. Counsell.* **4**, 86–91 (2012).
415. Watkins, P. C., Uhdler, J. & Pichinevskiy, S. Grateful recounting enhances subjective wellbeing: the importance of grateful processing. *J. Posit. Psychol.* **10**, 91–98 (2015).
416. Ghandeharioun, A., Azaria, A., Taylor, S. & Picard, R. W. 'Kind and Grateful': a context-sensitive smartphone app utilizing inspirational content to promote gratitude. *Psychol. Wellbeing* **6**, 9 (2016).
417. Sergeant, S. & Mongrain, M. Are positive psychology exercises helpful for people with depressive personality styles? *J. Posit. Psychol.* **6**, 260–272 (2011).
418. Cunha, L. F., Pellanda, L. C. & Reppold, C. T. Positive psychology and gratitude interventions: a randomized clinical trial. *Front. Psychol.* **10**, 584 (2019).
419. Koay, S. H., Ng, A. T., Tham, S. K. & Tan, C. S. Gratitude intervention on Instagram: an experimental study. *Psychol. Stud.* **65**, 168–173 (2020).
420. Shin, L. J. Gratitude in collectivist and individualist cultures. *J. Posit. Psychol.* **15**, 598–604 (2020).
421. Bohlmeijer, E. T., Kraiss, J. T., Watkins, P. & Schotanus-Dijkstra, M. Promoting gratitude as a resource for sustainable mental health: results of a 3-armed randomized controlled trial up to 6 months follow-up. *J. Happiness Stud.* **22**, 1011–1032 (2021).
422. Kerr, S. L., O'Donovan, A. & Pepping, C. A. Can gratitude and kindness interventions enhance wellbeing in a clinical sample? *J. Happiness Stud.* **16**, 17–36 (2015).
423. Lau, R. W. L. & Cheng, S.-T. Gratitude orientation reduces death anxiety but not positive and negative affect. *Omega* **66**, 79–88 (2012).
424. Lau, R. W. L. & Cheng, S.-T. Gratitude lessens death anxiety. *Eur. J. Ageing* **8**, 169 (2011).
425. O'Connell, B. H., O'Shea, D. & Gallagher, S. Enhancing social relationships through positive psychology activities: a randomised controlled trial. *J. Posit. Psychol.* **11**, 149–162 (2016).
426. O'Connell, B. H., O'Shea, D. & Gallagher, S. Examining psychosocial pathways underlying gratitude interventions: a randomized controlled trial. *J. Happiness Stud.* **19**, 2421–2444 (2018).
427. Renshaw, T. L. & Rock, D. K. Effects of a brief grateful thinking intervention on college students' mental health. *Ment. Health Prev.* **9**, 19–24 (2018).
428. O'Connell, B. H., O'Shea, D. & Gallagher, S. Feeling thanks and saying thanks: a randomized controlled trial examining if and how socially oriented gratitude journals work. *J. Clin. Psychol.* **73**, 1280–1300 (2017).
429. Froh, J. J., Sefick, W. J. & Emmons, R. A. Counting blessings in early adolescents: an experimental study of gratitude and subjective wellbeing. *J. Sch. Psychol.* **46**, 213–233 (2009).
430. Drewery, D. W., Cormier, L. A., Pretti, T. J. & Church, D. Improving unmatched co-op students' emotional wellbeing: test of two brief interventions. *Int. J. Work-Integr. Learn.* **20**, 43–53 (2019).
431. Hoepfner, B. B., Schick, M. R., Carlon, H. & Hoepfner, S. S. Do self-administered positive psychology exercises work in persons in recovery from problematic substance use? An online randomized survey. *J. Subst. Abuse Treat.* **99**, 16–23 (2019).
432. Tagalidou, N., Baier, J. & Laireiter, A. R. The effects of three positive psychology interventions using online diaries: a randomized-placebo controlled trial. *Internet Intervent.* **17**, 100242 (2019).
433. Gander, F., Proyer, R. T., Hentz, E. & Ruch, W. Working mechanisms in positive interventions: a study using daily assessment of positive emotions. *J. Posit. Psychol.* **15**, 633–638 (2020).
434. Martínez-Martí, M. L., Avia, M. D. & Hernández-Lloreda, M. J. Effects of an appreciation of beauty randomized-controlled trial web-based intervention on appreciation of beauty and wellbeing. *Psychol. Aesthet. Creat. Arts* **12**, 272 (2018).
435. Buchanan, K. E. & Bardi, A. Acts of kindness and acts of novelty affect life satisfaction. *J. Soc. Psychol.* **150**, 235–237 (2010).
436. Alden, L. E. & Trew, J. L. If it makes you happy: engaging in kind acts increases positive affect in socially anxious individuals. *Emotion* **13**, 64–75 (2013).
437. Ko, K., Margolis, S., Revord, J. & Lyubomirsky, S. Comparing the effects of performing and recalling acts of kindness. *J. Posit. Psychol.* **16**, 73–81 (2021).
438. Wang, M.-C., Tran, K. K., Nyutu, P. N. & Fleming, E. Doing the right thing: a mixed-methods study focused on generosity and positive wellbeing. *J. Creativity Ment. Health* **9**, 318–331 (2014).
439. Hurley, D. B. & Kwon, P. Results of a study to increase savoring the moment: differential impact on positive and negative outcomes. *J. Happiness Stud.* **13**, 579–588 (2012).
440. Layous, K., Kurtz, J., Chancellor, J. & Lyubomirsky, S. Reframing the ordinary: imagining time as scarce increases wellbeing. *J. Posit. Psychol.* **13**, 301–308 (2018).
441. Smith, J. L. & Bryant, F. B. Enhancing positive perceptions of aging by savoring life lessons. *Ageing Ment. Health* **23**, 762–770 (2019).
442. Palmer, C. A. & Gentzler, A. L. Adults' self-reported attachment influences their savoring ability. *J. Posit. Psychol.* **13**, 290–300 (2018).
443. Wellenzohn, S., Proyer, R. T. & Ruch, W. Humor-based online positive psychology interventions: a randomized placebo-controlled long-term trial. *J. Posit. Psychol.* **11**, 584–594 (2016).
444. Martínez-Martí, M. L., Avia, M. D. & Hernández-Lloreda, M. J. The effects of counting blessings on subjective wellbeing: a gratitude intervention in a Spanish sample. *Span. J. Psychol.* **13**, 886–896 (2010).
445. van der Spek, N. et al. Efficacy of meaning-centered group psychotherapy for cancer survivors: a randomized controlled trial. *Psychol. Med.* **47**, 1990–2001 (2017).
446. Chancellor, J., Margolis, S., Jacobs Bao, K. & Lyubomirsky, S. Everyday prosociality in the workplace: the reinforcing benefits of giving, getting, and glimpsing. *Emotion* **18**, 507–517 (2018).
447. Chancellor, J., Layous, K. & Lyubomirsky, S. Recalling positive events at work makes employees feel happier, move more, but interact less: a 6-week randomized controlled intervention at a Japanese workplace. *J. Happiness Stud.* **16**, 871–887 (2015).
448. Hurley, M. V., Walsh, N. E., Mitchell, H., Nicholas, J. & Patel, A. Long-term outcomes and costs of an integrated rehabilitation program for chronic knee pain: a pragmatic, cluster randomized, controlled trial. *Arthritis Care Res.* **64**, 238–247 (2012).
449. Cook, E. A. Effects of reminiscence on life satisfaction of elderly female nursing home residents. *Health Care Women Int.* **19**, 109–118 (1998).
450. Davis, M. C. Life review therapy as an intervention to manage depression and enhance life satisfaction in individuals with right hemisphere cerebral vascular accidents. *Issues Ment. Health Nurs.* **25**, 503–515 (2004).
451. Franklin, F. C. & Cheung, M. Legacy interventions with patients with co-occurring disorders: legacy definitions, life satisfaction, and self-efficacy. *Subst. Use Misuse* **52**, 1840–1849 (2017).
452. Hallford, D. J. & Mellor, D. Brief reminiscence activities improve state wellbeing and self-concept in young adults: a randomised controlled experiment. *Memory* **24**, 1311–1320 (2016).
453. Latorre, J. M. et al. Life review based on remembering specific positive events in active aging. *J. Aging Health* **27**, 140–157 (2015).

454. Mei, Y., Lin, B., Li, Y., Ding, C. & Zhang, Z. Effects of modified 8-week reminiscence therapy on the older spouse caregivers of stroke survivors in Chinese communities: a randomized controlled trial. *Int. J. Geriatr. Psychiatry* **33**, 633–641 (2018).
455. Preschl, B. et al. Life-review therapy with computer supplements for depression in the elderly: a randomized controlled trial. *Aging Ment. Health* **16**, 964–974 (2012).
456. Rattenbury, C. & Stones, M. J. A controlled evaluation of reminiscence and current topics discussion groups in a nursing home context. *Gerontologist* **29**, 768–771 (1989).
457. Yousefi, Z., Sharifi, K., Tagharrobi, Z. & Akbari, H. The effect of narrative reminiscence on happiness of elderly women. *Iran. Red Crescent Med. J.* **17**, e19612 (2015).
458. Cook, E. A. The effects of reminiscence on psychological measures of ego integrity in elderly nursing home residents. *Arch. Psychiatr. Nurs.* **5**, 292–298 (1991).
459. Westerhof, G. J., Lamers, S. M. A., Postel, M. G. & Bohlmeijer, E. T. Online therapy for depressive symptoms: an evaluation of counselor-led and peer-supported life review therapy. *Gerontologist* **59**, 135–146 (2019).
460. Dong, X. et al. Telephone-based reminiscence therapy for colorectal cancer patients undergoing postoperative chemotherapy complicated with depression: a three-arm randomised controlled trial. *Support. Care Cancer* **27**, 2761–2769 (2019).
461. Bryant, F. B., Osowski, K. A. & Smith, J. L. Gratitude as a mediator of the effects of savoring on positive adjustment to aging. *Int. J. Aging Hum. Dev.* **92**, 275–300 (2021).
462. Westerhof, G. J., Korte, J., Eshuis, S. & Bohlmeijer, E. T. Precious memories: A randomized controlled trial on the effects of an autobiographical memory intervention delivered by trained volunteers in residential care homes. *Aging Ment. Health* **22**, 1494–1501 (2018).
463. Korte, J., Bohlmeijer, E., Cappeliez, P., Smit, F. & Westerhof, G. Life review therapy for older adults with moderate depressive symptomatology: a pragmatic randomized controlled trial. *Psychol. Med.* **42**, 1163–1173 (2012).
464. Lan, X., Xiao, H., Chen, Y. & Zhang, X. Effects of life review intervention on life satisfaction and personal meaning among older adults with frailty. *J. Psychosoc. Nurs. Ment. Health Serv.* **56**, 30–36 (2018).
465. Zhou, W. et al. The effects of group reminiscence therapy on depression, self-esteem, and affect balance of Chinese community-dwelling elderly. *Arch. Gerontol. Geriatr.* **54**, e440–e447 (2012).
466. Lai, C. K. Y., Chin, K. C. W., Zhang, Y. & Chan, E. A. Psychological outcomes of life story work for community-dwelling seniors: a randomised controlled trial. *Int. J. Older People Nurs.* **14**, e12238 (2019).
467. Hijazi, A. M. et al. Brief narrative exposure therapy for posttraumatic stress in Iraqi refugees: a preliminary randomized clinical trial. *J. Trauma. Stress* **27**, 314–322 (2014).
468. Hilpert, P., Bodenmann, G., Nussbeck, F. W. & Bradbury, T. N. Improving personal happiness through couple intervention: a randomized controlled trial of a self-directed couple enhancement program. *J. Happiness Stud.* **17**, 213–237 (2016).
469. Tsivos, Z.-L., Calam, R., Sanders, M. R. & Wittkowski, A. A pilot randomised controlled trial to evaluate the feasibility and acceptability of the Baby Triple P Positive Parenting Programme in mothers with postnatal depression. *Clin. Child Psychol. Psychiatry* **20**, 532–554 (2015).
470. Yamada, T., Kawamata, H., Kobayashi, N., Kielhofner, G. & Taylor, R. R. A randomised clinical trial of a wellness programme for healthy older people. *Br. J. Occup. Ther.* **73**, 540–548 (2010).
471. Fabrizio, C. S. et al. Parental emotional management benefits family relationships: a randomized controlled trial in Hong Kong, China. *Behav. Res. Ther.* **71**, 115–124 (2015).
472. Simkiss, D. E. et al. Effectiveness and cost-effectiveness of a universal parenting skills programme in deprived communities: multicentre randomised controlled trial. **3**, e002851 (2013).
473. McGowan, S. K. & Behar, E. A preliminary investigation of stimulus control training for worry: effects on anxiety and insomnia. *Behav. Modif.* **37**, 90–112 (2013).
474. Reinke, B. J., Holmes, D. S. & Denney, N. W. Influence of a ‘friendly visitor’ program on the cognitive functioning and morale of elderly persons. *Am. J. Community Psychol.* **9**, 491–504 (1981).
475. Cheng, S.-T., Fung, H. H., Chan, W. C. & Lam, L. C. W. Short-term effects of a gain-focused reappraisal intervention for dementia caregivers: a double-blind cluster-randomized controlled trial. *Am. J. Geriatr. Psychiatry* **24**, 740–750 (2016).
476. Larson, J. et al. The impact of a nurse-led support and education programme for spouses of stroke patients: a randomized controlled trial. *J. Clin. Nurs.* **14**, 995–1003 (2005).
477. Arola, A., Dahlin-Ivanoff, S. & Haggblom-Kronlof, G. Impact of a person-centred group intervention on life satisfaction and engagement in activities among persons aging in the context of migration. *Scand. J. Occup. Ther.* **27**, 269–279 (2020).
478. Braganza, D. J., Piedmont, R. L., Fox, J., Fialkowski, G. M. & Gray, R. M. Examining the clinical efficacy of core transformation: a randomized clinical trial. *J. Counsel. Dev.* **97**, 293–305 (2019).
479. Kruizinga, R. et al. An assisted structured reflection on life events and life goals in advanced cancer patients: outcomes of a randomized controlled trial (Life InSight Application (LISA) study). *Palliat. Med.* **33**, 221–231 (2019).
480. Sullivan, G. J., Hain, D. J., Williams, C. & Newman, D. Story-sharing intervention to improve depression and wellbeing in older adults transitioning to long-term care. *Res. Gerontol. Nurs.* **12**, 81–90 (2019).
481. Hajjabbagh, N., Fereidooni-Moghadam, M., Masoudi, R. & Etamadifar, M. The effect of an emotional intelligence component program on happiness in patients with epilepsy. *Epilepsy Behav.* **106**, 106972 (2020).
482. Contractor, A. A., Banducci, A. N., Jin, L., Keegan, F. S. & Weiss, N. H. Effects of processing positive memories on posttrauma mental health: A preliminary study in a non-clinical student sample. *J. Behav. Ther. Exp. Psychiatry* **66**, 10156 (2020).
483. Zhang, T., Fu, H. & Wan, Y. The application of group forgiveness intervention for courtship-hurt college students: a Chinese perspective. *Int. J. Group Psychother.* **64**, 298–320 (2014).
484. Muller, A., Heiden, B., Herbig, B., Poppe, F. & Angerer, P. Improving wellbeing at work: a randomized controlled intervention based on selection, optimization, and compensation. *J. Occup. Health Psychol.* **21**, 169–181 (2016).
485. Read, A., Mazzucchelli, T. G. & Kane, R. T. A preliminary evaluation of a single session behavioural activation intervention to improve wellbeing and prevent depression in carers. *Clin. Psychol.* **20**, 36–45 (2016).
486. Xie, J. et al. A randomized study on the effect of modified behavioral activation treatment for depressive symptoms in rural left-behind elderly. *Psychother. Res.* **29**, 372–382 (2019).
487. Soucy, I., Provencher, M. D., Fortier, M. & McFadden, T. Secondary outcomes of the guided self-help behavioural activation and physical activity for depression trial. *J. Ment. Health* **28**, 410–418 (2019).
488. Hojjat, S. K. et al. The effectiveness of group assertiveness training on happiness in rural adolescent females with substance abusing parents. *Glob. J. Health Sci.* **8**, 156–164 (2015).
489. Coote, H. M. J. & MacLeod, A. K. A self-help, positive goal-focused intervention to increase wellbeing in people with depression. *Clin. Psychol. Psychother.* **19**, 305–315 (2012).
490. Sheldon, K. M., Kasser, T., Smith, K. & Share, T. Personal goals and psychological growth: testing an intervention to enhance goal attainment and personality integration. *J. Pers.* **70**, 5–31 (2002).
491. Leung, S. S. K. & Lam, T. H. Group antenatal intervention to reduce perinatal stress and depressive symptoms related to intergenerational conflicts: a randomized controlled trial. *Int. J. Nurs. Stud.* **49**, 1391–1402 (2012).
492. Elliott, T. R., Brossart, D., Berry, J. W. & Fine, P. R. Problem-solving training via videoconferencing for family caregivers of persons with spinal cord injuries: a randomized controlled trial. *Behav. Res. Ther.* **46**, 1220–1229 (2008).
493. Elliott, T. R., Berry, J. W. & Grant, J. S. Problem-solving training for family caregivers of women with disabilities: a randomized clinical trial. *Behav. Res. Ther.* **47**, 548–558 (2009).
494. Berry, J. W., Grant, J. S., Elliott, T. R., Edwards, G. & Fine, P. R. Does problem-solving training for family caregivers benefit their care recipients with severe disabilities? A latent growth model of the project clues randomized clinical trial. *Rehabil. Psychol.* **57**, 98–112 (2012).
495. Oliver, J. & Macleod, A. K. Working adults’ wellbeing: An online self-help goal-based intervention. *J. Occup. Organ. Psychol.* **91**, 665–680 (2018).
496. Roch, R. M., Rosch, A. G. & Schultheiss, O. C. Enhancing congruence between implicit motives and explicit goal commitments: results of a randomized controlled trial. *Front. Psychol.* **8**, 1540 (2017).
497. Kenny, R., Fitzgerald, A., Segurado, R. & Dooley, B. Is there an app for that? A cluster randomised controlled trial of a mobile app-based mental health intervention. *Health Inform. J.* **26**, 1538–1559 (2020).
498. Crawford, J., Wilhelm, K. & Proudfoot, J. Web-based benefit-finding writing for adults with type 1 or type 2 diabetes: preliminary randomized controlled trial. *JMIR Diabetes* **4**, e13857 (2019).
499. Nelson, S. K., Fuller, J. A. K., Choi, I. & Lyubomirsky, S. Beyond self-protection: self-affirmation benefits hedonic and eudaimonic wellbeing. *Pers. Soc. Psychol. Bull.* **40**, 998–1011 (2014).
500. Roche, L., Dawson, D. L., Moghaddam, N. G., Abey, A. & Gresswell, D. M. An acceptance and commitment therapy (Act) intervention for chronic fatigue syndrome (CFS): a case series approach. *J. Contextual Behav. Sci.* **6**, 178–186 (2017).
501. Lyubomirsky, S. & Lepper, H. S. A measure of subjective happiness: preliminary reliability and construct validation. *Soc. Indic. Res.* **46**, 137–155 (1999).
502. Mueller, R. M., Lambert, M. J. & Burlingame, G. M. Construct validity of the outcome questionnaire: A confirmatory factor analysis. *J. Pers. Assess.* **70**, 248–262 (1998).

503. Topp, C. W., Østergaard, S. D., Søndergaard, S. & Bech, P. The WHO-5 Wellbeing Index: a systematic review of the literature. *Psychother. Psychosom.* **84**, 167–176 (2015).
504. Shepherd, J., Oliver, M. & Schofield, G. Convergent validity and test–retest reliability of the authentic happiness inventory in working adults. *Soc. Indic. Res.* **124**, 1049–1058 (2015).
505. Wallace, K. A. & Wheeler, A. J. Reliability generalization of the life satisfaction index. *Educ. Psychological Meas.* **62**, 674–684 (2002).
506. Huebner, E. S. Initial development of the student's life satisfaction scale. *Sch. Psychol. Int.* **12**, 231–240 (1991).
507. Seligson, J. L., Huebner, E. S. & Valois, R. F. Preliminary validation of the brief multidimensional students' life satisfaction scale (BMSLSS). *Soc. Indic. Res.* **61**, 121–145 (2003).
508. Moum, T., Naess, S., Sørensen, T., Tamsb, K. & Holmen, J. Hypertension labelling, life events and psychological wellbeing. *Psychol. Med.* **20**, 635–646 (1990).
509. Cummins, R. A., Eckersley, R., Pallant, J., Van Vugt, J. & Misajon, R. Developing a national index of subjective wellbeing: The Australian Unity Wellbeing Index. *Soc. Indic. Res.* **64**, 159–190 (2003).
510. Kammann, R. & Flett, R. Affectometer 2: a scale to measure current level of general happiness. *Aust. J. Psychol.* **35**, 259–265 (1983).
511. Campbell, A., Converse, P. & Rodgers, W. *The Quality of American Life: Perceptions, Evaluations and Satisfaction* (Russell Sage Foundation, 1976).
512. Post, M. W., van Leeuwen, C. M., van Koppenhagen, C. F. & de Groot, S. Validity of the life satisfaction questions, the life satisfaction questionnaire, and the satisfaction with life scale in persons with spinal cord injury. *Arch. Phys. Med. Rehabil.* **93**, 1832–1837 (2012).
513. Fugl-Meyer, A. R., Melin, R. & Fugl-Meyer, K. S. Life satisfaction in 18- to 64-year-old Swedes: in relation to gender, age, partner and immigrant status. *J. Rehabil. Med.* **34**, 239–246 (2002).
514. Stones, M. in *Encyclopedia of Quality of Life and Wellbeing Research* (ed Michalos, A. C.) 3987–3990 (Springer, 2014).
515. Dambrun, M. et al. Measuring happiness: from fluctuating happiness to authentic-durable happiness. *Front. Psychol.* **3**, 16–16 (2012).
516. Nieboer, A., Lindenberg, S., Boomsma, A. & Bruggen, A. C. V. Dimensions of wellbeing and their measurement: the Spf-II scale. *Soc. Indic. Res.* **73**, 313–353 (2005).
517. Gilbert, P. et al. Feeling safe and content: A specific affect regulation system? Relationship to depression, anxiety, stress, and self-criticism. *J. Posit. Psychol.* **3**, 182–191 (2008).
518. Chiang, Y. C., Lee, C. Y. & Hsueh, S. C. Happiness or hopelessness in late life: a cluster RCT of the 3L-Mind-Training programme among the institutionalized older people. *J. Adv. Nurs.* **76**, 312–323 (2020).
519. Cheng, S. T., Mak, E. P. M., Kwok, T., Fung, H. & Lam, L. C. W. Benefit-finding intervention delivered individually to Alzheimer family caregivers: longer-term outcomes of a randomized double-blind controlled trial. *J. Gerontol. B* **75**, 1884–1893 (2020).
520. Hills, P. & Argyle, M. The Oxford Happiness Questionnaire: a compact scale for the measurement of psychological wellbeing. *Pers. Individ. Differ.* **33**, 1073–1082 (2002).
521. Diener, E. et al. New wellbeing measures: short scales to assess flourishing and positive and negative feelings. *Soc. Indic. Res.* **97**, 143–156 (2010).
522. De Beni, R., Borella, E., Carretti, B., Marigo, C. & Nava, L. *Portfolio per la Valutazione del Benessere e delle Abilità Cognitive Nell'età Adulta e Avanzata* (Giunti, OS, 2008).
523. Waterman, A. S. et al. The questionnaire for eudaimonic wellbeing: psychometric properties, demographic comparisons, and evidence of validity. *J. Posit. Psychol.* **5**, 41–61 (2010).
524. Watson, D. & Clark, L. A. *The PANAS-X: Manual for the Positive and Negative Affect Schedule-Expanded Form* (Univ. Iowa, 1999).
525. Laurent, J. et al. A measure of positive and negative affect for children: scale development and preliminary validation. *Psychological Assess.* **11**, 326 (1999).
526. Boyle, G. J. Reliability and validity of Izard's differential emotions scale. *Pers. Individ. Differ.* **5**, 747–750 (1984).
527. Cohn, M. A., Fredrickson, B. L., Brown, S. L., Mikels, J. A. & Conway, A. M. Happiness unpacked: positive emotions increase life satisfaction by building resilience. *Emotion* **9**, 361 (2009).
528. Bradburn, N. M. *The Structure of Psychological Wellbeing* (Aldine, 1969).
529. Derogatis, L. *The Affects Balance Scale* (Clinical Psychometric Research, 1975).
530. Mroczek, D. K. & Kolarz, C. M. The effect of age on positive and negative affect: a developmental perspective on happiness. *J. Pers. Soc. Psychol.* **75**, 1333–1349 (1998).
531. Mayer, J. D. & Gaschke, Y. N. The experience and meta-experience of mood. *J. Pers. Soc. Psychol.* **55**, 102–111 (1988).
532. Cheng, S.-T. Age and subjective wellbeing revisited: a discrepancy perspective. *Psychol. Aging* **19**, 409–415 (2004).
533. Steyer, R., Schwenkmezger, P., Notz, P. & Eid, M. Testtheoretische analysen des mehrdimensionalen befindlichkeitsfragebogen (MDBF). *Diagnostica* **40**, 320–328 (1994).
534. Diener, E. & Emmons, R. A. The independence of positive and negative affect. *J. Pers. Soc. Psychol.* **47**, 1105 (1984).
535. Denollet, J. Emotional distress and fatigue in coronary heart disease: the Global Mood Scale (GMS). *Psychol. Med.* **23**, 111–111 (1993).
536. Bradley, C. *Handbook of Psychology and Diabetes: A Guide to Psychological Measurement in Diabetes Research and Practice* (Harwood Academic Publishers, 1994).
537. Lamers, S. M. A., Westerhof, G. J., Bohlmeijer, E. T., ten Klooster, P. M. & Keyes, C. L. M. Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). *J. Clin. Psychol.* **67**, 99–110 (2011).
538. Bisseling, E. et al. Development of the therapeutic alliance and its association with internet-based mindfulness-based cognitive therapy for distressed cancer patients: secondary analysis of a multicenter randomized controlled trial. *J. Med. Internet Res.* **21**, e14065 (2019).
539. Su, R., Tay, L. & Diener, E. The development and validation of the Comprehensive Inventory of Thriving (CIT) and the Brief Inventory of Thriving (BIT). *Appl. Psychol. Health Well Being* **6**, 251–279 (2014).
540. Hervas, G. & Vazquez, C. Construction and validation of a measure of integrative wellbeing in seven languages: The Pemberton Happiness Index. *Health Qual. Life Outcomes* **11**, 66 (2013).
541. Massé, R. et al. Elaboration and validation of a tool to measure psychological wellbeing: WBMMS. *Can. J. Public Health* **89**, 352–357 (1998).
542. Shah, N. & Stewart-Brown, S. The Warwick–Edinburgh Mental Wellbeing Scale: role and impact on public health policy and practice. *Eur. J. Public Health* <https://doi.org/10.1093/eurpub/ckx186.237> (2017).
543. Stewart-Brown, S. et al. Internal construct validity of the Warwick–Edinburgh mental wellbeing scale (WEMWBS): a Rasch analysis using data from the Scottish health education population survey. *Health Qual. Life Outcomes* **7**, 15 (2009).
544. Butler, J. & Kern, M. L. The PERMA-Profil: a brief multidimensional measure of flourishing. *Int. J. Wellbeing* **6**, 1–48 (2016).
545. Kokko, K., Korkalainen, A., Lyyra, A.-L. & Feldt, T. Structure and continuity of wellbeing in mid-adulthood: a longitudinal study. *J. Happiness Stud.* **14**, 99–114 (2013).

Acknowledgements

The authors thank colleagues at the South Australian Health and Medical Research Institute, Wellbeing and Resilience Centre, for their support during the creation of this review, S. Brown and N. May, for their help in crafting the search strategy. This work was supported by a grant by the James and Diana Ramsay Foundation. The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

Author contributions

J.v.A.: review methodology, screening of literature, data extraction, risk of bias, meta-analysis and writing. M.I.: review methodology, screening of literature, data extraction, risk of bias and writing. L.L.: screening of literature, data extraction, risk of bias and writing. J.B.: data extraction, risk of bias and writing. Z.K.: risk of bias and writing. M.C.: data extraction and writing. M.K.: input into methodology, focus of review and writing.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1038/s41562-021-01093-w>.

Correspondence and requests for materials should be addressed to J.v.A.

Peer review information *Nature Human Behaviour* thanks Pete Harris, Laura Anne Weiss and the other, anonymous, reviewer(s) for their contribution to the peer review of this work.

Reprints and permissions information is available at www.nature.com/reprints.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

© The Author(s), under exclusive licence to Springer Nature Limited 2021

Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- | | | |
|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The statistical test(s) used AND whether they are one- or two-sided
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | A description of all covariates tested |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
<i>Give P values as exact values whenever suitable.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated |

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection

Data analysis

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

Life sciences Behavioural & social sciences Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Systematic review and meta-analysis utilising meta-regression (sub-group analyses)
Research sample	Studies investigating adults and youths in clinical and non-clinical populations. Studies needed to be RCTs, needed to use a validated measure of mental wellbeing and needed to test psychological interventions. Studies focusing on participants with cognitive impairment or studies conducted in another language than English were excluded.
Sampling strategy	The data sources for the current meta-analysis were peer-reviewed journal articles, as sourced via PsycINFO, PsycARTICLES, Scopus, Medline, and CINAHL. The search strategy was devised by professional librarians.
Data collection	All data was sourced via the above mentioned databases. Existing systematic reviews that arose from the search on related interventions or topics, as well as reference lists of included studies were furthermore screened.
Timing	Final search was run in July 2020 with extraction and data-analysis occurring up to 24th of December 2020
Data exclusions	Heterogeneity analyses combined with visual inspection of plots were run to determine the impact of extreme outliers. All studies reporting Cohen's D's of over 2 were generally excluded due to their extreme contribution to heterogeneity, which was profound even though a random effects analysis was run.
Non-participation	not applicable in review
Randomization	The review only included RCTs including crossover and cluster RCTs

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> Antibodies
<input checked="" type="checkbox"/>	<input type="checkbox"/> Eukaryotic cell lines
<input checked="" type="checkbox"/>	<input type="checkbox"/> Palaeontology and archaeology
<input checked="" type="checkbox"/>	<input type="checkbox"/> Animals and other organisms
<input checked="" type="checkbox"/>	<input type="checkbox"/> Human research participants
<input checked="" type="checkbox"/>	<input type="checkbox"/> Clinical data
<input checked="" type="checkbox"/>	<input type="checkbox"/> Dual use research of concern

Methods

n/a	Involved in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> ChIP-seq
<input checked="" type="checkbox"/>	<input type="checkbox"/> Flow cytometry
<input checked="" type="checkbox"/>	<input type="checkbox"/> MRI-based neuroimaging