

# Mental Health and/or Mental Illness: A Scoping Review of the Evidence and Implications of the Dual-Continua Model of Mental Health

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## Abstract

The dual-continua model of mental health suggests that mental illness and positive mental health reflect distinct continua, rather than the extreme ends of a single spectrum. The aim of this review was to scope the literature surrounding the dual-continua model of mental health, to summarise the evidence, highlight the areas of focus for individual studies and discuss the wider implications of the model. A search was conducted in PsycINFO (n=233), PsycARTICLES (n=25), Scopus (n=137) and PubMed (n=47), after which a snowballing approach was used to scope the remaining literature. The current scoping review identified 83 peer-reviewed empirical articles, including cross-sectional, longitudinal and intervention studies, which found overall support for superior explanatory power of dual-continua models of mental health over the traditional bipolar model. These studies were performed in clinical and non-clinical populations, over the entire life-course and in Western and non-Western populations. This review summarised the evidence suggesting that positive mental health and mental illness are two distinct but interrelated domains of mental health; each having shared and unique predictors, influencing each other via complex interrelationships. The results presented here have implications for policy, practice and research for mental health assessment, intervention design, and mental health care design and reform.

Eaton (1951) proposed that mental health ‘merges imperceptibly and gradually like the colours of the spectrum into mental illness’ (as cited by Herron and Trent, 2000). This description illustrates a bipolar relationship between mental health and mental illness; a relationship and assumption that underpins clinical psychology and mental health care design (Keyes, 2005). The bipolar model implies that mental health and mental illness reflect opposite ends of the same continuum, where an individual ‘moves’ along the continuum, away from mental illness and towards mental health (Trent, 1992). In this model, individuals are either mentally ill or presumed mentally healthy (Keyes, 2005). As the aetiology and treatment of mental illness were researched and progressed faster

than that of mental health, the existence of mental health became virtually synonymous with the absence of mental illness. As such, clinical psychology and psychiatry have primarily focused on the reduction of mental illness symptoms or psychopathology in order to improve mental health.

While pervasive, the model is considered an untested assumption, and the philosophical validity of the model has been widely criticised. For instance, many have disparaged the arbitrary point on the continuum where illness transitions to health, the sex and cultural differences that influence this arbitrary point, the impossibility of ‘gaining’ mental health (if it is defined as the absence/loss of illness), and the futility of improving mental health whilst being

diagnosed with a mental illness (Herron and Trent, 2000). Criticisms and rejection of the bipolar model in the context of mental health were documented as early as 1958 by Marie Jahoda (Jahoda, 1958) who argued that the absence of disorder constituted an insufficient criterion for mental health. Jahoda outlined six dimensions of positive mental health, which would later be operationalised via Carol Ryff's work on psychological wellbeing: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-actualisation (Ryff, 1989). In combination with Ed Diener's (1984) research into subjective wellbeing, Ryff's seminal work brought the study of positive mental health into mainstream social science (Keyes, 2013).

Drawing on the work of humanistic psychologists such as Rogers and Maslow, the emergence of positive psychology in the 2000's formalised the paradigm shift toward the promotion of mental health as something separate to mental illness. Mental health or positive mental health is since defined as the experience of positive feelings or subjective wellbeing and functioning fully or optimally (Huppert, 2005), encompassing individual resources such as life satisfaction (Diener, 1984), positive emotions (Fredrickson, 2001), meaning and purpose in life (Steger et al., 2006), resilience (Bonanno, 2004), character strengths (Peterson and Seligman, 2004), and interpersonal relationships (Reis and Gable, 2003). While positive psychology has brought more attention to the importance of positive mental health, the main body of work did not focus on the relationship between mental illness and mental health, and has largely been conducted in isolation from mental illness (Payton, 2009).

Dual-continua or dual-factor models of mental health have been proposed by various authors as an alternative to the bipolar model, postulating that

mental illness and positive mental health reflect distinct continua rather than the extreme ends of a single spectrum; see Figure 1 for a schematic on both models (Jahoda, 1958; Keyes and Lopez, 2002; Suldo and Shaffer, 2008; Epp, 1988; Massé et al., 1998; Greenspoon and Saklofske, 2001). In the dual-continua model, mental health and mental illness are considered related but distinct constructs, and individuals can experience high levels of positive mental health even with the diagnosis of a mental illness (Keyes, 2005).

A useful analogy for the dual-factor model can be found in the relationship between positive and negative affect. Positive and negative affect were initially assumed bipolar opposites of each other. In-depth statistical analysis of scores on positive and negative affect measures however resulted in the finding that positive and negative affect are in fact independent of each other, despite their 'logical' bipolarity (Bradburn, 1969; Nowlis, 1965; Feldman Barrett and Russell, 1998). Similar to the discourse on positive and negative affect, recent and emerging research indicates that high levels of positive mental health assets are possible despite psychopathology and mental illness diagnosis (Goodman et al., 2018), and positive mental health can be built in those with a diagnosed mental illness (Fava et al., 1998; Seligman et al., 2006). A neural precedent of the dual-continua model has been discovered, and evidence suggests that positive emotions are mediated by separate neural processes to negative emotions, and likely serve distinct evolutionary functions (Davidson, 2000; Fredrickson, 2001).

It has been proposed that widespread and systematic adoption of the dual-continua model would inspire significant reform to the mental health care system, which may better prepare systems for the overwhelming burden of mental illness (Vigo et al., 2016). Herron and Trent (2000) interrogated the

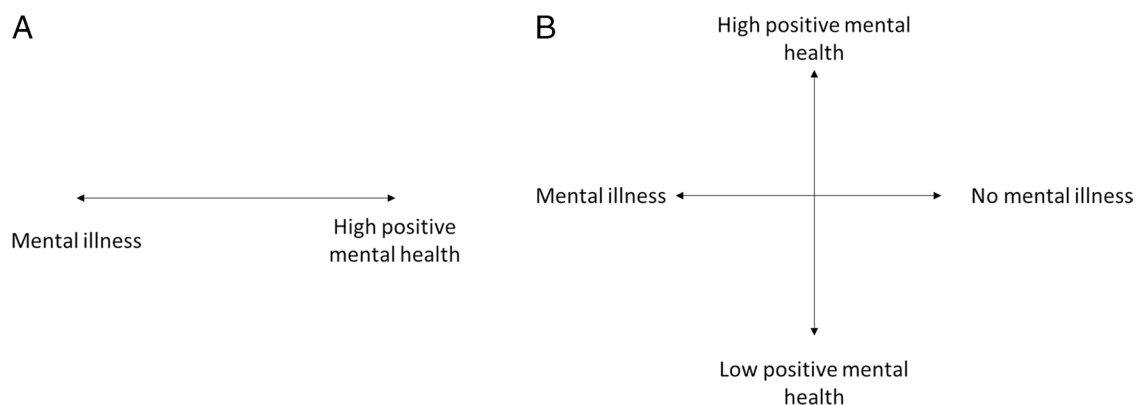


Figure 1: Diagrammatic representation of the bipolar (a) and dual-continua (b) models of mental health.

dual-continua model from a range of philosophical approaches, and concluded that it had five key implications:

1. It allows a concept (mental health or mental illness) to be described which is independent of other concepts, and so can be tested and measured independently;
2. It allows an individual to be mentally healthy and mentally ill at the same time, and thus facilitates the creation of groups that are impossible under bipolar models;
3. It allows an individual to disclose information about mental health while holding confidential information about mental illness;
4. It provides new avenues for proactive rather than reactive system design in mental health promotion; and
5. It is less reliant on labour-intensive downstream interventions and therefore can be more widely applied.

Despite these apparently significant implications to our mental healthcare system and its patients, the validity of the dual-continua model has been questioned by some. For instance, Huppert (2014) argued that while it may be possible to periodically experience flourishing in some mental illnesses such as schizophrenia or personality disorder, it is hard to imagine that an individual with severe depression or anxiety (or common mental disorder) is capable of flourishing. In light of the implications stated by Herron and Trent (2000), the question therefore remains whether the dual-factor model has higher utility and explanatory power compared to bipolar models in general, across different mental illnesses and within different contexts and settings.

This review was designed to scope the scientific literature investigating the validity of the dual-continua model of mental health. This review will summarise the evidence of the model, determine the main focus areas in the literature, and collate the implications of the included studies, with the aim of informing policy, practice and future research.

## Methods

This scoping review was designed to identify peer-reviewed scientific articles which specifically tested mental health and mental illness as two distinct constructs and was based on the Joanna Briggs Institute methodology (JBI, 2015). As noted by Payton (2009), terminology and nomenclature remains an impasse to progress in the field of mental health

research. Mental health, mental illness, distress and wellbeing are often used interchangeably. Similarly, various names for dual-continua models have been proposed, including the dual-factor model, two-factor, two-continua, the complete state model, and complete mental health. Due to this non-specific and imprecise taxonomy, it was determined that a snowballing approach was the most appropriate way to search the literature, first beginning with the studies that specifically mention dual-continua or dual factor model of mental health and then using reference list screening to effectively scope additional literature. For ease of reading, the current review uses the term 'dual-continua model' to describe the models.

A search was conducted in February 2019 of four scientific databases (Pubmed, PsycINFO, PsycARTICLES, and Scopus). The search strategy included all known variations of the dual-continua model (dual-continua, dual-continuum, dual-factor, two-continua, two-continuum, two-factor, and complete state) AND 'model' AND 'mental health'. Inclusion criteria included: (1) title, abstract, or keywords explicitly mention or implicitly refer to the dual-continua model of mental health, (2) the studies utilized an empirical study design, and (3) the study was published in a refereed journal in the English language. Two reviewers independently screened titles and abstracts, to determine preliminary inclusion status before conducting a full-text screen. Inter-rater reliability was calculated using SPSS v25 ( $k = 0.88$ ).

Data extracted included: Author, year of publication, aim of the study, study methodology, sample size, geographical location of participants, sex, age, types of participants, measurement tools used for mental illness and positive mental health, correlations between measurements (if available), key study results relevant to the dual-continua model, and implications of the results.

Data analysis was conducted in a two-stage process, first, extracted data were organised into groups based on either methodological or thematic similarity (for research on the validity of the model and implications of the model respectively). The extracted data were then interpreted and analysed narratively.

## Results

### Search flow

The search terms across the four databases resulted in 477 articles; PsycINFO ( $n=233$ ), PsycARTICLES ( $n=25$ ), Scopus ( $n=137$ ), PubMed ( $n=47$ ). After deduplication, 395 original articles were identified. The most common reason for exclusion during the

title and abstract screen was no clear reference to a dual-continua model, despite referencing both positive mental health and mental illness. The comprehensive description of the screening process is displayed in the PRISMA statement, which resulted in 83 original articles to be included in the review (Figure 2; Moher et al., 2009). The characteristics of all included studies can be found in Table A1.

### Design of included studies

The large majority of studies used an observational design (n=81). Sixty-six studies used a cross-sectional study design using data stemming from large population-level datasets or using data that was gathered prospectively by the researchers. Sixteen studies used a longitudinal observational design, with follow-up ranging between one year and ten years. One study used a mixed-methods design, while only two studies used an experimental intervention design.

### Countries

Most studies were conducted in the United States of America (n=31), Netherlands (n=12), Australia (n=7), United Kingdom (n=7), Canada (n=6), China

(n=3), Germany (n=3), South Korea (n=2), Russia (n=2), Italy (n=2), and Poland (n=2). Other countries included Spain, Argentina, South Africa, Greece, Sweden, Singapore, Portugal, Turkey, and Serbia.

### Study samples and participant characteristics

The study samples consisted of adults (n=55), youth (n=23) or both (n=5). Overall, most studies recruited slightly higher percentage of females (between 50% to 70%). Sample sizes varied between 0-100 (n=3), 101-500 (n=21), 501-1000 (n=12), 1000-5000 (n=23) and 5000+ (n=15). Studies were conducted in populations over the life course, with mean ages ranging from 10.5 for the youngest population to 70.3 for the oldest population.

Most study participants were recruited from the general non-clinical population. Thirteen studies targeted participants with a (history of) mental illness, specifically affective disorders (n=6), substance use disorder (n=1), suicide ideation (n=2), post-traumatic stress disorder (n=1), eating disorders (n=1), or a combination of mental disorders (n=2). One study looked at the application of a dual-continua model in participants with various physical illnesses.

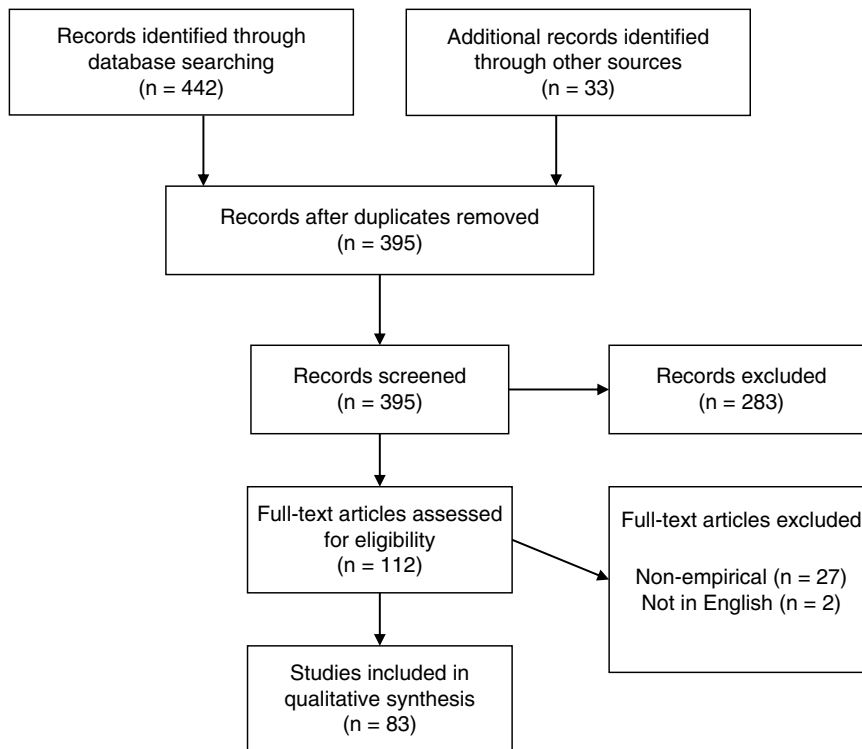


Figure 2: PRISMA flowchart of the study selection process.

Elementary and high school students were used in all but two studies (89%) that focused on application of dual-factor models in youth. In contrast, only nine adult-focused studies (18%) used student samples. Other populations that were specifically targeted in the recruitment included carers (n=3), older adults (n=1), the LGBTQI community (n=2), immigrants (n=1), siblings of those with a chronic illness or disability (n=1) and medical interns (n=1).

## Measures used

Measurement of positive mental health or flourishing was most commonly conducted using the Satisfaction with Life Scale (n=21) or the Mental Health Continuum – Short Form (MHC-SF) (n=23), administered in a range of languages including English, Dutch, Setswana, Polish, Korean, Spanish, Portuguese, and Italian. Five studies combined the use of Bradburn's Positive Affect Balance (Bradburn, 1969), Ryff's Psychological Wellbeing Scales (Ryff and Keyes, 1995), and Keyes Social Wellbeing Scales (Keyes, 1998) to determine the level of positive mental health, which are the same scales that the MHC-SF is based on.

Other commonly used measures included Positive and Negative Affect Schedule for adults or children (n=21), Psychological Wellbeing scale (n=12), Student's Life Satisfaction Scale (n=10), Bradburn's Affect Balance Scale (n=7), Social Wellbeing Scale (n=7), the full or brief Multidimensional student's life satisfaction scale (n=5), and Positive Mental health Scale (n=4).

Mental illness or symptoms of mental illness was most commonly measured using validated scales assessing affective disorders (depression and anxiety), via the Center for Epidemiologic Studies Depression Scale (CES-D) (n=11), Kessler psychological distress scale (n=1), Patient Health Questionnaire (PHQ) (n=3), Depression Anxiety Stress Scale (DASS-21) (n=6), Generalized Anxiety Disorder Scale (GAD) (n=3), Beck Depression Inventory (BDI) (n=2). Several studies screened for minor or non-psychiatric disorders via the GHQ (n=10), or general psychopathology via the Symptom Check List-90 (SCL-90) (n=2) and Brief Symptom Inventory (BSI) (n=6). Other studies relied on clinical interview diagnosis, using the Composite International Diagnostic Interview (WHO-CIDI) (n=9) or structured interviews using DSM or ICD10 criteria (n=2). A range of studies in the youth context, used scales that measure behavioural or emotional problems, or problems with coping, as their proxy to mental illness, for instance the Behavioural Assessment System for Children (BASC), the Youth Self Report form of the child behaviour checklist, the Reynolds adolescent

adjustment screening inventory (RAASI), or the Self-Report Coping Scale (SRCS).

Few studies used unvalidated measures of positive mental health or mental illness, which limited the interpretability of their results. For example, some studies (n=4) used "positive items" of measures that are normally used to measure mental illness, such as the General health Questionnaire (GHQ). Less commonly used scales, including single-item scales can be found in Table A1.

## Focus areas of studies

The main focus areas of included studies have been collated and summarised below. The specific aims and results of each individual study are available in Table A1.

### *Investigation of the dual-continua model fit*

Reflecting the central aim of this review, the majority of included studies focused on whether the relationship between positive mental health and mental illness reflect a single bipolar continuum or a dual-continua. This was most commonly performed using Confirmatory Factor Analysis; a statistical technique to test the adequacy of a theorised model to represent the data. Three models were commonly tested, single axis (or bipolar), two orthogonal factors (independent and distinct factors), and two oblique factors (independent and related factors), displayed in Figure 3. It was consistently found that the data best fit the two-factor oblique model, indicating that positive mental health and mental illness represent two separate constructs which share a degree of overlap (Magalhaes and Calheiros, 2017; Massé et al., 1998; Winzer et al., 2014; Kim et al., 2014; Keyes, 2005).

The analysis was usually performed in the context of measurement tool validation, in particular validating the MHC-SF (Lim, 2014; Lamers et al., 2011; Petrillo et al., 2015; Lupano Perugini et al., 2017; Karas et al., 2014; Keyes et al., 2008), with other studies investigating the MHI (Heubeck and Neill, 2000; Veit and Ware, 1983), or the potential appropriateness of using the GHQ to capture positive mental health and mental illness (Hu et al., 2007).

### *Validating sub-groups within dual-continua model*

A second focus area of the included studies was to determine whether participant responses on positive mental health and mental illness measures could

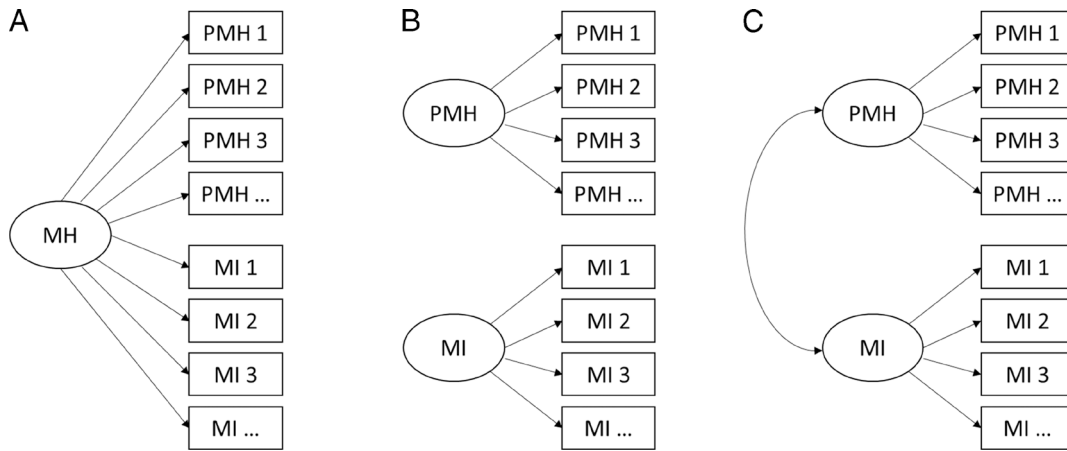


Figure 3: The three commonly tested models in Confirmatory Factor Analysis used to test the best model fit for the data: Single axis, which would indicate the bipolar model (a), two orthogonal factors, independent and distinct (b), and two oblique factors, independent and related (c). PMH=Positive mental health, MI = mental illness, MH = mental health. Circles indicate latent constructs, and boxes indicate survey items.

lead to the identification of distinct groups within the dual-continua model. Many studies divided their participants into four groups: ‘Complete mental health’ (no mental illness, high positive mental health), ‘Vulnerable’ (low mental illness, low positive

mental health), ‘Symptomatic but content’ (high mental illness, high mental health), and ‘Struggling’ (high mental illness, low mental health), displayed in Figure 4. The exact descriptors of each group used in the included studies varied, often depending on

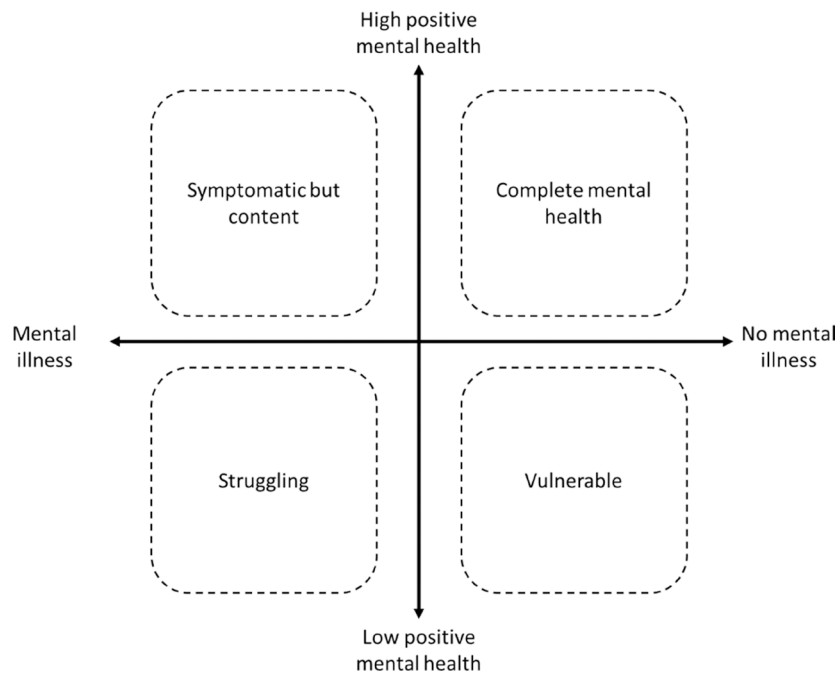


Figure 4: Sub-groups of mental health, as postulated by dual-factor models. Keyes’ (Keyes, 2005) terminology to describe the groups is used in throughout this paper to highlight the four mental health groups: ‘Complete Mental Health’ (no mental illness, high positive mental health), ‘Vulnerable’ (no mental illness, low positive mental health), ‘Symptomatic but content’ (mental illness, high positive mental health), and Struggling (mental illness, low positive mental health).

the theoretical background preferred by the authors (Keyes, 2005; Suldo and Shaffer, 2008; Greenspoon and Saklofske, 2001). For ease of reading, we will use Keyes' terminology throughout the current review and attached appendices. The apparent validity of these sub-groups was often tested by contrasting sub-group performance on a range of psychological, behavioural, or physical outcomes.

Expanding on this were a small number of longitudinal studies that focused on the stability of group members over time, with the aim of determining whether: (1) current levels of positive mental health influence future scores of measures of mental illness, (2) change in levels of positive mental health influence future scores of measure of mental illness, and (3) whether specific sub-groups are more transient or stable than others (Xiong et al., 2017; Kelly et al., 2012; Lamers et al., 2015; Wood and Joseph, 2010; Grant et al., 2013).

### ***Differential predictors of mental illness and positive mental health and correlations with other key outcomes***

A third area of focus of included studies was to determine whether positive mental health and mental illness were associated with different predictors and variables, and whether they were associated with positive or negative outcomes. This was often performed for two reasons, either to establish whether positive mental health and mental illness are predicted by different factors (supporting the claim that they are distinct constructs), or to assess whether measures of mental illness or mental health were differentially associated with other psychological or behavioural resources or outcomes (to maximise explanatory power of measurement tools). Examples of specific resources or outcomes that were studied included curiosity (Jovanovic and Brdaric, 2012), personality (Lyons et al., 2013; Spinhoven et al., 2015; Lamers et al., 2012), self-efficacy (Schonfeld et al., 2016), health-risk behaviour (Venning et al., 2013), genetics (Bartels et al., 2013), risk of cardiovascular disease (Keyes, 2004), coping (Kinderman et al., 2015), positive psychology constructs, and general socio-demographic variables (Westerhof, 2013; Weich et al., 2011; Westerhof and Keyes, 2010; Huppert and Whittington, 2003).

Studies including youth, high school and university students focused on determining the differential associations between mental illness, positive mental health, and educational, behavioural, and developmental outcomes (Rose et al., 2017; Suldo and Shaffer, 2008; Suldo et al., 2016; Lyons et al., 2013; Antaramian, 2011; Magalhaes and Calheiros,

2017; Renshaw and Cohen, 2014; Eklund et al., 2011). Examples of these outcomes included grade point average, suspension rates, social adjustment, self-efficacy beliefs, identity development, social support, and school bonding.

The association with predictors and outcomes was also studied in a range of specific and at-risk populations such as carers (Pruchno et al., 1996; Smith, 1996), older adults (Jiang and Lu, 2018), chronically ill people and their siblings (Hallion et al., 2018; Fontana et al., 1980), LGBT community (Peter, 2018; Bariola et al., 2017), migrants (du Plooy et al., 2018), minority populations (Rose et al., 2017), and for specific mental illness diagnoses (Baiden and Fuller-Thomson, 2016; Seow et al., 2016; Fuller-Thomson et al., 2016; Spinhoven et al., 2015; Van Erp Taalman Kip and Hutschemaekers, 2018; Franken et al., 2018; Diaz et al., 2017; Teismann et al., 2018).

### ***Impact of interventions***

A final area of focus was to determine the effect of interventions on measures of mental illness and positive mental health, in the context of the dual-continua model. Bohlmeijer et al. (2015) assessed the efficacy of ACT on flourishing in depressed participants and showed that it was possible to improve the level of positive mental health in those with a mental illness. Trompetter et al. (2017) investigated the differential impact of Acceptance and Commitment Therapy (ACT) on positive mental health and mental illness for patients who were being treated for anxiety and depression. This statistical approach revealed that 64% of the participants improved on *either* positive mental health or anxiety symptoms post-intervention and 72% improved in *either* depressive symptoms or positive mental health.

### ***Implications of the dual-continua model***

The implications of the dual-continua model were often explicitly discussed in the studies included in this review. The implications extracted from each study are available in Table A1 and were narratively categorised into three broad themes. The first theme of implications involves the measurement approaches to determine mental health and mental illness status, and whether assessment of mental health should include measures of both positive mental health and mental illness. The second theme related to intervention design, delivery, and implementation. This was discussed in the context of treatment and prevention of mental illness, as well as the promotion of positive mental health. The final theme

of implications of the dual-continua model centred on the opportunities that the model presents to mental health care reform. This discourse included a re-orientation from deficit- or illness-focused services to strength-focused ones, re-conceptualising how mental health is portrayed to reduce stigma of illness, and the inclusion of services specifically focused on improving positive mental health as an early intervention or preventative approach.

## Discussion

This scoping review identified a considerable body of empirical research investigating the validity of the dual-continua model, and the overarching notion that positive mental health and mental illness represent two distinct, yet related, constructs.

### Evidence supporting the dual-continua model

The evidence found by the majority of the included 83 studies supports the existence of the dual-continua model. A large proportion of studies used CFA to compare whether the data best fit a bipolar model or the two variations of the dual-continua model (where mental illness and positive mental health are either independent of each other or share a degree of overlap; Figure 2). Studies consistently found that the data best fit the 'two oblique factor' model, indicating that mental illness and positive mental health are distinct but related. This finding was replicated across cultures, sex, age, and using different measures of positive mental health and mental illness, thereby supporting the general validity of the dual-continua model (Franken et al., 2018; Petrillo et al., 2015; Keyes et al., 2008).

Another common approach to test the validity of the dual-continua model was to analyse whether various drivers, predictors, or outcomes related similarly to mental illness and positive mental health. This was often done by splitting participants into sub-groups (Figure 4). This approach was used to indicate that the sub-groups existed, and that it was possible for individuals to report high levels of positive mental health despite mental illness. The existence of these sub-groups was validated by the consistent finding that the groups performed differently across a broad range of psychological and behavioural resources and outcomes. Other studies adopted a more rigorous approach and investigated the predictors that were associated with mental illness and positive mental health using regression analysis. This was best exemplified by Kinderman et al. (2015) who showed that different individual and social

factors differentially influence positive mental health and mental illness.

Most of this research was cross-sectional, supported by a smaller number of longitudinal studies. Findings consistently demonstrated that positive mental health and mental illness differentially predict various outcomes (Du Plooy et al., 2018; Kinderman et al., 2015). In general, it was found that the absence of illness was not sufficient to predict various desirable outcomes such as academic achievement and interpersonal relationship quality, which were predicted by high levels of or improvements in positive mental health (Suldo and Shaffer, 2008). The fact that mental illness and positive mental health predict or explain different outcomes was a strong indication that the constructs are distinct, and the fact that there was some overlap points to the constructs sharing some degree of overlap.

### Generalisability of the evidence

There was a great degree of variety in the methodology of the studies included in this review, indicating a considerable degree of confidence in the generalisability of the support of the dual-continua model. The studies were conducted in twenty Western and non-Western countries, indicating that the evidence presented is not culturally specific. The most common method of participant sampling was through population-level survey data, producing nationally representative data which has low risk of sampling bias (Banerjee and Chaudhury, 2010). Although this approach ensures appropriate representation across sex and age, there is a possible underrepresentation of groups that are usually excluded from population-level surveys, for instance the most elderly, homeless people, and mental health inpatients. The evidence provided by studies using population-level surveys was supported by a range of studies that specifically recruited minority and at-risk groups, as well as participants with various degrees of mental illness, increasing confidence in the generalisability of the results across societies.

Studies relied on a broad spectrum of validated measurement tools, reducing potential bias introduced by using a specific measurement tool (Egloff, 1998). Mental illness was measured using validated self-report tools designed to measure various disorders continuously, including depression, anxiety, and general psychopathology. Studies using these measures were complemented by research that relied on assessment using clinical interviews (e.g. using CIDI or based on DSM-IV criteria), instilling a high degree of confidence that the dual-factor

model is not merely a statistical phenomenon of a particular measurement design.

Similarly, positive mental health assessment relied on assessment using a number of validated measures, targeting different constructs ranging from satisfaction with life and positive affect, to overall flourishing, social wellbeing and psychological wellbeing. Many articles included in this review were validation papers of the MHC-SF, consistently finding good internal consistency and validity. Unlike all other continuous measures of positive mental health, the MHC-SF is particular because it can be used to either measure positive mental health continuously or to categorically 'diagnose' flourishing similar to the DSM-V protocol. Generally, the continuous approach was used in confirmatory factor analysis, while the categorical approach was used to create sub-groups and analyse group differences. Renshaw et al. (2016) compared the categorical and continuous approaches, albeit using measures other than the MHC-SF, and found that each approach resulted in conflicting interpretations. This implies that the method used to investigate the single- versus dual-continua models can influence assessment results in practice. While categorical assessment may be criticised for a lack of discriminative power (Doll, 2008), it is closest to the current way that individual mental illness assessment and population-based screening work in practice, thereby supporting the applicability of its use in practice.

### Generalisability across mental illness

High levels of positive mental health assets are attainable in individuals diagnosed with a mental illness, demonstrated across major depressive disorder, bipolar disorder, social anxiety, schizophrenia, and trauma-related disorders (Goodman et al., 2018). Of the studies included in the current review, the dual-continua model was investigated across a range of mental illnesses and related concepts, including participants experiencing suicidal ideation, general psychopathology and psychological distress, depression, anxiety, stress, trauma, loneliness, and eating disorders. Of the studies that focused on recruiting patients with a mental illness, as opposed to using general populations, the large majority supported the validity of the dual-continua model, particularly when looking at patients with mild to moderate mental illness.

Results for populations of patients with severe to extremely severe mental illness are less convincing. Van Erp Taalman Kip and Hutschemaekers (2018) found that mental illness and positive mental health were highly negatively correlated ( $r = -0.071$ ) in severely

mentally ill populations, with positive mental health contributing significantly less to a two-factor model compared to the symptoms of mental illness. Other research found high correlations between mental illness and mental health in mentally ill, particularly in depressed patients (Bartels et al., 2013), and supported the researchers finding differential levels of positive mental health depending on mental illness diagnosis, e.g. depression versus anxiety (Seow et al., 2016; Franken et al., 2018). The study by Van Erp Taalman Kip and Hutschemaekers (2018) was the sole study identified in this review that contradicted the dual-continua model. These results imply that in extremely severe psychopathology, particularly in depression, positive mental health constructs may be highly correlated with mental illness symptoms and patients may exhibit difficulty distinguishing mental illness symptoms from symptoms of positive mental health. There is evidence to suggest that the precision of positive mental health measures may change across the range of scores, and this may also be true for the level of psychopathology (Abbott et al., 2010).

The notion that it is possible to have a high level of positive mental health and common mental illness at the same time has been contested in the literature. Huppert (2005) argued that it was difficult to imagine a situation where an individual diagnosed with severe depression is able to function well psychologically. We suggest that this criticism is influenced by the 'observational window' and measurement approaches considered, or in other ways we measure both outcomes. Asking someone to judge their positive mental health and mood symptoms in the moment, or asking them to reflect back over their mood and positive mental health over a longer period, will lead to different subjective interpretations. Similarly, using measures that consist of a large number of the same items, as is the case for depression measures, will lead to large overlap. For example, ratings on a meaningful life are often asked in wellbeing questionnaires, whereas ratings on life being meaningless are often included in depression measures. Feldman Barrett and Russell (1998) recommended that such 'bipolar antonyms' can be misleading in analysis of independence or bipolarity, and can be avoided by ensuring that measurement tools include items that adequately represent the breadth of each construct. In this context, this would include measuring a diverse range of psychological illness constructs, as well as a range of psychological well-being constructs.

Massé et al. (1998) provided an example of this approach, albeit with constructs that are no longer considered central to either positive mental health or mental illness. This study used CFA to test the model

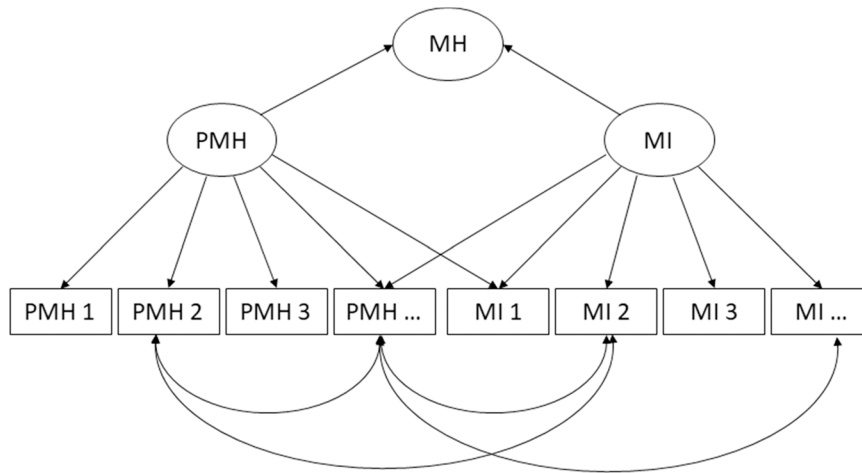


Figure 5: Higher order theoretical relationship between mental illness (distress) and positive mental health (wellbeing), adapted from the model presented in Massé et al. (Massé et al., 1998). PMH = Positive mental health, MI = mental illness, MH = mental health. Circles indicate latent constructs, and boxes indicate survey items.

fit of mental health as a second order structure, underpinned by the distinct but related latent factors of positive mental health and mental illness. As visible in Figure 5, they included a range of constructs under positive mental health and mental illness, some of which relate to both positive mental health and mental illness. Following the depression example, if only happiness and anhedonia were used as indicative measures of positive mental health and mental illness, then a bipolar model would become easily apparent. However, using a broader, multifaceted approach to positive mental health (e.g. using the MHC-SF) and mental illness (e.g. using the BSI), the dual-continua model would emerge as a more appropriate fit of the data.

Overall, there is sufficient evidence to support the validity of the dual-continua model of mental health. Longitudinal and cross-sectional data from around the world indicates that positive mental health and mental illness reflect two distinct, yet related phenomena. The validity of the dual-continua model may however be relative to the window of time and the definitions and assessment methods of positive mental health and mental illness. In particular, more work should be conducted to investigate whether the dual-continua is appropriate in severe forms of psychological distress or mental illness.

### Implications of the dual-continua model for policy, practice, and research

The validity of the dual-continua model has important implication for policy, practice, and research and the

current scoping review extracted the implications discussed by the authors of included studies. Across the eighty-three publications, the implications were relatively convergent and overlapping, and were collected into three broad themes; implications for mental health measurement and assessment, mental health treatment and intervention design, and mental health care system reform.

### **Mental health assessment**

Study authors strongly advocated to assess positive mental health and mental illness together, rather than using only one or the other. There was a consensus, based on their research results, that a focus on either positive mental health or mental illness alone would not provide a complete image of the mental health status of an individual or population. It is well established in positive psychology that the absence of mental illness does guarantee optimal mental health (Slade, 2010). The dual-continua model would equally suggest that high levels of positive mental health do not guarantee the absence of mental illness. Studies found up to 36% of participants who displayed high levels of positive mental health with symptoms of mental illness (Venning et al., 2013).

At a population level, the inclusion of positive mental health measures with existing indicators of mental illness enables researchers to understand the economic, social, and individual drivers of both positive mental health and mental illness. It was shown that these drivers are not necessarily the

same, although there is some overlap (Kinderman et al., 2015). This degree of insight is not available in most population-level research, as positive mental health measures are often not included.

At the individual level it enables professionals in various settings to identify previously invisible sub-groups. For example, research in schools commonly constructed the four sub-groups ('Complete Mental Health', 'Vulnerable', 'Symptomatic but content' and 'Struggling' groups) and would continue to assess group-membership on educational, behavioural, cognitive and emotional outcomes. Across the studies, participants in the 'Complete Mental Health' group outperformed the other groups, while the 'Vulnerable' group scored significantly worse than those with Complete Mental health, being consistently associated with poor performance across the studies (Suldo and Shaffer, 2008; Renshaw and Cohen, 2014; Antaramian, 2015). In traditional assessment (mental illness only), the 'Vulnerable' and 'Complete mental health' group would have been combined as a 'no mental illness' category, despite the fact that these two groups show different performance on a range of education, behavioural, cognitive, and emotional outcomes.

One of the most striking examples of the importance of capturing the sub-groups, and thereby identifying at-risk individuals, comes from studies that investigated the role of positive mental health as a predictor of mental illness risk. Keyes et al. (2010) conducted a longitudinal study of mentally healthy participants (without a diagnosis of mental illness) of the 1995 and 2005 waves of the Midlife in the United States (MIDUS) National Study of Health and Well-being. The study showed that participants who gained or maintained high levels of positive mental health over the 10-year period had a decreased risk of developing a mental illness (being depression, anxiety, and panic disorder), and that participants whose positive mental health declined or remained low had significantly increased risk of developing mental illness. Similar results were observed by Wood and Joseph (2010), who found that people with low levels of positive mental health were several times more likely to be depressed 10 years later. Grant et al. (2013) and Lamers et al. (2015) supported these findings, finding that low levels of positive mental health predicted risk of higher depressive symptoms within one year. There is also evidence to suggest that high levels or increased levels of positive mental health dramatically improve the likelihood of recovering from a mental illness (Iasiello et al., 2019).

Positive mental health and mental illness need to be assessed together when trying to establish a

picture of an individual's or population mental health status. This must be done using measurement tools specifically designed to capture either construct in a representative manner; as simply using positive items of mental illness questionnaires is not a valid measurement approach (Winzer et al., 2014). Failing to use fit-for-use measurement tools for both mental health and mental illness when performing mental health assessments will lead to suboptimal explanatory power of drivers and outcomes, and does not allow for the identification of key at-risk groups.

### **Intervention design and evaluation**

A second key theme of implications relates to mental health intervention design, with the recurring finding that interventions that improve positive mental health and reduce mental illness can be complementary but different (Kinderman et al., 2015). Further, it was found that a positive response in one continua does not exclude, nor guarantee a positive response in the other. Instead, interventions and mental health promotion programs will benefit from targeting both the reduction of illness symptoms and improvement of positive mental health.

The efficacy of mental health interventions is generally evaluated using average change in positive mental health or mental illness of the entire group. However, research using the dual-continua model suggested that while an intervention may improve overall positive mental health and reduce mental illness on average, more complex interactions may be occurring at the individual level. In particular, Trompetter et al. (2017) re-evaluated a randomized controlled trial of an ACT intervention that measured dimensions of both mental illness and positive mental health (n=250). While this RCT revealed average improvements in positive mental health and reductions in mental illness at the group level, using reliable change analysis it was found that the majority of individuals improved in *either* mental illness or positive mental health. The traditional bipolar model would suggest that an improvement in positive mental health and a reduction in mental illness signify the same outcome. Instead, through the dual-continua model, when an intervention focuses on or can address both positive mental health and mental illness, a failure to see an effect in either outcome does not mean that the intervention did not have a positive effect for the participants.

The authors commented on the utility of ACT in relation to the dual-continua model, as it is a commonly used treatment paradigm that can be

used to reduce psychopathological vulnerabilities and build resources for improving positive mental health. Other clinical interventions have been designed to improve the wellbeing of individuals with psychopathology including Wellbeing Therapy (Fava et al., 1998) and Positive Psychotherapy (Seligman et al., 2006), which all fall under the larger umbrella of Positive Clinical Psychology (Wood and Tarrier, 2010). Using traditional clinical techniques such as cognitive restructuring, scheduling of activities, assertiveness training, and problem solving, these interventions aim to improve positive mental health assets such as Ryff's domains of psychological wellbeing (Fava et al., 1998; Duckworth et al., 2005), while also treating mental illness. These interventions and treatment paradigms have implicitly or explicitly adopted the dual-continua model, by designing program components that improve wellbeing, despite the client's diagnosis of mental illness.

Greater sophistication should be employed to understand which individuals might benefit most from interventions specifically designed to improve positive mental health and reduce mental illness, whether delivered simultaneously or consecutively (Schueller, 2014). An example of this sophistication comes from Jans-Beken et al. (2017) who investigated the dual-continua model in a longitudinal study of gratitude, psychopathology, and subjective wellbeing. This study found that practicing gratitude may positively impact an individual's future level of positive mental health and psychopathology, but is less likely to ameliorate symptoms of psychopathology when they are present. This indicates that interventions to improve traits such as gratitude should be carefully designed to consider the trait dynamics with both mental illness and mental health.

Adoption of the dual-continua model on intervention design has significant potential, especially when combined with the ability to identify at-risk subgroups. At the individual level this can inform better intervention design, while at the community and society level, it may allow governments to prioritise policies and create more targeted interventions. The evidence to drive this change does not just need to come from future studies; there is a substantial literature of randomised controlled trials which have measured both positive mental health and mental illness. Secondary analysis of these data using the aforementioned method proposed by Trompeter et al. (2017) would provide much needed insight into the efficacy of interventions through the dual-continua model lens, and will provide greater clarity for intervention design by identifying 'for whom' interventions are most effective.

## **Reform to the health care system**

The final theme of implications of the dual-continua model of mental health is related to mental health care system reform, where a need to integrate and unify traditional psychotherapy and positive psychology was commonly advocated; a call that is not new (Wood and Tarrier, 2010), but certainly has not gained traction as of yet. Current approaches are deficit-focused and preference the reduction of mental illness symptoms, resulting in reactive health care (Herron and Trent, 2000). Hence, the specific inclusion of positive mental health initiatives into the health care system to complement current services was commonly cited as a much desired reform to the mental health care system. In addition to aforementioned changes in relation to measurement and intervention, two specific treatment approaches that could benefit from examining the evidence provided for dual-factor models are integrated care approaches and stepped-care approaches.

Integrated care strives to achieve optimal outcomes for patient, provider and system (Kodner and Spreeuwenberg, 2002); overlooking the important role that positive mental health plays would be detrimental to outcomes for integrated care, regardless of whether the main presenting symptoms are mental or physical. An important precedent for successful implementation of positive mental health into integrated mental health care has already been established through interventions such as Wellbeing Therapy and Positive Psychotherapy, and overarching fields such as positive clinical psychology and positive psychiatry (Jeste et al., 2015; Wood and Tarrier, 2010). These therapies have been designed to broaden the scope of traditional psychopathology with the central thesis that building positive mental health assets, in addition to treating symptoms, is effective and may engender more meaningful recovery and reduce the likelihood of relapse (Slade, 2009). Research found in this review indicated that individuals who have had severe depression or suicidal ideation can achieve complete mental health (Baiden and Fuller-Thomson, 2016), that positive assessments of wellbeing and strengths may transform how clients view themselves and their satisfaction with clinical assessment (Macaskill, 2012). Positive mental health assets such as character strengths may provide clinicians new resources to help individuals manage their illness (Macaskill and Denovan, 2014). The systemic neglect of functioning after depression is emerging in the literature (Rottenberg et al., 2018), and positive mental health and the dual-continua of mental health could facilitate the shift in recovery narrative (Slade, 2010).

In a stepped-care model of mental health care, prevention and health promotion precede self-guided help and low-resource intensive interventions, before clinical intervention is required. Longitudinal research identified in the current review indicated that positive mental health is an important resource to reduce the incidence of mental illness (and other physical illness) and therefore should be a primary focus of public policy and health promotion (Lamers et al., 2015; Keyes et al., 2010; Wood and Joseph, 2010; Schotanus-Dijkstra et al., 2017). This will subsequently or conjointly lead to improvements in other crucial areas such as health risk behaviour (Venning et al., 2013). An important key group that needs to be targeted, in both preventative and early intervention efforts are those who reside in the 'Vulnerable' group; this group is the most transient (Kelly et al., 2012; Xiong et al., 2017) and across studies associated with worse outcomes than participants with 'Complete Mental Health'.

### Limitations

Despite identifying a broad range of publications investigating the dual-continua model of mental health, our ability to effectively scope the literature was restricted by imprecise taxonomy and nomenclature that is pervasive throughout wellbeing and positive psychology literature (Salvador-Carulla et al., 2014; Dodge et al., 2012). This is an avoidable impasse, but will require consolidation, collaboration, and standardised use of language between positive mental health and mental illness researchers. The non-systematic snowballing method utilised to overcome this barrier may present a bias towards finding papers that support the dual-continua model. This was minimised by broad reference list screening, which did not return a single study that contradicted the validity of the dual-continua model. Another potential limitation was the use of English-only studies; however, this was likely mitigated by the inclusion of many studies conducted in non-Western and non-English speaking countries. Finally, assessment of research quality was not included in this scoping review, and poorly conducted research may have influenced the results. The bias may be offset by the inclusion of a wide range of study designs and overwhelming consistency of the findings.

### Conclusion

There is a sufficient body of evidence to suggest that positive mental health and mental illness are not the opposite ends of the same continuum, and instead

reflect two distinct yet related continua. The current review identified eighty-three publications, which were conducted in clinical and non-clinical populations, over the entire life-course and in Western and non-Western cultures. The review summarised the evidence that positive mental health and mental illness are two distinct but interrelated domains of mental health; each having shared and unique predictors, influencing each other via complex relationships. Further research should be conducted to understand whether the dual-continua model of mental health is valid in the most severe cases of mental illness, and the influence that particular measurement tools may have on the relationship between mental illness and mental health.

The authors of included studies strongly advocated for the adoption of the dual-continua model in policy, research, and practice. The main implications of the adoption of the dual-continua model were related to the inclusion of positive mental health measurement into mental health assessment, utilising interventions to improve positive mental health to promote mental health and prevent mental illness, and the addition of positive mental health measurement and intervention to complement the traditional approaches to inspire mental health care system reform.

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### Conflict of Interest

The authors declare no conflict of interest.

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## Appendix

Table A1. Summary of reviewed literature extraction.

Author	Aims/Purpose	Method	Location	Participants	Wellbeing tool	Mental illness tool	Key result relevant to current review	Key implications of CMH
Alterman et al. (2010)	To examine the latent structure of a number of measures of mental health and mental ill-ness in substance use disorder outpatients	Cross-sectional study n = 484	United States of America	Adult (mental illness) Age: 38.4 (9.4) 70% male	- Positive and Negative Affect Schedule (PANAS)	- Profile of Mood States (POMS)	- The study found two distinct factors for mental illness and mental health - Some measures associated with positive mental health (social support and optimism) showed inverse high correlations and high factor loadings for mental illness	- CFA support for the existence of two obliquely related, negatively correlated dimensions - Some tools related to positive mental health also showed high correlations with negative mental health, which may be influenced by the constructs and assessments used to measure them
Antaramian et al. (2010)	To investigate the utility of using a dual-factor approach in youth mental health and assess group differences in student engagement, academic achievement, environmental support	Cross-sectional study n = 764	United States of America	Youth (students) Specific age not reported 54% female	- Students' Life Satisfaction Scale (SLSS) - Positive and Negative Affect Scale for Children (PANAS-C)	- Self-report coping scale (SRCS)	- The results support the dual-factor model of mental health in young adolescents - those with low positive mental health and no mental illness are similarly at risk of developing academic and behavioural problems than those with mental illness	- Monitoring of wellbeing is recommended to help guide systematic interventions for those at risk of problematic school performance, as only students with complete mental health show advantageous academic and behavioural outcomes
Antaramian (2015)	Examine the utility of the dual-factor model in understanding the psychological adjustment and educational functioning of college students	Cross-sectional study n = 561	United States of America	Adult (students) Age: 19.5 63% female	- Subjective wellbeing: - Positive and Negative Affect Schedule (PANAS) - Satisfaction With Life Scale (SWLS)	- Center for Epidemiologic Studies Depression Scale (CES-D)	- The study found four clear groups with differing mental illness and positive mental health, supporting the dual-factor model of mental health - The groups differed in their educational functioning, with participants with complete mental health outperforming the other groups on student engagement and GPA	- Both the presence of positive wellbeing and the absence of psychopathological symptoms are important for facilitating academic success, as positive mental health is a contributor to optimal college experience and academic success, thereby indicating that positive mental health should be considered in monitoring and intervention delivery

<p>Batden and Fuller-Thompson (2016)</p>	<p>Identify factors associated with complete mental health in individuals who had ever seriously considered suicide</p>	<p>Cross-sectional study Sample 1 n = 21270 Sample 2 n = 2842</p>	<p>Canada</p>	<p>Youth and Adult (General population) Age not reported Gender ratio not reported</p>	<p>- Mental Health Continuum - Short Form (MHC-SF)</p>	<p>- World Health Organisation - Composite International Diagnostic Interview</p>	<p>- A dual-factor model is useful in describing mental health in lifetime suicide ideations; the study found lower complete mental health than people who did not show suicide ideation - Social support, financial stability, older age, good physical health and sleep are protective modifiable factors for complete mental health - Many individuals with these positive attributes who had previously considered suicide made a full recovery into complete mental health, free of suicidal thoughts</p>	<p>- There are a number of modifiable protective factors (social support, physical health and sleep) that are associated with complete mental health in suicide ideations, and can present a target for policy and interventions</p>
<p>Barola et al. (2017)</p>	<p>To determine the applicability of the dual continuum model in a sample of lesbians and gay men</p>	<p>Cross-sectional study n = 847</p>	<p>Australia</p>	<p>Adult (general population) Age: 18-85 48% female</p>	<p>- Mental Health Continuum - Short Form (MHC-SF)</p>	<p>- Patient Health Questionnaire (PHQ-9) - Generalized Anxiety Disorder Scale (GAD-7)</p>	<p>- There were higher rates of generalised anxiety in females, while no gender differences in depression or positive mental health were found - Irrespective of displaying criteria for mental illness, varying levels of positive mental health were found, providing support for the dual-factor model - General perceived health status was higher among those with complete mental health, suggesting higher adaptability than the other groups</p>	<p>- The use of a dual-factor model is appropriate for LGBT people, and can provide extra insight into ways to achieve optimal health</p>

Bartels et al. (2013)	The present study examined the association between subjective well-being (SWB) and psychopathology, and genetics, and investigated the etiology of this association in a large cohort of twins	Cross-sectional study n = 10610	Netherlands	Youth (general population) Age: 16.4 (1.6) 56% female	- Satisfaction with life Scale (SWLS) - Subjective Happiness Scale	- Youth Self Report (YSR)	- Substantial shared genetic influences on wellbeing and psychopathology, where genetic liability of low subjective wellbeing can be indicative of a genetic liability for higher psychopathology - The commonality of heritable influences on SWB and psychopathology may lead to the identification of the vulnerable at risk groups prior to any manifestation of psychopathology	- As there is a genetic overlap between subjective wellbeing and psychopathology, screening for wellbeing can prove to be an innovative way to address mental illness, and reach larger proportions of the population, than waiting for psychopathology to occur. - Due to the influence of non-shared influences, which is complex and construct specific, there is evidence to suggest that mental illness and mental health are not polar opposites -The genetic overlap between wellbeing and psychopathology justifies the integration of prevention and promotion in the field of Mental Health, and indicates that wellbeing screening can play an important role in this process
Bohlmeijer et al. (2015)	To evaluate the effect of Acceptance and Commitment Therapy on Flourishing within the Complete Mental Health framework	Randomised Controlled Trial n = 376	Netherlands	Adult (mental illness) Age: 18-73 70% female	- Mental Health Continuum - Short Form (MHC-SF)	- Center for Epidemiologic Studies Depression Scale (CES-D)	- The use of an ACT intervention improved positive mental health significantly more than the control condition	-ACT is a treatment modality that can be used to promote positive mental health in individuals with mild to moderate depressive symptoms
Diaz et al. (2017)	To apply the complete state model of mental health to posttraumatic stress disorder (PTSD)	Cross-sectional study n = 69	Spain	Adult (mental illness) Age: 42.3 (12.0) 56% female	- Satisfaction With Life Scale (SWLS) - Positive Affect Scale - Psychological Wellbeing Scales (PWS) - Social Wellbeing Scales (SWS)	- Davidson Trauma Scale - Structured clinical interview for DSM-IV-TR Axis I (SCID-I)	- The absence of PTSD following traumatic event is not equivalent to the presence of health (although many victims recovered from PTSD, very few achieved complete mental health) - Positive affect, self-acceptance and positive relationships were negatively correlated to PTSD	- It is important that public aid and health care for victims of terrorist attacks are aimed at improving victim positive mental health, even if they no longer meet diagnostic criteria for PTSD, with positive affect, self-acceptance and positive relationships being potential avenues for interventions

Author(s)	Objective	Design	Location	Participants	Measures	Findings	Conclusions
Dowdy et al. (2015)	To test the validity of a youth social emotional distress survey, and test its appropriateness for complete mental health screening	Cross-sectional study n = 3780	United States of America	Youth (students) Age not reported, high school grades 9-12 52% female	- Brief Multidimensional Student Life Satisfaction Scale (BMSLSS) - Social Emotional Health Survey Secondary	- The SED-S scale appears to be a valid measure of self-reported internalising distress - Analysis indicated that SED-S is related to, but distinct from life satisfaction and positive psychological traits	- Constructs of psychopathology are related to, yet distinct from constructs of positive mental health
du Plooy et al. (2018)	To examine a broad range of factors related to migration and their links to flourishing and/or distress	Cross-sectional study n = 1446	Australia	Adult (general population) Age: 46.5 (17.9) 52% female	- Mental Health Continuum - Short Form (MHC-SF)	- A range of factors uniquely associated with either distress or flourishing, for instance younger age and being a student was associated with distress, but not flourishing. Identifying with the host nation (Australia), and being self-employed, was associated with flourishing but not distress - Other factors were associated with both, including amount of time spent in the host nation and experiences of discrimination and racism	- Factors influencing psychological distress and flourishing are sometimes similar, and sometimes different - Informing or guiding the implementation of policies and interventions that support flourishing may help governments to reduce overall health and social costs. This needs to be based on a thorough understanding of factors associated with flourishing, distress or both
Eklund et al. (2011)	To explore the utility of a dual-factor model of mental health in college students	Cross-sectional study n = 246	United States of America	Adult (students) Age: 18-25 79% female	- Brief Multidimensional students' life satisfaction scale (BMSLSS) - Mental Health Continuum - Short Form (MHC-SF)	- Positive traits hope, grit, and gratitude were higher in high wellbeing group, regardless of level of psychopathology - Attention problems were most profound for the students showing symptoms of mental illness, regardless of level of wellbeing - Locus of control was highest for the students without symptoms of mental illness, regardless of levels of wellbeing	- Important to evaluate the presence or absence of psychological symptoms and psychological wellness to obtain a more accurate and rounded assessment of individual functioning and to guide intervention design as different groups may require different interventions

Fontana et al. (1980)	To determine the applicability of the dual-continua model in a hospitalised physically ill population and to test whether positive and negative affect are independent with unique correlates	Longitudinal observational study n = 80	United States of America	Adult (physically ill) Age: 55.7 100% male	- Bradburn's ten items for positive and negative affect	- Personal Adjustment and Role Skills scale (PARS)	- The study supports the notion that psychological impairment and psychological health are independent of one another - When asking others to rate mental illness and positive mental health, this construct appears less independent, indicating that mental health and impairment are opposites when conceived through the eyes of others	- Both psychological impairment and psychological health should be measured, particularly when they are assessed from people's self-reports - Measurement method (e.g. self versus other) influences the presence of a dual-factor model
Franken et al. (2018)	To validate the mental health continuum short form and the dual continua model of wellbeing in a mental health care setting	Cross-sectional study n = 472	Netherlands	Adult (mentally ill) Age: 40.0 (11.6) 59% female	- Mental Health Continuum Short Form (MHC-SF)	- Outcome Questionnaire (OQ-45)	- Correlations between positive mental health and psychopathology were generally high, particularly highest in mood disorders - The study demonstrated evidence to support the validity of the dual continua model in clinical populations, specifically mood disorder, anxiety disorder, personality disorder, and developmental disorder	- The dual continua model is appropriate and applicable in mental health care, despite relatively high correlations between general psychopathology and wellbeing
Fuller-Thomson et al. (2016)	To investigate factors associated with complete mental health among a nationally representative sample of Canadians with a history of depression	Cross-sectional study n = 20955	Canada	Adult (mentally ill) Age: 20-89 51% female	- Mental Health Continuum - Short Form (MHC-SF)	- Composite International Diagnostic Interview (WHO-CIDI)	- Those who had never experienced a depressive episode, after controlling for other variables, had three times higher odds of being in complete mental health - Two in five people with a history of depression demonstrated complete mental health - Several modifiable factors such as social support, smoking, substance abuse, pain, spirituality and physical activity can be improved to achieve complete mental health - Those with the longest depression were equally likely to achieve complete mental health as those with shortest depressive episode	- Having had depression is associated with a lower odds of showing complete mental health - It is within the grasp of many individuals who have previously had depression (2 in 5) to fully flourish and achieve complete mental health, with several modifiable factors (smoking, social support, pain, spirituality and physical activity) being identified as potential areas for interventions

Furlong et al. (2017)	To examine the possible effects of mischievous response patterns on school-based screening results, in the context of the dual-factor model of mental health	Cross-sectional study n = 1857	United States of America	Youth (students) 51% female	- Brief multidimensional student's life satisfaction scale (BMSLSS)	- Strengths and Difficulties Questionnaire (SDQ)	- 2% of the sample responds mischievous - most mischievous respondents were in the symptomatic but content groups and the troubled groups, not the vulnerable groups - The greatest number of students in all groups, particularly the vulnerable and troubled groups, respond meaningfully	- Universal screening will lead to meaningful data for the large majority of respondents (98%), with particularly high meaningful responses noted for the vulnerable and complete mental health group
Gilmour (2014)	To examine the distribution of mental health across the complete mental health subgroups in a Canadian community sample	Cross-sectional study n = 25113	Canada	Youth and Adult (general population) Age: 15-75 51% female	- Mental Health Continuum - Short Form (MHC-SF)	- Composite International Diagnostic Interview (WHO-CIDI)	- The study found high rates of flourishing (72,5%) - Complete mental health was only moderately correlated with mental disorders, mood disorders, generalized anxiety disorder and substance disorder - Older age, being married, low socio-economic status, high spirituality, good physical health were related to complete mental health	- While the large majority displayed complete mental health, the correlations between mental illness and mental health was only moderate, supporting the dual-factor models within Canada
Grant et al. (2013)	To assess whether low well-being is a risk factor for depressive symptoms	Longitudinal observational Study n = 1621	United States of America	Adult (general population) 48% female	- Mental Health Continuum - Short Form (MHC-SF)	- Patient Health Questionnaire (PHQ-9)	- Individuals with low baseline wellbeing showed significantly more increase in depression over time when dealing with a stressful period in life	- The results indicate that assessing wellbeing status can be a practical way to address future risk for developing depression
Greenspoon and Saklofske (2001)	To explore the validity and utility of a dual-factor approach to mental health and mental illness	Cross-sectional study n = 407	Canada	Youth (students) Age: 10.5 (0.7) 50% female	- Multidimensional Students' Life Satisfaction Scale (MSLSS)	- Behaviour Assessment System for Children (BASC)	- Many group differences were observed using the dual-continua model rather than the single illness-health continuum	- The dual continua model has strong application in intervention and prevention, especially in youth

Hallion et al. (2018)	To assess complete mental health in adult siblings of those with a chronic illness or disability	Cross-sectional study n = 144	Australia	Adult (students) Control group: Age: 19.0 (1.7) 51% female Siblings group: Age: 22.7 (8.0) 68% female	- Satisfaction with life scale (SWLS) - Psychological Wellbeing Scale (PWB) - Social wellbeing scale (15-item)	- Depression Anxiety Stress Scales (DASS-21)	- The study found four distinct groups in siblings with and without illness - The study did not find worse outcomes for siblings of people with a chronic condition compared to their peers - The sample showed worse findings for this student population compared to the general public	- The use of CMH model in these two populations was supported as can be witnessed by four distinct groups in people with and without siblings with illness
Headley et al. (1993)	To determine the dimensions of mental health (life satisfaction, positive affect, anxiety, depression) and assess the validity of widely used measures	Cross-sectional study n = 942	Australia	Adult (general population) Age: 18-65 54% female	- Life as a whole (LAW) index - Satisfaction With Life Scale (SWLS) - Fordyce 0-10 Happy Scale - Positive Affect Scale (PAS)	- Negative Affect Scale (NAS) - State Anxiety Scale - Beck Depression Inventory (BDI) - General Health Questionnaire (GHQ-12)	- Life satisfaction, positive affect, anxiety, and depression represent four separate dimensions that should all be measured in general population surveys - There are differences in relationships between positive and negative constructs, depression and life satisfaction are strongly related (pointing more towards a single continuum) whereas life satisfaction and anxiety are less strongly correlated (pointing to two dimensions) - The results might be influenced by situational factors (e.g. mood at the time) as opposed to the underlying dimensions	- Four dimensions of mental health and mental illness (life satisfaction, positive affect, anxiety, depression) can be included in population surveys, but need to be assessed as separate constructs, as they influence one another differently
Heubeck and Neill (2000)	To examine the factor structure underlying adolescents' responses to the Mental Health Inventory in a sample of Australian school students	Cross-sectional study n = 878	Australia	Youth (students) Age: 14.7 (0.9) 49% female	- The mental health inventory	- The mental health inventory	- The study finds adequate support for the existence of a correlated two-factor model - A single factor model showed poor fit - All positively worded items formed one factor, and so did all the negative ones, which may point to the two factor structure being a result of item wording	- The study found evidence of the two-factor structure of psychological wellbeing and psychological distress, as this showed better fit than a single factor model

Hu et al. (2007)	To test whether the GHQ-12 assesses both positive and negative mental health, and that these domains are independent of each other	Cross-sectional study Sample 1 n = 8978 Sample 2 n = 6451	United Kingdom	Adult (general population) Sample 1: Age: 41.7 (16.0) 53% female Sample 2: Age: 43.0 (16.4) 53% female	- 6 positive items of General Health Questionnaire (GHQ-12)  - 6 negative items of General Health Questionnaire (GHQ-12)	- Positive mental health and symptoms of mental disorder were differently associated with age (older age = lower wellbeing), unemployment, being single, not having financial strain and having good physical health - Fewer symptoms of mental disorder were also related to being male, and neither being a single parent nor living alone	- Measuring wellbeing in addition to symptoms of mental illness provides more detail to the mental health profile of individuals, and can be used in population-based research
Huppert and Whittington (2003)	To compare the characteristics and determinants of positive mental health and mental illness in a general population sample	Longitudinal observational Study n = 6317	United Kingdom	Adult (general population) Age: 18-65+ Gender ratio not reported	- Positive General Health Questionnaire (POS-GHQ)  - General Health Questionnaire	- Evidence of independence of positive and negative mental health, as they show differential response patterns over time, response different for men (but not for women) - GHQ was more related to physical health (illness and disability), lack of social support; factors which don't appear to affect wellbeing as much. Employment on the other hand, affected wellbeing more, and mental illness less	- Positive mental health and mental illness are differently influenced by demographic, health, and social factors, and need to be measured separately to form a complete picture of mental health status
Iasiello et al. (2019)	To investigate whether positive mental health predicts recovery from a mental illness over time	Longitudinal study n = 1723	United States of America	Adult (general population) Age not reported Gender ratio not reported	- Bradburn's scales of positive affect - Ryff's measures of psychological wellbeing - Keyes' social wellbeing  - Composite International Diagnostic Interview Short Form (CIDI-SF)	- Increased or maintained high levels of positive mental health predict recovery from affective disorders over a 10 year period  - Mental health care systems should explore offering of services designed to improve positive mental health in addition to reducing mental distress - Positive mental health and mental illness are separate constructs, and both should be included in the assessment of patients interacting with mental health care systems	

Jans-Beken et al. (2017)	Investigate prospective associations between gratitude and both dimensions of psychopathology and subjective wellbeing	Longitudinal observational study n = 706	Netherlands	Adult (general population) Age: 44 (14) 69% female	- Satisfaction With Life Scale (SWLS) - Positive Affect and Negative Affect Schedule (PANAS)	- Symptom Check List-90 (SCL-90)	- Gratitude is only weakly associated with lower levels of psychopathology, while staying moderately associated with higher levels of wellbeing	- Cultivating a sense of gratitude may positively influence wellbeing, regardless of current levels of psychopathology, but is less likely to reduce symptoms of psychopathology when they are present, which holds implications for gratitude interventions
Jiang and Lu (2018)	Examine the prevalence and correlates of three mental health categories as described in dual-factor models among older Adults in China	Cross-sectional study n = 15050	China	Adult (general population) Age: 63.0 (9.3) 53% female	- WHO Quality of Life questionnaire (WHO QoL)	- International Classification of Diseases, 10th version (ICD-10) - Anxiety (single item)	- Three distinct groups were found, which were in line with other studies - Correlates differed per group, with complete mental health outperforming the other groups in education, income, employment, residence and cognitive function	- The study finds validation of dual-factor models within a Chinese older adult population, which holds implications for interventions (e.g. more self-realisation activities should be promoted) as complete mental health is associated with a range of protective factors for mental illness
Joseph and McCollam (1993)	To determine whether one should view depression and happiness as opposite ends of a single continuum	Cross-sectional study n = 56	United Kingdom	Adult (students) Age: 19.0 86% female	- Oxford Happiness Inventory	- Beck Depression Inventory (BDI)	- A bi-polar measure of mental illness and positive mental health offered better capability to capture the range of responses than a unipolar measure	- Using bi-polar measures of mental health and mental illness can better explain mental health within individuals and populations
Jovanovic and Brdaric (2012)	To explore the relations between trait curiosity and the wellbeing and psychological distress of adolescents	Cross-sectional study n = 408	Serbia	Youth (students) Age: 16.6 (0.9) 61% female	- Multidimensional student's life satisfaction scale (MSLSS) - Inventory of the Positive and Negative Affect Schedule-X (SIAB-PANAS-X)	- Depression Anxiety and Stress Scale (DASS-21)	- Curiosity was differentially related to positive wellbeing (high curiosity was positively related to wellbeing), and showed no relation to depression, anxiety, or stress	- The results indicate that curiosity is a specific predictor of positive wellbeing, but not of psychological distress, giving support to the two-continuum model of mental health and illness

Karademas (2007)	To investigate whether predictor variables differently associate with positive wellbeing and mental illness symptoms	Cross-sectional study n = 201	Greece	Adult (general population) Age: 41.6 (10.2) 57% female	-Oxford happiness inventory	- Mood and Anxiety Symptom Questionnaire – (MASQ)	- Mental illness and wellbeing are predicted by different factors, indicating the need to select specific strategies and techniques when trying to improve either one, and to further investigate the different predictors of mental health and mental illness
Karas et al. (2014)	Validation of the Polish Mental Health Continuum - Short Form and verification of the two-continua model in a Polish population	Cross-sectional study n = 2115	Poland	Adult (general population) Age: 29.0 (10.6) 56% female	- Mental Health Continuum-Short Form (MHC-SF) - Positive and Negative Affect Schedule - Expanded Form (PANAS-X)	- General Health Questionnaire (GHQ-28)	- The study found that a two-related-factor model showed the best fit, compared to a single and two-factor-unrelated model - The use of the MHC-SF in a Polish population confirms the two-continua model of mental health, where mental health and mental illness are two related but distinguishable factors
Kelly et al. (2012)	Investigate the utility of the dual factor model in youth by determining the longitudinal stability of group membership and whether social support variables predicted changes in group membership	Longitudinal observational study n = 730	United States of America	Youth (Students) Age: 11-15 51% female	- Student's life satisfaction scale - Positive and Negative Affect Scale for Children (PANAS-C)	- Self-report coping scale (34-item)	- The study found that the vulnerable group was the most transient - Those with high subjective wellbeing were more likely to show less psychopathology at the follow-up - Of students with high psychopathology, those with high SWB were more likely to improve compared to those with low SWB - Social support positively influenced improvement in mental health - Using a dual-factor approach allows for better insight in who improved in mental health than measures of psychopathology alone
Keyes (2004)	Employ the complete mental health diagnosis to investigate its association with coronary artery and cardiovascular diseases in community-dwelling adults	Cross-sectional study n = 3032	United States of America	Adult (general population) Age: 25-74 51% female	- Bradburn's scales of positive affect - Ryff's measures of psychological wellbeing - Keyes' social wellbeing	- Composite International Diagnostic Interview Short Form (CIDI-SF)	- Complete mental health can be useful for identifying risk of cardiovascular disease more accurately than either dimension alone - Complete mental health participants have the lowest prevalence of CVD - Those with mental illness and languishing had the highest risk of cardiovascular disease - Older females who were mentally healthy had lower risks of cardiovascular disease compared to any of the other groups

Keyes (2005)	To test the relationship between measures of mental health and mental illness	Cross-sectional study n = 3032	United States of America	Adult (general population) Age: 25-74 51% female	<ul style="list-style-type: none"> <li>- Bradburn's scales of positive affect</li> <li>- Ryff's measures of psychological wellbeing</li> <li>- Keyes' social wellbeing</li> </ul>	- Composite International Diagnostic Interview Short Form (CIDI-SF)	<ul style="list-style-type: none"> <li>- The structure of mental health is distinct from the structure of mental illness, with a two-factor model showing a better fit than a single factor model</li> <li>- Complete Mental Health was associated with low helplessness and high goal setting, resilience, and intimacy</li> </ul>	<ul style="list-style-type: none"> <li>- Classifying and monitoring a population with the added dimension of WB useful as anything other than complete mental health is associated with less healthy functioning</li> <li>- Extant talk therapies may be useful for promoting flourishing as well as treating mental illness (due to association of complete mental health with low helplessness and high goals, resilience, and intimacy)</li> <li>- Study validates the use of the MHC-SF in a South-African population</li> </ul>
Keyes et al. (2008)	To evaluate the Mental Health Continuum-Short Form in Setswana-speaking South Africans	Cross-sectional study n = 1050	South Africa	Adult (general population) Age: 30-80+ 62% female	<ul style="list-style-type: none"> <li>- Mental Health Continuum-Short Form (MHC-SF)</li> <li>- Affectometer 2 (10-item)</li> <li>- Satisfaction With Life Scale (SWLS)</li> </ul>	- General Health Questionnaire (GHQ)	<ul style="list-style-type: none"> <li>- The study found a better fit for a two-factor model than for a one factor-model</li> <li>- The study found adequate internal consistency for the MHC-SF (0.74)</li> </ul>	<ul style="list-style-type: none"> <li>- Positive mental health can predict the chance of 'recovery' from depression over a 10 year period, and can therefore be targeted in prevention initiatives</li> </ul>
Keyes et al. (2010)	To determine the prevalence of mental health and mental illness, determine its stability over time and test whether changes in mental health predict changes in mental illness	Longitudinal observational Study n = 1723	United States of America	Adult (mental illness) Age: 25-74 Gender ratio not reported	<ul style="list-style-type: none"> <li>- Bradburn's scales of positive affect</li> <li>- Ryff's measures of psychological wellbeing</li> <li>- Keyes' social wellbeing</li> </ul>	- Composite International Diagnostic Interview Short Form (CIDI-SF)	<ul style="list-style-type: none"> <li>- Change in positive mental health impacted rate of mental illness, with reductions from flourishing to languishing being associated with an 8.2x risk of remaining diagnosed with mental illness and going from moderate mental health to languishing being associated with a 4.4x risk over a 10 year period</li> <li>- Staying languishing was associated with a 6.6x odds of remaining diagnosed with mental illness</li> <li>- The likelihood of remaining diagnosed with mental illness declined by 26% per unit of change in wellbeing</li> </ul>	<ul style="list-style-type: none"> <li>- Positive mental health can predict the chance of 'recovery' from depression over a 10 year period, and can therefore be targeted in prevention initiatives</li> </ul>

Author (Year)	To investigate	Study Design	Location	Participants	Measures	Findings	Conclusions
Kim (2017)	To investigate group differences in suicide resilience using the complete state model of mental health	Cross-sectional study n = 297	South Korea	Adults (Students) Age not reported Gender ratio not reported	- Mental Health Continuum - Short Form (MHC-SF)	- Mental Disorder Inventory (MDI)	- Levels of suicide resilience corresponded to complete state model group. In those without a mental illness, the 'complete mental health' group had the highest level of suicide resilience, which declined with wellbeing. Similarly, in those with a mental illness, suicide resilience declined with wellbeing  - The results of this study suggest that both mental illness and wellbeing should be actively considered in mental health promotion
Kim et al. (2014)	To investigate the relative associations of a strength-focused measure and a symptom-focused measure on wellbeing, and determine gender differences on these associations	Cross-sectional study n = 118	United States of America	Youth (students) Age: 15.1 (1.5) 56% female	- Social emotional health survey (SEHS) - Positive and Negative Affect Scale for Children (PANAS-C) - Students' Life Satisfaction Scale (SLSS)	- Behavioural Assessment System for Children-2 (BASC-2) - Behavioural and Emotional Screening System (BESS)	- Using both strength-focused and symptom-focused screening measures could help school practitioners better understand the complete mental health needs and status of all students
Kinderman et al. (2015)	Examine whether anxiety, depression and wellbeing have different causal determinants and mediators	Cross-sectional study n = 32827	United Kingdom	Adult (general population) Age: 40.5 (14.3) 61% female	- BBC subjective wellbeing scale (BBC-SWB)	- Cambridge Neuro-psychological Test Automated Battery (CANTAB) - Goldberg Anxiety and Depression scales	- The study found support for the hypothesis that wellbeing and mental illness have distinct causal pathways, with different causal factors and psychological mediators - despite the existence of a high correlation between the two -Interventions looking to improve well-being and preventions aimed at mental illness should be complementary but different and should target different causal factors and pathways

Lamers et al. (2011)	To evaluate the validity of the Mental Health Continuum-Short form across the life course	Cross-sectional study n = 1662	Netherlands	Adult (general population) Age: 47.6 (17.7) 50% female	Mental Health Continuum-Short Form (MHC-SF) - Satisfaction With Life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS) - Happiness (1-item)	Brief Symptom Inventory (BSI)	<ul style="list-style-type: none"> <li>- The study found the best fit for the three factors within the MHC-SF</li> <li>- An overarching two-continuum model with correlated factors showed the best statistical fit in confirmatory factor analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Mental health and mental illness are distinct indicators of mental wellbeing, instead of a single continuum</li> <li>- The MHC-SF is a valid tool for measuring mental health in a Dutch population</li> </ul>
Lamers et al. (2012)	Examine whether psychopathology and positive mental health show differential associations with the Big Five personality traits	Cross-sectional study n = 1161	Netherlands	Adult (general population) Age: 18-88 50% female	Mental Health Continuum-Short Form (MHC-SF)	Brief Symptom Inventory (BSI)	<ul style="list-style-type: none"> <li>- The big five personality traits are differentially associated with psychopathology and positive mental health. Emotional stability is related to psychopathology while extraversion and agreeableness are associated with wellbeing</li> <li>- The explained variance is greater for psychopathology (19%) than for wellbeing (9%)</li> </ul>	<ul style="list-style-type: none"> <li>- The study supports a dual-factor approach and indicates that interventions that look at alleviating psychopathology may have to focus on different underlying factors than interventions that aim at enhancing positive mental health</li> </ul>
Lamers et al. (2015)	Investigate the relation between positive mental health and mental illness symptoms over time	Longitudinal study n = 1932	Netherlands	Adult (general population) Age: 18-65+ 52% female	Mental Health Continuum-Short Form (MHC-SF)	Brief Symptom Inventory (BSI)	<ul style="list-style-type: none"> <li>- The study found a strong bidirectional relationship, with both low wellbeing and mental illness being a risk factor for the development of one another over time</li> <li>- The association remains after controlling for baseline levels of wellbeing and mental illness; a finding that highlights the existence of two factors</li> <li>- Changes over time in wellbeing and mental illness were an even stronger predictor than absolute levels</li> </ul>	<ul style="list-style-type: none"> <li>- This study underlines the importance and usefulness of monitoring positive mental health and psychopathology over time, for instance as part of assessment and outcome monitoring practices</li> </ul>

Lim (2014)	Examine the psychometric properties of the Mental Health Continuum-SF in a Korean population, and establish the prevalence of mental health in the sample	Cross-sectional study n = 547	South Korea	Youth (Students) Age: 16.1 (0.3) 57% female	- Mental Health Continuum-Short Form (MHC-SF) - Satisfaction With Life Scale (SWLS)	- General Health Questionnaire (GHQ)	- The MHC-SF showed a best fit when a three-factor solution was used - A two correlated factor showed the best fit between positive mental health and mental disorder	- The current study validates the use of the MHC-SF in a Korean population, and supports the dual-factor model of mental health
Lupano Perugini et al. (2017)	Examine the psychometrics of the Mental Health Continuum-SF in the Argentinean context, and to obtain evidence of the two-continua model	Cross-sectional study n = 1300	Argentina	Adult (general population) Age: 40.3 (13.6) 50% female	- Mental Health Continuum-Short Form (MHC-SF) - Satisfaction with Life Scale (SWLS) - Positive and Negative Affect Scale (PANAS) - Well-Being Index (WBI)	- Center for Epidemiologic Studies - Depression Scale (CES-D) - Symptom Checklist-90-Revised (SCL-90-R)	- A three dimensional model for subjective, psychological and social wellbeing showed the best fit, regardless of gender or age - Scores on the MHC-SF were positively correlated to wellbeing indices and negatively to mental illness indices, supporting the dual-factor models	- The current study validates the use of the MHC-SF in an Argentinian population, and supports the dual-factor model of mental health
Lyons et al. (2012)	Examine the contributions of personality, environmental, and perceived social support variables in classifying adolescents using a dual-factor model of mental health	Cross-sectional study n = 990	United States of America	Youth (students) Age: 14.6 (2.1) 64% female	- Students' Life Satisfaction Scale (SLSS)	- Youth self-report of the child behaviour checklist (YSR)	- The four distinct groups as proposed by dual-factor models emerged, with personality and social support factors influencing each group differently - Extraversion and neuroticism were linked to the two psychopathology groups, but not with the vulnerable group - Parental social support contributed to vulnerable and troubled groups, while other social support did not differ between groups - Acute stressful life events predicted being in the troubled group	- Interventions aimed at targeting student's mental health need to take antecedents into account depending on the four groups, the susceptibility to change of these antecedents (social support is for instance more likely to change than personality), and the magnitude of the effect of these antecedents

Lyons et al. (2013)	Determine the usefulness of the dual-factor model in adolescents, and its relationship to academic performance and student engagement	Longitudinal study n = 1809	United States of America	Youth (students) Age: 12.7 (0.7) 52% female	- Students' Life Satisfaction Scale (SLSS) - Positive and Negative Affect Scale for Children (PANAS-C)	- Self-Report Coping Scale (SRCS)	- The four distinct groups performed differently on GPA and student engagement - The participants with low wellbeing but without mental illness showed less emotional engagement and a bigger decline in GPA than those with complete mental health	- Professionals should consider a student's level of positive mental health, as it can aid in monitoring a potential area of risk that can affect GPA and student engagement
Macaskill (2012)	To measure the relationship between strengths, wellbeing and coping mechanisms in individuals living with recurrent depression, and assess the usefulness of strengths assessment within psychological assessment	Mixed methods n = 112	United Kingdom	Adult (mental illness) Age: 41.3 (11.2) 24% female	- Satisfaction With life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS)	- Short Depression-Happiness Scale	- Strength assessment was considered useful and helpful as a complement to traditional psychological assessment - Integrating strengths within psychological assessment may transform how patients suffering from recurrent depression see themselves and the satisfaction with assessment, as well as how they view life after depression	
Macaskill and Donovan (2014)	To examine the relationship of character strengths with mental illness and wellbeing	Cross-sectional study n = 214	United Kingdom	Adult (students) Age: 19.1 (3.3) 79% female	- Satisfaction With life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS)	- General Health Questionnaire (GHQ-28)	- There were no differences between GHQ case and non-case students found on life satisfaction and positive affect scores, supporting a dual-factor model - There were differences in positive and negative affect between case and non-case students, indicating to the importance of addressing them separately in clinical practice - Character strengths were generally equally important for case and non-case students	- Character strengths are resources that therapists can use to build positive mental health in individuals with and without mental illness

Magalhães and Calheiros (2017)	Explore the use of a dual-factor model in youth mental care and study group differences as determined by the dual-factor model in relation to a set of social support components and resources	Cross-sectional study n = 369	Portugal	Youth (general population) Age: 14.7 (1.8) 46% female	<ul style="list-style-type: none"> <li>- Satisfaction With life Scale (SWLS)</li> <li>- Scales of Psychological wellbeing</li> </ul>	<ul style="list-style-type: none"> <li>- Reynolds adolescent adjustment screening inventory (RAASI)</li> </ul>	<ul style="list-style-type: none"> <li>- Confirmatory factor analysis supports a better fit of a two-dimensional model compared to a one-dimensional model</li> <li>- There were group differences in social support, with the complete mental health group showing better results on social support dimensions, and the troubled group showing worst results</li> <li>- The promotion of protective factors (e.g. relationships) can contribute to higher levels of positive mental health</li> </ul>	<ul style="list-style-type: none"> <li>- This study supports the need to implement, monitor and evaluate interventions tailored to the youth's needs, taking into account their positive mental health as well as their psychological difficulties, and not one or the other</li> </ul>
Massé et al. (1998)	To investigate whether psychological distress and subjective wellbeing are the opposite poles of the same axis of mental health, or independent constructs	Cross-sectional study n = 398	Canada	Youth and Adult (general population) Age: 15-65+ 52% female	<ul style="list-style-type: none"> <li>- Well-Being Manifestations Measure Scale (WBMMMS)</li> </ul>	<ul style="list-style-type: none"> <li>- Distress Manifestations Measure Scale (DMMS)</li> </ul>	<ul style="list-style-type: none"> <li>- The best model features a structure of psychological distress and wellbeing as two correlated dimensions reflecting a higher order construct of mental health</li> </ul>	<ul style="list-style-type: none"> <li>- Assessments of mental health in the general population provide a better explanation of mental health when using measures of wellbeing and psychological distress</li> </ul>
Olszewski (2012)	To use the complete model of mental health to study group differences in applied ways of coping with stress	Cross-sectional study n = 74	Poland	Adult (students) Age: 22-44 Gender ratio not reported	<ul style="list-style-type: none"> <li>- Satisfaction with Life Scale (SWLS)</li> </ul>	<ul style="list-style-type: none"> <li>- State-Trait Anxiety Inventory</li> </ul>	<ul style="list-style-type: none"> <li>- Two groups were identified, those with high anxiety and average life satisfaction, and those with above average life satisfaction and lower than average anxiety</li> <li>- Participants in these groups responded differently to the COPE scale</li> </ul>	NA

Payton (2009)	To investigate the relationship between positive mental health, mental illness, and psychological distress	Cross-sectional study n = 4242	United States of America	Adult Age: 25-74 Gender ratio not reported	- Ryff's Scales of Psychological Wellbeing	- Disorder composite diagnosis of depression, anxiety, or panic attack - Distress composite of symptom items to measure mood and malaise	- Diagnosis of mental illness, positive mental health, and psychological distress are distinct, and should not be directly contrasted	- Conflating distress, disorder, and mental health likely obscures important underlying variation, therefore these variables should be measured separately
Peter (2018)	To investigate the dual-factor model within a large-scale group of gays and lesbians, and their heterosexual counterparts	Cross-sectional study n = 25113	Canada	Adult (general population) Age: 45.7 51% female	- Mental Health Continuum - Short Form (MHC-SF)	- World Health Organisation World Mental Health-Composite International Diagnostic Interview (WMH-CIDI) criteria	- LGB individuals had less positive mental health and more mental illness than heterosexual counterparts - There were differing proportions in each of the four groups for LGB compared to heterosexual counterparts - There were differences between the type of mental illness and the level of positive mental health experienced	- Using a dual-continua model aids in better identification of high-risk individuals, beyond what is found using a single continuum, as simply being free of mental illness does not guarantee optimal mental health, and levels of positive mental health differ depending on the mental illness diagnosis of the client
Petrillo 2015	Validation of the Italian MHC-SF and verification of the dual-factor model	Cross-sectional study n = 1438	Italy	Adult (general population) Age: 47.1 (19.6) 52% female	- Mental Health Continuum (MHC-SF) - Satisfaction With life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS)	- General Health Questionnaire (GHQ-12) - Center for Epidemiologic Studies Depression Scale (CED-D)	- The MHC-SF factor structure was replicated in this Italian sample and showed good psychometric properties	- The MHC-SF is validated for use in Italian populations

Pruchno et al. (1995)	Examine the effects that caregiving has on the positive and negative mental health of multiple caregivers, their husbands and the co-resident children, and determine whether differential predictors for both exist in these groups	Cross-sectional study n = 140	United States of America	Adult (carers) Age: 49.4 (range 33-67) 100% female	- Positive Affect Scale of the Bradburn's Affect Balance Scale	- Center for Epidemiologic Studies Depression Scale (CES-D)	- Poorer physical health and greater negative appraisals were predictors of depression, while predictors of positive affect were less consistent in the population	- The study found differential predictors for positive mental health and negative mental health, with predictors differing for males and females, highlighting the importance of addressing different factors when targeting positive mental health and mental illness
Pruchno et al. (1996)	To investigate the relationship between positive and negative wellbeing and their differential predictors in a group of carers	Cross-sectional study n = 838	United States of America	Adult (carers) Age: 65.2 100% female	-Life Satisfaction Index A (LSIA) -Bradburn's Affect Balance Scale	- Center for Epidemiologic Studies Depression Scale (CES-D)	- A two factor model was confirmed with different predictors being associated with negative and positive mental health: positive appraisals were uniquely predictive of positive mental health, while child maladaptive behaviour was a unique predictor of negative mental health. - Some predictors, e.g. negative appraisal of the caregiving role and physical health, were predictive of both positive and negative mental health	- The study highlights the importance of discovering common and differential predictors of positive and negative mental health, and the implications this has for potential treatment and prevention opportunities
Renshaw and Cohen (2014)	Investigate between-group differences of complete mental health across three key indicators of college student functioning (academic achievement, interpersonal connectedness, and physical health)	Cross-sectional study n = 1356	United States of America	Adult (students) Age: 19.2 (2.0) 65% female	- 10-item Life Satisfaction subscale of the Quality of Life Interview, Brief Version (QOL-BV)	- Brief Symptom Inventory-18 (BSI-18)	- Four distinct groups, as postulated by the dual factor model, could be noted in the data set - Life satisfaction provides additive value in predicting life-functioning across interpersonal, physical health, and academic achievement domains (when considered in conjunction with psychological distress indicators)	- Mental health work undertaken with college students would benefit from consideration of life satisfaction as a complement to traditional indicators of psychological distress, as it can aid in prediction of student achievement

Renshaw et al. (2016)	Investigate the concurrent validity of a dual-factor model using two analytic approaches, categorical and continuous	Cross-sectional study n = 951	United States of America	Adult (students) Age: 20.0 (1.6) 72-75% female	- Satisfaction With life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS)	- Depression Anxiety Stress Scale (DASS-21) - UCLA Loneliness Scale	- Using a categorical approach to classifying mental health and illness, a dual-factor model shows the best fit - Using a continuous approach to classifying mental health and illness, a unidimensional wellbeing model showed a better fit, than a bi-dimensional model or a Uni-dimensional distress model	- Categorical or continuous approaches to operationalising mental health and mental illness can lead to different results, and more research into assessment methods is required - Categorical assessment is currently mostly used in practice, thereby validating the dual-factor approach for current mental health practice
Renshaw (2018)	To validate the Psychological Wellbeing and Distress Screener in a Turkish population, and confirm the measure's dual-continua structure	Cross-sectional study n = 399	Turkey	Youth (students) Age: 13.9 (1.6) 49% female	- Psychological Wellbeing and Distress Screener (PWDS)	- Psychological Wellbeing and Distress Screener (PWDS)	- The wellbeing and distress scales of the PWDS best fit the dual-continua model - Both scales significantly predicted positive affect, negative affect, and school support, yet only the wellbeing scale was a significant predictor of family support and peer support	- Measures of mental illness and wellbeing differentially predict variables related to desirable educational outcomes.
Rose et al. (2017)	Identify mental health groups of African American youth and explore the association between the resulting classes and demographic and educational experiences	Cross-sectional study n = 1170	United States of America	Youth (students) Age: 15.0 (1.4) 52% female	- Life satisfaction (Single item)	- Center for Epidemiologic Studies Depression Scale (CES-D) - WMH-CIDI	- The study found four distinct groups as demonstrated by using a dual-factor approach to mental health - Those demonstrating complete mental health had higher correlations particularly with school bonding, but also less suspensions and grade retention	- Dual factor is useful to more comprehensively assess mental health of school-going youth, as can provide a more detailed insight into the associations of important factors such as school bonding (belonging) with mental health

Schönfeld et al. 2016	Investigate the potential mediation effects of general self-efficacy on positive and negative mental health	Cross-sectional study n = 10698	Germany, China, Russia	Adult (students) Age: 21-26 47-69% female	- Positive mental health scale (PMH)	- Depression Anxiety Stress Scale (DASS-21)	- Perceived self-efficacy mediated the effect of stress on positive mental health and mental illness, but significant differences were found such that larger effects were seen for positive mental health. - These results were replicated in all three student samples	- Protective factors such as self-efficacy exert different influences on positive mental health and negative mental health in the context of stress-negating processes of daily life - Due to the changeable nature of self-efficacy and its significant (but different) role in both positive and negative mental health, it constitutes an important target for treatment and prevention to reduce the effect of stress on health
Schonfeld et al. (2017)	To compare indicators of complete mental health across the lifespan in different countries	Cross-sectional study n = 6303	Germany, Russia, United States of America	Adult (general population) 51-55% female	- Positive mental health scale (PMH)	- Depression Anxiety Stress Scale (DASS-21)	- Older Russians experience more negative mental health, while German and American older adults experience more positive mental health - Similarly, differences in levels of depression, anxiety and resilience were found in the three cohorts indicating a potential effect of economic and social circumstances between nations on both indicators	- Complete mental health, resilience, and social support across the lifespan varies substantially, and may be influenced by the particular economic and social circumstances a nation is exposed to
Seow et al. (2016)	Determine levels of positive mental health in an Asian outpatient population, establish its correlates and investigate whether higher levels of positive mental health would be associated with better life satisfaction and general functioning in this population	Cross-sectional study n = 218	Singapore	Adults (mental illness) Age: 38.4 (11.7) 49% female	- Positive mental health instrument - Satisfaction With life Scale (SWLS)	- Generalized Anxiety Disorder 7 (GAD-7) - Patient Health Questionnaire (PHQ-9)	- It is important to explore the level and determinants of PMH among individuals with mental illness so that clinicians and health professionals can formulate targeted wellbeing interventions in the treatment and rehabilitation of those individuals within clinical settings. This is particularly relevant for younger patients and those with early onset of illness as these display lower levels of positive mental health	

Shaffer-Huckins et al. (2010)	To test whether positive mental health and mental illness associate differently with various physical health indicators	Cross-sectional study n = 401	United States of America	Youth (students) Age: 12.96 (1.0) 60% female	<ul style="list-style-type: none"> <li>- Students' Life Satisfaction Scale (SLSS)</li> <li>- Positive and Negative Affect Scale for Children (PANAS-C)</li> </ul>	<ul style="list-style-type: none"> <li>- Youth Self Report form of the Child Behaviour Checklist (YSR)</li> </ul>	<ul style="list-style-type: none"> <li>- Positive caregiving appraisals are an essential aspect of any comprehensive theory of caregiver wellbeing, which can be influenced by improving positive mental health</li> </ul>
Smith (1996)	To examine the usefulness of a two-factor model in predicting caregiving outcomes for older mothers providing care to offspring with mental retardation	Cross-sectional study n = 235	United States of America	Adult (carers) Age: 70.3 100% female	<ul style="list-style-type: none"> <li>- Ego-integrity subscale from the ego adjustment scale (10-item)</li> </ul>	<ul style="list-style-type: none"> <li>- Negative affect scale of the affect balance scale (5-item)</li> </ul>	<ul style="list-style-type: none"> <li>- Wellbeing reduced negative mental health via decreasing perceived caregiver burden</li> </ul>
Spinhoven et al. 2015	Examine whether participants with higher symptom levels of a current or past emotional disorder report to be less happy than controls and to assess whether measurements of extraversion and neuroticism predict future happiness independent of measurements of emotional disorder or symptom severity	Longitudinal observational study n = 2142	Netherlands	Adult (mental illness) Age: 48.2 (13.1) 66% female	<ul style="list-style-type: none"> <li>- Self-rating of Happiness scale (1-item)</li> <li>- Mood and Anxiety Symptom Questionnaire-Shortened Dutch Version (MASQ-D30; 30-item)</li> </ul>	<ul style="list-style-type: none"> <li>- Composite Interview Diagnostic Instrument (CID)</li> <li>- Inventory of Depressive Symptomatology self-report (IDS-SF)</li> </ul>	<ul style="list-style-type: none"> <li>- Wellbeing levels differ per affective disorder type and personality type influences happiness and emotional wellbeing independently of psychological disorder or symptom severity, pointing to the utility of accounting for personality factors when trying to address wellbeing and happiness in people with and without mental illness</li> <li>- Happiness and emotional wellbeing were most strongly related to depressive disorders and to social anxiety disorder</li> <li>- Relationships to generalised anxiety disorder, panic disorder and agoraphobia were much smaller</li> <li>- Personality factors, specifically extraversion, contribute to wellbeing, even after controlling for emotional disorder and symptom severity</li> </ul>

Suldo and Shaffer (2008) and Suldo et al. (2011)	Examine whether student's initial levels of subjective wellbeing and psychopathology predict school performance one year later	Longitudinal observational study n = 341	United States of America	Youth (students) Age: 13.0 (1.0) 59% female	- Students' life satisfaction scale - Positive and Negative Affect Schedule for Children (PANAS-C)	- Youth self-report form of the child behaviour checklist (YSR)	- Students with low psychopathology and moderate to high wellbeing had least deterioration of academic scores, including reading skills, attendance rates, academic self-perceptions and goals, and social support from classmates and parents - Mean academic performance of vulnerable students was similar to that of troubled students, highlighting that psychopathology increases risk of underachievement - Those with mental illness but high wellbeing had better physical health and social functioning	- The absence of mental illness is not sufficient to guarantee optimal academic achievement - This supports the collection of information regarding student's SWB in order to provide a more complete understanding of student's mental health as well as academic functioning
Suldo (2015)	Examine the influence of peer behaviour on indicators of mental health and psychopathology	Cross-sectional study n = 500	United States of America	Youth (students) Age: 15.3 (1.0) 59% female	- Students' life satisfaction scale - Positive and Negative peer and associated	- Self-report of personality form of the Behaviour Assessment System for Children, Second Edition (BASC-2)	- Positive peer relations resulted mainly in greater positive mental health, being life satisfaction and positive affect, as opposed to psychopathology - Negative peer behaviours mainly influenced psychopathology and negative affect	- Positive and negative peer relations and their associated behaviours influence positive mental health and mental illness differently
Suldo et al. (2016)	Determine the proportion of students in each quadrant of the dual-factor model and examine how mental health, defined in a dual-factor model, relates to adjustment, social adjustment, identity development, and physical health	Cross-sectional study n = 500	United States of America	Youth (students) Age: 15.3 (1.0) 59% female	- Students' life satisfaction scale - Positive and Negative Affect Schedule for Children (PANAS-C)	- Self-report of personality form of the Behaviour Assessment System for Children, Second Edition (BASC-2)	- The study found four distinct groups as indicated in the dual-factor model in this student population - The groups differ in academic attitudes, social adjustment, identity development, and physical health, with high positive mental health being associated with a lower likelihood of problems in developmental outcomes	- Complete mental health, validated in this study, aligns with community approach to prevention, treatment, and promotion of wellbeing in youth, and can help schools determine allocation of efforts and resources: the most intense services should be reserved for troubled students, who require both reduction in psychopathology and increases in SWB

Teismann et al. (2018)	Determine the proportion of participants who demonstrate suicide ideation and positive mental health, and examine whether the presence of positive mental health influences suicide behaviour	Cross-sectional study n = 282	Germany	Adult (Mental illness) Sample 1: Age: 43.0 (12.1) 54% female Sample 2: Age: 37.9 (12.8) 71% female	- Positive Mental Health Scale (9-item)	- Depressive Symptom Inventory - Suicidality subscale (DCI-SS) - Suicidal behaviours questionnaire - revised (SBQ-R)	- The study could clearly find four distinct groups based on the dual-factor theories - Suicide behaviour was different between groups, with less suicide attempts in suicide ideations that have moderate to high positive mental health	- The Complete state model is useful for identifying risk profiles for suicide ideations
Tomba et al. (2014)	To assess psychological well-being in out-patients with eating disorders and in controls	Cross-sectional study n = 245	Italy	Youth and Adult (mental illness) Age: 28.3 (9.7) 96% female	- Psychological Wellbeing Scales	- General Health Questionnaire (GHQ)	- Impaired levels of psychological wellbeing were independent from the presence of psychopathology, and differed per specific eating disorder diagnosis	- Results support the need to assess psychological wellbeing in outpatients with eating disorders, as it can share a more detailed view on mental health of eating disorder patients
Trompetter et al. (2017)	Investigate the impact of Acceptance and Commitment Therapy on depression or anxiety symptoms and positive mental health	Randomised Controlled Trial n = 250	Netherlands	Adult (mental illness) Age: 45.5 (11.0) 70% female	- Mental Health Continuum - Short Form	- Center for Epidemiologic Studies Depression Scale (CES-D) - Hospital Anxiety and Depression Scale (HADS)	- Baseline level of and change in positive mental health moderately predicted effectiveness on depression/anxiety - Baseline level of and change in depression/anxiety moderately predicted effectiveness on positive mental health - Two thirds of participants improved on either positive mental health or depression/anxiety, not both	- The differential effect of ACT on positive mental health and mental illness, and the fact that response differs for patients, indicates that practitioners benefit from monitoring and working on and monitoring both when treating their patients - Using one treatment method may not necessarily mean that patients can achieve complete mental health as interventions, for a substantial group of participants, are only effective on one dimension - Systematically implementing measurements of both psychopathology and positive mental health will facilitate better informed decisions about the continuation and focus of patients in mental health treatment

Author(s)	Study Design	Location	Participants	Outcome	Findings
Van Erp Taalman Kip and Hutsche- maekers (2018)	Cross-sectional study n = 1069	Netherlands	Adult (mental illness) Age: 47.6 (17.7) 63% female	- Mental Health Continuum - Short Form  - Outcome Questionnaire (OQ-45)	- Mental health patients do not display a tripartite structure for wellbeing - A two-factor model explained a good fit, but the wellbeing components only explained little variance - If factor independency is a pre-requisite, a single factor structure would be the best fit  - Mental illness and mental health are highly correlated in patients with high levels of mental illness - Therefore CMH may be a useful metaphor for recovery only, or for participants who are not mentally ill
Veit and Ware (1983)	Cross-sectional study n = 5089	United States of America	Youth and Adult (general population) Age: 13-69 54% female	- Mental health Inventory	- A large mental health factor underlies the mental health index, with two underlying factors for wellbeing and psychological distress - Reliance on a single score (psychological wellbeing or illness) is associated with a significant loss of information - Positive items clustered together to define psychological wellbeing and items describing negative states clustered together to define psychological distress - A total of 5 underlying factors influence wellbeing (positive affect, emotional ties) and psychological distress (anxiety, depression, loss of control)
Vela et al. (2016)	Cross-sectional study n = 130	United States of America	Adult (students) Age: 20.2 (3.3) 62% female	- Satisfaction With Life Scale (SWLS)  - Center for Epidemiologic Studies Depression Scale (CES-D)	- Different traits associated with positive psychology differentially predict life satisfaction and mental illness, which holds implications for intervention developers and practitioners  - Presence of meaning in life, mindfulness and hope were related to life satisfaction - Mindfulness and search for meaning in life were associated with depression - Different individual strengths influence life satisfaction and depression

<p>Venning et al. (2013)</p> <p>Determine the prevalence and distribution of complete mental health states in young Australians, and investigate the association of these states to health-risk behaviours</p>	<p>Cross-sectional study</p> <p>n = 3913</p>	<p>Australia</p>	<p>Youth (students)</p> <p>Age: 13-17</p> <p>52% female</p>	<p>- Satisfaction With Life Scale (SWLS)</p> <p>Psychological Wellbeing Scale</p> <p>Social Wellbeing Scale</p>	<p>- Depression</p> <p>Anxiety</p> <p>Stress Scale (DASS-21)</p>	<p>- Participants who had high wellbeing and no mental illness (42%) engaged less in health-risk behaviours such as smoking or consuming alcohol, compared to other groups</p> <p>- Measuring both mental illness and mental health can discover groups that previously may have gone unnoticed; groups who show differences in health-risk behaviour taking</p>
<p>Weich et al. (2011)</p> <p>To describe mental wellbeing in a general population sample and to test whether indicators of wellbeing, health status, income and employment status are independent from mental illness</p>	<p>Cross-sectional study</p> <p>n = 7461</p>	<p>United Kingdom</p>	<p>Adult (general population)</p> <p>Age: 50.5 (18.4)</p> <p>58% female</p>	<p>- 9 single item questions related to wellbeing</p>	<p>- Clinical Interview Schedule (CIS-R)</p>	<p>- The paper demonstrates evidence of the interrelation but independence of mental illness and mental health in an English population</p> <p>- Wellbeing and mental illness are correlated but independent factors</p> <p>- Eudemonic and hedonic wellbeing are distinct but related components of wellbeing</p>
<p>Westerhof and Keyes (2010)</p> <p>To study age differences in mental health and mental illness, and determine age differences in being completely mental healthy (flourishing and no mental illness) and mentally ill (languishing and mental illness)</p>	<p>Cross-sectional analysis of one time-point in longitudinal study</p> <p>n = 1340</p>	<p>Netherlands</p>	<p>Adult (general population)</p> <p>Age: 48.32 (17.7)</p> <p>50% female</p>	<p>- Mental Health Continuum - Short Form (MHC-SF)</p>	<p>- Brief Symptom Inventory (BSI)</p>	<p>- This study did not find a clear relationship between age and level of mental health (flourishing), but did find differences in mental illness, highlighting the usefulness of the dual-factor model in assessment of mental health status in adults</p> <p>- Older adults experience similar amounts of mental health as younger adults, as slight differences could be explained by age-related differences in life circumstances</p> <p>- Younger adults do show more mental illness, but have no less mental health than older adults</p>

Westerhof (2013)	To analyse the components of complete mental health with sociodemographic variables over time	Longitudinal study n = 1340	Netherlands	Adult (general population) Age: 48.3 (17.7) 50% female	- Mental Health Continuum - Short Form (MHC-SF)	- Brief Symptom Inventory (BSI)	- Sociodemographic variables hold different relations with different indicators of mental illness and mental health; relations that are remarkably stable across time - The exceptions to this stability were age and educational level, showing distinct time trajectories for the different indicators of mental health and illness	- Public mental health care is best served by a differentiated approach in the treatment and prevention of mental illness, as well as by the promotion and protection of mental health. Such a differentiated approach should be tailored to groups with different socio-demographic backgrounds
Wilkinson and Walford (1998)	To verify that, in adolescents, psychological health can be viewed as being comprised of two dimensions: wellbeing and distress	Cross-sectional study n = 345	Australia	Youth (students) Age: 17.1 (0.7) 79% female	- Satisfaction With Life Scale (SWLS) - Happiness Thermometer (1-item) - Positive and Negative Affect Schedule (PANAS)	- State-Trait Anxiety Inventory - Center for Epidemiologic Studies Depression Scale (CES-D)	- The study found support for the two-factor model over a single factor model in this adolescent population, although the results were less profound when comparing results to adults - Anxiety and negative mood were indicators of psychological distress, while happiness, life satisfaction and positive affect were indicators of wellbeing	- While a two-factor model worked in this adolescent population, the fit was less than what is witnessed in adult populations, thereby indicating that assessment may need to take each into account
Winzer et al. (2014)	To investigate the existence of the dual-continua model in a Swedish sample, and explore its associations with demographic, social and health factors	Longitudinal observational Study n = 23394	Sweden	Adult (general population) Age: 16-29 56% female	- Positive Items of the General Health Questionnaire (GHQ-12)	- Negative Items of the General Health Questionnaire (GHQ-12)	- An exploratory and confirmational factor analysis found support for a two-factor model. Predictors for positive and negative mental health were "mirrored", which points to a one-factor model	- Measurement of two dimensions of mental health need to use instruments specifically adapted for this purpose, instead of using measurement tools that are designed to measure just one construct (e.g. mental illness) - Work needs to be done to identify specific theoretical predictors that are linked to positive mental health rather than ill-health

Wood and Joseph (2010)	To test whether people low in wellbeing are at risk for having clinically elevated levels of depression ten years later	Longitudinal observational Study n = 5566	United States of America	Adult (general population) Age: 51-56 55% female	- Scales of Psychological Wellbeing	- Centre for Epidemiologic Depression (CES-D)	- People with low levels of positive wellbeing have a 7.2x higher risk of being depressed 10 years later, which remained 2.2x higher when controlling for other baseline predictors	- As low wellbeing predicts future depression, it becomes important to understanding its relationship with mental disorder, and supports the notion that addressing wellbeing as a means of preventing and treating depression is warranted
Xiong et al. (2017)	To verify the dual-factor model in a Chinese population, investigate differences in self-efficacy beliefs and academic emotions in the four different dual factor model groups, and determine the stability and dynamics of mental health status for each group	Longitudinal observational study n = 1293	China	Youth (students) Age: 14.7 (1.9) 47% female	- Satisfaction With Life Scale (SWLS) - Positive and Negative Affect Schedule (PANAS)	- Youth Self Report form of the child behaviour checklist	- The different dual-factor model groups demonstrated different scores for self-efficacy and academic emotions, and different groups showed different stability in mental health over time. Most notably the vulnerable group showed high transition rates into other quadrants, pointing to the importance of targeting interventions at this group	- This measurement approach can assist school psychologists and others engaged in psychological service to children in schools to target those most at risk to proactively prevent problems - Those with low subjective wellbeing and psychology are most transient and therefore may require particular attention from health providers to ensure the likelihood of positive change
Yoo and Kahng (2019)	To test the existence of the dual-continuum model and to examine the relationship between positive and negative mental health and a range of different predictors of positive youth outcomes	Cross-sectional study n = 471	South Korea	Youth (students) Age: 17.9 (0.4) 50% female	- Korean Child Wellbeing Index	- Reynold's Suicidal Ideation Questionnaire (SIQ)	- The dual-continuum model was supported as the data fit a two-factor correlated model rather than a single-factor model - Positive mental health and negative mental health differentially predicted variables related to mental health, most notably peer and parent relationships, self-work, and emotion-focused coping	- The dual continuum model can be used to better inform theory-based interventions. The model provides greater insights into which interventions are likely to improve well-being or reduce mental illness