# Risk and Protective Factors for Depression: A Network Analysis

Symeonidou, Alexandra


**Master Thesis**

# Risk and Protective Factors for Depression: A Network Analysis

**Alexandra Symeonidou**

**MSc Clinical Psychology**

**Supervisor: Dr Eiko Fried**

**Institute of Psychology**

**Universiteit Leiden**

**Academic Year 2021-2022**

**Table of Contents**

## Summary

The literature on risk and protective factors for depression focuses on biological, demographic, social-environmental, and psychological factors. Estimating a network model, this thesis project explores how dynamic psychological risk and protective factors for depression interact and determines which factors are more central to a network of these factors (Research Question 1). It also tests if dynamic risk and protective coping factors relate to current depressive symptoms, as prior studies suggest (Research Question 2). Cross-sectional data from 453 students at a Dutch higher education participating in the WARN-D research project were analyzed. Overall, protective factors clustered together, as risk factors did. The strongest positive associations emerged between Seeking Distraction and Ignoring and between Locus of Control and Optimism. The strongest negative relations merged between Seeking Social Support and Ignoring, Resilience and Intolerance of Uncertainty, and Catastrophizing. Self-efficacy, Resilience, and Self-esteem were the most central features of the network. The results did not support the hypothesis that all the included risk and protective factors are related to current depressive symptoms. Only some were, with the strongest positive associations being between current depressive symptoms and Persistent Thinking and Optimism. Despite the limitations of the present work, these findings highlight the importance of further research on risk and protective factors for depression.

*Keywords:* Risk Factors, Protective Factors, Depression, Network Analysis

**Risk and Protective Factors for Depression: A Network Analysis**

According to the American Psychiatric Association (2013, APA), depression affects an estimated one in 15 adults (6.7%) in any given year, and one in six people (16.6%) will experience a major depressive disorder at some time in their life. Depression is particularly high among university students (Ibrahim et al., 2013), can be associated with a range of adverse outcomes, and, in severe cases, lead to suicide (Holman & Williams, 2020).

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (APA, 2013) defines depression as a common and serious medical illness that negatively affects how one feels, thinks, and acts. Due to the severity of health outcomes resulting from depression, programs have been developed to reduce depressive symptoms (Stockings et al., 2016, Werner-Seidler et al., 2017), and plenty of studies have been published regarding risk factors (Costello et al., 2008). A risk factor is a characteristic (biological, psychological, social) associated with a higher likelihood of problem outcomes (National Research Council, 2009). Conversely, a protective factor is defined as a similar characteristic that reduces the negative impact of a risk factor on problem outcomes (National Research Council, 2009).

The literature focuses on biological, demographic, social-environmental, and psychological factors (previous episodes, cognitive, behavioral, and personality aspects) (APA, 2013; Dobson & Dozois, 2008). Biological factors refer to neurological (Giacobbe & Kennedy, 2006; Sullivan et al., 2000), family history (Hawton et al., 2013; Nierenberg et al., 2007), and regulatory-related facets (Khazaie et al., 2020). Many studies also investigate demographic factors like race, ethnicity, and gender (Patil et al., 2018; Salk et al., 2017). Regarding the social and environmental factors, attachment style (Dobson & Dozois, 2008; Rowe et al., 2020, Warfa et al., 2014), parenting style (Gorostiaga et al., 2019), marriage & relationship issues (Whisman & Uebelacker, 2009), low social support (Gariépy et al., 2016), excessive reassurance and negative feedback-seeking (Evraire & Dozois, 2011; Starr & Davila, 2008;), early life adversity (Gilmer & McKinney, 2003; Gutman & Nemeroff, 2003; LeMoult et al., 2020), and stressful life events (Dobson & Dozois, 2008; Mazure, 1998; Paykel, 2003), are some well-established factors.

Lastly, there are the psychological factors, the focus of this paper. The following sections introduce the cognitive, behavioral, and personality-related psychological risk and protective factors correspondingly, only to explore later how they interact with one another and current major depressive symptomatology. This categorization only enhances the utility of the study. Many of the factors described may fall under multiple categories.

### 1.1. Cognitive and Behavioral Psychological Factors

At a cognitive and behavioral level, cognitive deficits, maladaptive information processing, intolerance of uncertainty, and maladaptive emotion regulation skills can act as risk factors for depression. On the contrary, one's self-efficacy, optimism, and adaptive emotion regulation skills can have a protective role.

#### *Risk Factors*

A meta-analysis (Rock et al., 2013) revealed significant cognitive deficits in information processing, memory, and attention in patients with depression. Additionally, cognitive models of depression support that maladaptive thinking (schemas, beliefs, assumptions), negative appraisals, and biases towards oneself, the world and the future contribute to developing and maintaining depression (Beck, 1967; Beck et al., 1979). Abramson et al. (1989) suggested that people with relevant depressogenic styles tend to make adverse inferences regarding stressful life events. A recent metanalysis (Tang et al., 2020) showed that automatic thoughts and self-evaluation have the largest effect size on predicting depression. One can also mention here self-blame referring to thoughts of blaming oneself for what one has experienced. Although inconsistent findings have been produced, most studies show that a self-blaming attributional style is related to depression (Anderson et al., 1994).

Intolerance of uncertainty (IU) is defined as a cognitive bias that affects how a person perceives, interprets, and responds to uncertain situations on a cognitive, emotional, and behavioral level (Yook et al., 2010). Individuals high on IU find uncertainty stressful, believe uncertainty is harmful and should be avoided, and have difficulty functioning in uncertain situations (Buhr & Dugas, 2002). Research suggests that IU may lead to major depressive disorder through pathways similar to Generalized Anxiety Disorder. Rumination has been associated with IU and hypothesized to mediate depressive symptoms (Yook et al., 2010). A recent meta-analysis associated IU with GAD, MDD, and OCD (Gentes & Ruscio, 2011).

Emotion regulation (ER) is a multidimensional construct defined as the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions (Thompson, 1994). ER skills entail the overall trait-level difficulties in regulating emotions and the habitual use of specific adaptive or maladaptive ER strategies (Aldao et al., 2016). According to multiple meta-analyses, challenges in applying ER skills are associated with depression symptoms and are common targets of treatment (Daros et al., 2021; Schäfer et al., 2016; Tang et al., 2020; Visted et al., 2018). One can identify adaptive ER strategies (cognitive reappraisal, problem-solving, and acceptance) and maladaptive ER strategies (avoidance, suppression, and rumination) relevant to depressive symptoms (Schäfer et al.,

2016). Another study found that rumination, self-blame, catastrophizing, withdrawal, and ignoring regulation skills were related to more depression symptoms, while positive reappraisal, seeking distraction, actively approaching, and seeking social support to fewer. Another theoretical distinction for ER is between cognitive (e.g., rumination) and behavioral (e.g., seeking support) skills (Garnefski & Kraaij, 2006; Kraaij & Garnefski, 2019).

Rumination is defined as a mode of responding to distress by passively focusing on possible causes and consequences of one's distress without moving into active problem-solving (Nolen-Hoeksema, 1991). Rumination is consistently a risk factor for the development of depression, with individuals with a ruminative response style being more likely to develop and experience more depressive symptoms (Aldao et al., 2010; Garnefski & Kraaij, 2006b; Hong, 2007; Kovács et al., 2020; McLaughlin & Nolen-Hoeksema, 2011; Nolen-Hoeksema, 2000; O'Connor et al., 2007; Sarin et al., 2005). Depressive disorders are related to heightened repetitive negative thinking (RNT) in the form of worry and rumination (Ehring et al., 2011). A meta-analysis associated rumination with concurrent and future levels of depression and the stable effect of gender differences (Rood et al., 2009). Another relevant way of responding to distress is catastrophizing, referring to thoughts explicitly emphasizing the terror of what one has experienced (Garnefski & Kraaij, 2006a). Effect sizes for catastrophizing bias on depression are large (Nieto et al., 2020)

Avoidance is viewed as a maladaptive emotion regulation strategy applied as (a) experiential avoidance (avoidance of internal psychological events) that is related to detrimental psychological outcomes (Hayes et al. 1996); (b) behavioral expressions of avoidance (avoidance of external stimuli or situations) (Werner and Gross, 2010). While avoidance may reduce negative emotions in the short term, its long-term psychological costs outweigh its benefits as negative emotions (Werner and Gross, 2010). The more frequent habitual use of avoidance has been associated with depressive symptoms (Aldao et al., 2010; Schäfer et al., 2016; Siu and Shek, 2010; Visted et al., 2018). Experiential avoidance is relevant to the coping skill of ignoring, as described by Kraaij & Garnefski (2019), reflecting the tendency to behave as if nothing has happened.

Suppression is another maladaptive ER strategy with negative long-term consequences for mental health. Suppression has been conceptualized in different ways, (1) referring to the suppression of emotional expressions (i.e., expressive suppression) or (2) the internal suppression of emotional experiences and thoughts (Gross, 2009). In meta-analyses, the habitual use of suppression has been associated with detrimental psychopathological depressive outcomes (Aldao et al., 2010; Cameron & Overall, 2018; Visted et al., 2018). The

coping skill of withdrawing is relevant here, as described by Kraaij & Garnefski (2019), referring to drawing oneself back from situations and contacts to deal with a stressful event.

***Protective Factors***

Self-efficacy refers to an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977). A recent study showed that for those with prior depression, self-efficacy mediates approximately 40% of the effect of dependent stressful life events on symptoms of depression (Maciejewski et al., 2000). A study suggested a model in which negative parental rearing behavior and a negative attributional style featured as the primary sources of depression while coping styles and self-efficacy played a mediating role (Muris et al., 2001). According to Bandura's work (Bandura, 1977, 1982), either low self-efficacy expectancies or low outcome expectancies can lead to apathy, lack of interest, feelings of worthlessness, and depressed affect.

There are two dominant modes of measurement of optimism in the literature: dispositional optimism and attributional style. The first one refers to traits of pervasive patterns of thoughts for the future, while the second one explains past or current events (Dobson & Dozois, 2008). Reformulated helplessness theories implicate pessimistic explanatory style and exceptional pessimism as a risk factor for depression (Abramson et al., 1978). More recent research showed that optimistic individuals tend to be more resistant to depression, while pessimists are more likely to experience depression (Schueller & Seligman, 2008). Muris et al. (2001) suggested that attributional style and negative parental behavior feature primary sources of depression. Additionally, a meta-analytic review on the Penn Resilience program based on exercises of Learned Optimism (Brunwasser et al., 2009) has demonstrated its effectiveness, supporting the protective function of optimism.

Contrary to maladaptive emotion regulation skills, cognitive reappraisal is considered an adaptive ER strategy, which involves changing thoughts and beliefs about a stimulus or situation (Aldao et al., 2010). Higher depressive and anxiety symptoms have been associated with a less frequent habitual use of cognitive reappraisal (Dryman & Heimberg, 2018; Eastabrook et al., 2014; Garnefski & Kraaij, 2006b; Schäfer et al., 2016; Visted et al., 2018). Additionally, acceptance of one's emotions is described as "allowing one's reactions to proceed without resisting them" (Werner and Gross, 2010, p. 30). According to Twohig and Levin (2017), acceptance is the opposite of experiential avoidance. Research supports that accepting internal events is an adaptive way of handling emotions (Werner and Gross, 2010).

A higher level of habitual acceptance is associated with lower levels of depressive symptoms (Schäfer et al., 2016; Visted et al., 2018; Weinberg and Klonsky, 2009).

Problem-solving is a cognitive-affective-behavioral process by which an individual attempts to identify or discover effective or adaptive solutions for stressful problems encountered during everyday life living (Nezu, 2004). It involves cognitive and behavioral responses (Frye & Goodman, 2000). D'Zurilla et al. (2004) distinguish two components of problem-solving as *meta-cognitive schemata* (cognitive) about one's ability to solve problems and available problem-solving *skills* (behavioral). Deficits in problem-solving have been linked to depressive symptoms across the lifespan (Becker-Weidman et al., 2010; Garnefski & Kraaij, 2006b; Kraaij & Garnefski, 2019; Schäfer et al., 2016; Visted et al., 2018). According to Kraaij and Garnefski (2019), when referring to problem-solving, higher use of seeking distraction, actively approaching, and seeking social support is related to fewer depression symptoms, while higher use of withdrawal and ignoring is related to more.

### 1.2. Personality-Related Psychological Factors

Neuroticism, perfectionism, and external locus of control play the most significant role as risk factors at a personality level, whereas self-esteem and resilience play the most significant role as protective factors.

#### *Risk Factors*

The tripartite model of anxiety and depression (Clark & Watson, 1991) has played a prominent role in shaping the associations between personality and Axis I psychopathology. Negative and positive effects are strongly linked to neuroticism and extraversion, respectively (Watson et al., 1999). Hence, Clark et al. (1994) argued that all anxiety and depressive disorders are associated with neuroticism. Recent studies or meta-analyses have concluded that mental illness, in general, is associated with high neuroticism (Malouff, Thorsteinsson, and Schutte, 2005) and specifically that MDD and unipolar depression emerge among its strongest correlates (Fried et al., 2013; Kotov et al., 2010; Tang et al. 2020).

According to recent meta-analyses (Egan et al., 2021; M. M. Smith et al., 2016; Tang et al., 2020), perfectionism also plays a significant role. Definitions of perfectionism center on pursuing high standards and self-criticism over not meeting standards (Limburg et al., 2016). In the literature, two distinct types of perfectionism exist: a maladaptive form that results in emotional distress and a second form that is relatively benign, perhaps even adaptive (Bieling et al., 2004). Perfectionistic concerns have been suggested to be more strongly related to maladaptive outcomes, such as depression, and perfectionistic strivings

with adaptive outcomes, such as positive affect (Bieling, Israeli, et al., 2004; Bull et al., 2022; Enns et al., 2001; Graham et al., 2010; Sassaroli et al., 2008; Wright et al., 2021). However, there is the argument that perfectionistic strivings are also associated with maladaptive outcomes (Egan et al., 2011; Limburg et al., 2016; Lombardo et al., 2013).

Additionally, locus of control (LOC) has been studied as a risk and protective factor for depression. LOC is the degree to which people believe that one, as opposed to external forces like faith and chance (external locus), has control over the outcome of events in their lives (Rotter, 1954). According to Yu and Fan (2014), external locus of control is positively related to self-esteem and depression. A recent meta-analysis on the cultural meaning of perceived control results revealed moderately strong relationships between external LOC and depression symptoms (Cheng et al., 2013). Studies on medically vulnerable populations have shown a negative correlation between external LOC and depression (Aarts et al., 2015) or that LOC fails to mediate between stress, anxiety, and depression in parents of children with a developmental disorder (Hamlyn-Wright et al., 2007).

***Protective Factors***

According to the self-esteem theory of depression, low self-esteem is one of the most critically vulnerable diatheses of depression (Orth and Robins, 2013; Tang et al., 2020). Sowislo and Orth (2013) found that self-esteem elicits a stronger predictive effect on depression than depression on self-esteem. The vulnerability model is robust and holds across gender, age, origin, affective-cognitive versus somatic symptoms of depression, and clinical versus nonclinical samples (Orth and Robins, 2013). Furthermore, research suggests that the effect is (a) partially mediated by rumination, (b) not influenced by other characteristics of self-esteem (i.e., stability and contingency), and (c) driven predominantly by global rather than domain-specific self-esteem (Orth and Robins, 2013).

According to Tang et al.'s (2020) meta-analysis, resilience can be a substantial risk or protective factor. Resilience is an interactive concept that refers to the capacity for relatively successful adaptation to adversity, the ability to bounce back after encountering difficulties, adverse events, or hard times (Rutter, 2007). Multiple meta-analyses and systematic reviews identified an association between greater resilience and less depressive symptomatology across the lifespan (Ketcham et al., 2020; Tamura et al., 2021; Wermelinger Ávila et al., 2016; Yeo et al., 2021).

Here, it might be helpful to separate two overall types of risk and protective factors; stable and dynamic. On the one hand, factors like neuroticism, adverse childhood experiences, and genetic, psychological, and physiological history have been established as

significant risk factors for depression (APA, 2013). Still, they cannot likely be significantly *changed* during psychological treatment and intervention. They can mainly be alleviated, and thus, we may refer to them as *stable* risk factors. On the other hand, *dynamic* risk factors, like cognitive and behavioral strategies, may be more relevant for effective prevention because these factors are amenable to change in therapy. We acknowledge that there is likely a continuum between stable and dynamic factors, but we believe that the separation is helpful, if pragmatic, for this thesis. We also acknowledge that knowing the individuals' dynamic protective factors provides practitioners with a focal point for strengths-based interventions.

Considering all the above, although we cannot definitively predict whether an individual will develop depression, investigating some of the complex interactions of risk and protective factors mentioned can enable us to predict who *might* more accurately. Additionally, focusing on dynamic risk and protective factors may be more relevant for effective prevention since these factors are more amenable to change in therapy.

### 1.3. Research Objectives and Hypotheses

This study aligns with the network approach to psychopathology, conceptualizing mental disorders as networks of mutually reinforcing nodes; these nodes are often symptoms (Robinaugh et al., 2016). An advantage of the network approach is that it estimates and visualizes the multivariate dependencies of the data that otherwise remain hidden.

This thesis project is based on the broad battery of baseline data collected for the 5-year WARN-D research project on building a personalized early warning system for depression, led by Associate Professor Dr. Eiko Fried and funded by the European Research Council. Using the network approach, this study explores how dynamic psychological risk and protective factors for depression interact and determines which factors are more central to a network of these factors after controlling for current depressive symptoms (Research Question 1). Specifically, the first research question is an exploratory one since the method of network analysis specifically for this purpose, to our knowledge, has not been used before.

This thesis project also tests if dynamic risk and protective coping factors measured in WARN-D relate to current depressive symptoms as prior studies suggest (Research Question 2). Based on the literature and the corresponding factors in the WARN-D dataset, the variables used will be: Self-esteem, Resilience, Rumination, Self-blame, Catastrophizing, Withdrawal, Ignoring, Self-efficacy, Optimism-Pessimism, Repetitive Negative Thinking, Positive Reappraisal, Acceptance, Seeking Distraction, Seeking Social Support, Active Approaching, Intolerance of Uncertainty, Locus of Control, and Current Depressive Disorder. Regarding the second research question, we hypothesize that all the above factors will be

related to current depressive symptoms. Self-esteem, resilience, and adaptive emotion regulation skills will be negatively associated with depressive symptoms (Tang et al., 2020). Repetitive negative thinking (RNT) will positively relate to depressive symptoms (Ehring et al., 2011). Optimistic individuals will score lower on depression, while pessimists higher (Schueller & Seligman, 2008). Intolerance of uncertainty and external locus of control will be positively associated with depression (Gentes and Ruscio, 2011; Yu and Fan, 2014), while self-efficacy will be negatively correlated to depression (Muris et al., 2001).

## Methods

The design of this study is cross-sectional. This thesis project is based on the broad battery of baseline data collected for the WARN-D project. The WARN-D study was approved by the Leiden University Psychology Ethics Committee on 06/09/2021.

### 2.1. Participants

WARN-D participants needed to be at least 18 years old, study at a Dutch higher education facility (pursuing an MBO, HBO, or WO degree), be fluent in either Dutch or English, own a smartphone with an Android/iOS operating system, and have a European bank account with an IBAN. Exclusion criteria were current schizophrenia, psychosis, thought disorder, major depressive disorder, (hypo)mania / bipolar disorder, primary substance use disorder, and moderate or severe suicidal ideation. Participants were excluded if they indicated they would find seeing daily calories burnt very stressful.

### 2.2. Procedure

The WARN-D project recruited participants via posters, social media, email newsletters, and word-of-mouth. People interested in participating indicated their email addresses in an online survey and were then invited to online surveys assessing inclusion and exclusion criteria and asking for their informed consent. The researchers asked participants if they were currently waiting for or in treatment by a licensed psychologist or psychiatrist and used validated self-report screeners to check for exclusion criteria.

After assessing the pre-set criteria and giving their consent, all approved participants could sign in and fill out the online survey sent to them in their predefined email. On the first page of the survey, the necessary information was given regarding the survey duration (75 minutes), the possibility of having a break after finishing the page they were currently on, and the overall content of the questions following. They were informed that it is ok not to think about the questions too long. Additionally, they were prepared to reply to questions about

positive and negative feelings and experiences they may have had. They were encouraged to answer all questions truthfully. Lastly, they were reminded that all answers are confidential, which means they could not personally be traced back to them.

For each of the following subsections of the survey, the necessary instructions were provided. During the survey, there were two attention checks. By the end, some meta-information questions checked participants' motivation to participate in this study, their understanding of the questions, their overall attention, and any feedback they may had.

**2.3. Measures**

In the WARN-D study, the psychological constructs of interest for this thesis project were operationalized as follows. Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965), a 10-item questionnaire assessed with a scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree). Higher scores indicate more positive self-esteem. A sample item is "On the whole, I am satisfied with myself." The Cronbach's alpha of the scale in the WARN-D sample was .90.

Cognitive Emotion regulation skills were measured using the short form Cognitive Emotion Regulation Questionnaire (CERQ-SF) (Garnefski & Kraaij, 2006), a 18-item questionnaire assessed with a scale (1 = (Almost) never, 2 = Sometimes, 3 = Regularly, 4 = Often, 5 = (Almost) always). In this questionnaire, there is a distinction between nine 2-item conceptual subscales. The subscales represent different cognitive skills: self-blame, other-blame, rumination, catastrophizing, putting into perspective, positive refocusing, positive reappraisal, acceptance, and planning. For this thesis project, only the data from the rumination, self-blame, catastrophizing, acceptance, and positive reappraisal subscales were used, as they have been previously proven to be skills relevant to depression (Kraaij & Garnefski, 2019). Individual subscale scores are obtained by summing up the scores belonging to the particular subscale (ranging from 2 to 10). The higher the subscale score, the more a cognitive skill is used. A sample item is "I think that I have to accept that this has happened." Cronbach's alpha for the subscales for the sample ranged from 0.74 to 0.85.

Behavioral Emotion regulation skills were measured using the Behavioral Emotion Regulation Questionnaire (BERQ) (Kraaij & Garnefski, 2019), a 20-item questionnaire assessed with a scale (1 = (Almost) never, 2 = Sometimes, 3 = Regularly, 4 = Often, 5 = (Almost) always). There is a distinction between five 4-item conceptual subscales. The subscales represent different behavioral skills: seeking distraction, withdrawal, actively approaching, seeking social support, and ignoring. Individual subscale scores are obtained by summing up the scores belonging to the particular subscale (ranging from 4 to 20). The

higher the subscale score, the more a behavioral skill is used. A sample item is “I avoid other people.” Cronbach’s alpha for the subscales for the sample ranged from 0.78 to 0.91.

Resilience was measured using the Brief Resilience Scale (BRS) (Smith et al., 2008), a 6-item questionnaire assessed with a scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree). A sample item is “I tend to bounce back quickly after hard times. ” Cronbach’s alpha for the sample was 0.85. Additionally, self-efficacy was measured using the General Self-Efficacy Scale (GSE) (Schwarzer & Jerusalem, 1995), a 10-item questionnaire assessed with a scale (1 = Not at all true, 2 = Hardly true, 3 = Moderately true, 4 = Exactly true). A sample item is “I can always manage to solve difficult problems if I try hard enough.” Cronbach’s alpha for the sample was 0.83.

Optimism-Pessimism was measured using the Life Orientation Test (LOT-R) (Scheier et al., 1994) without filler items, a 6-item test assessed with a scale (0 = Strongly disagree, 1= Disagree, 2 = Neutral, 3 = Agree, 4 = Strongly agree). A sample item is “In uncertain times, I usually expect the best.” Without the filler items, Cronbach’s alpha for the sample was 0.82, while the original scale reliability reported was 0.78 (Burke et al., 2000). For repetitive negative thinking, the measure used was the Persistent Thinking Questionnaire (PTQ) (Ehring et al., 2011b), with 15 items assessed with a scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Almost always). A sample item is “The same thoughts keep going through my mind again and again.” Cronbach’s alpha for the sample was 0.95.

Intolerance of Uncertainty was measured using the Intolerance of Uncertainty Short Form (IUS-12) (Carleton et al., 2007), a 12-item questionnaire assessed with a scale (1 = Not at all characteristic, 2 = A little characteristic, 3 = Somewhat characteristic, 5 = Entirely characteristic). A sample item is “Unforeseen events upset me greatly.” Cronbach’s alpha for the sample was 0.89. Additionally, Locus of Control was measured using the Pearlin & Schooler mastery scale (PSM) (Pearlin & Schooler, 1978), a 7-item questionnaire assessed with a scale (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree). A sample item is “There's no way I can solve some of the problems I have.” Cronbach’s alpha for the sample was 0.80.

Current Major Depressive Disorder was assessed using an adapted version of PHQ9 (Kroenke et al., 2001), a questionnaire with a 9-item Likert scale (0 = Not at all, 1 = Several Days, 2 = More Than Half the Days, 3 = Nearly Every Day). A sample item is “Little interest or pleasure in doing things.” Differences of the PHQ14, the adopted version used, compared to the PHQ9 were that all compound items were separated (e.g., sleep problem splits into hypersomnia and insomnia). Additionally, the used PHQ contained an impairment item

assessed with a Likert scale (0 = Not difficult at all, 1 = Somewhat difficult, 2 = Very difficult, 3 = Extremely difficult). The item was "If you checked any problems, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?" The adapted version's Cronbach's alpha for the sample was 0.84, while the reported reliability of the original scale ranges among studies with examples of 0.74 to 0.82 (Kocalevent et al., 2013; Titov et al., 2011).

**2.4. Statistical Analyses**

We estimated one regularized partial correlation network to gain insights into the structure of mutual dependence relations among the included constructs for Research Question 1 and 2 (as introduced in the introduction). A network consists of nodes (variables) and edges (connections between nodes). Edges were modeled akin to partial correlation coefficients, meaning that a connection between nodes A and B is the connection after controlling for all other nodes in the network. To do so, a particular type of regularized partial correlation network was computed, the Gaussian graphical model (Epskamp & Fried, 2018). To control for multiple testing, the EBICglasso package was used (Friedman et al., 2011). The least absolute shrinkage and selection operator (LASSO; Tibshirani, 1996) was also used, setting very small edges to zero with a tuning parameter of 0.5. This way, only the relevant edges were kept, revealing the underlying structure of the network, and leading to a sparse structure (Epskamp & Fried, 2018).

Regarding the estimation of regularized partial correlation networks, the raw regression coefficients are usually drawn to reveal the dynamic relations between variables. However, it is argued by Bulteel et al. (2016) that this may yield misleading network figures and characteristics because of two problems. First, the raw regression coefficients are sensitive to scale and variance differences among the variables. They, therefore, may lack comparability, which is needed if one wants to calculate, for example, centrality measures. Second, they only represent the unique direct effects of the variables, which may give a distorted picture when variables correlate strongly. Considering these problems, this study opted for *standardized* regression coefficients for all computed sum variables ($M$=0, $SD$=1) and the corresponding network model analysis (Bulteel et al., 2016). You may refer to Appendix A for the descriptive statistics of the *raw* data.

The most central nodes were also identified, namely nodes with the highest number of connections. The most commonly used centrality measures are node strength, closeness, and betweenness. In psychological networks, node strength is the sum of direct (i.e., adjacent) edges each node has calculated by taking the sum of all absolute edge weights a node is

directly connected to, negative and positive edges (Bringmann et al., 2019; Fried et al., 2017; Epskamp et al., 2018). Closeness refers to the average proximity of a given node to all other nodes, and betweenness measures the number of times a node is on the shortest path between two other nodes (Epskamp et al., 2018). The primary metric of interest in this study is expected influence (EI), which reflects the sum of all edges of a node (Robinaugh et al., 2016) instead of the absolute sum of all edges (node strength). We opted for this metric because commonly used centrality indices may not adequately assess a node's nature and strength since they do not distinguish between positive and negative edges (Robinaugh et al., 2016). Centrality difference tests were performed to determine if centrality values significantly differed (p=0.05 level) and how big this difference is. These tests are not corrected for multiple testing, given that this is not computationally feasible.

It was also investigated how accurate (i.e., prone to sampling variation) estimated networks are and how stable (i.e., interpretation remains similar with fewer observations) inferences from the network structure (such as centrality indices) are (Epskamp et al., 2017). Bootstrapping routines for the 95% confidence intervals of the edge weights were used for accuracy (number of bootstraps 1000). For the stability of the order of the centrality measures, case-dropping bootstrap was used to check if a central node remains central after random participants are dropped (number of bootstraps 1000) and non-parametric bootstrap to check if edges weights remain the same after random participants are dropped (number of bootstraps 1000). Additionally, it was indicated what proportion of participants can be dropped to retain, with 95% probability, a correlation of at least 0.7 between the centrality order in the bootstrapped datasets and the original order of centrality in the full dataset, or for the edge stability, between the edge weights in the bootstrapped datasets and the original edge weights. The centrality stability coefficient should be at least 0.25 and preferably above 0.5, while there are no clear thresholds for the edge stability (Vervaet et al., 2020).

One question that often arises in the context of network models is power. The formula ($p = (a * (a - 1)) / 2$) was used to calculate the number of parameters for undirected networks with $a$ representing the number of nodes in the network and $p$ the number of parameters estimated in the network. Given that the network contains 18 nodes, 153 parameters are estimated. Although no formal power calculations are yet available in the literature, Epskamp et al. (2017) suggest that the number of observations in a network should be at least more than its parameters ($>p$) and preferably three times more than its parameters ($3 * p$). Thus, at least more than 153 observations were needed for this project, preferably 459. Knowing that

the data set used consisted of 453 observations, we believe power should be sufficient (Epskamp et al., 2017).

The Network and all measures mentioned above were estimated and analyzed using the JASP package (Version 0.16)[Computer software] (JASP Team, 2021).

## Results

### 3.1. Demographics

The data used in this thesis project are estimated at n=453 students. The majority identified as females regarding their sex (84%) and gender identity (80%), had heterosexual orientation (60.9%) and faced low gender struggles (*M*=1.84, *Min*=1, *Max*=7, *SD*=1.32). Their age ranged from 18 to 53 years old (*M*=22.6), and 50% of them were of Dutch nationality, as both of their parents (48%). Also, 38% had two or more nationalities (10%), and around 47% were international students. The majority were single (46.4%) or in a steady relationship (34.1%). Only 10 of them had children (2.2%), the majority lived with friends or roommates (39%), and identified as not religious (72.3%). Regarding the missing values, nine participants left the survey before finishing due to session expiration; these were excluded pairwise from the data.

Regarding education, most participants pursued a Bachelor's degree or equivalent (39.9%) in social and behavioral sciences (42.1%) and were in their first year (37.2%) or a Secondary school diploma (39.1%). Most of their parents had completed a University / WO Master's degree or equivalent (30.1%). The average social status was 7.13 (*Min*=4, *Max*=13, *SD*=1.49), while 45.9% worked and 52.8% did so not out of necessity. The mean of their work satisfaction was 5.04 (*Min*=1, *Max*=7, *SD*=1.25), and the majority usually had some money left over (55.8%).

### 3.2. Research Question 1

This research question explores how dynamic psychological risk and protective factors for depression interact after controlling for current depressive symptoms. The estimated 18-item network structure is presented in Figure 1. One may also refer to Figure 2, where only the edges between the risk and protective factors nodes are highlighted. The edges between the predictive factors and the current depressive symptoms are only visually

removed to ease the reader's focus on the edges relevant to this research question.

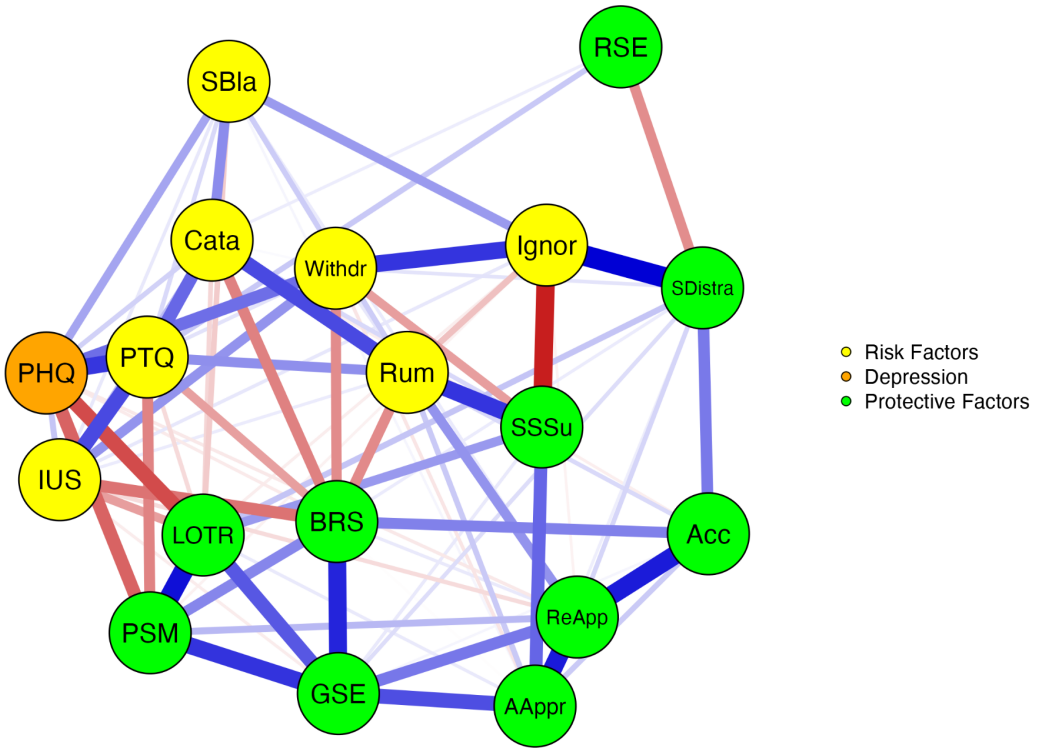


FIGURE 1 Risk and Protective Factors for Depression network. Nodes represent factors, edges represent regularized partial correlation coefficients between nodes. Blue lines represent positive edges, red lines negative edges. Thicker and more saturated edges visualize stronger connections. Current Depressive Symptoms ('PHQ'), Persistent Thinking ('PTQ'), Intolerance of Uncertainty ('IUS'), Rumination ('Rum'), Self-blame ('SBla'), Catastrophizing ('Cata'), Withdrawal ('Withdr'), Ignoring ('Ignor'), Self-esteem ('RSE'), Resilience ('BRS'), Self-efficacy ('GSE'), Locus of control ('PSM'), Optimism ('LOTR'), Reappraisal ('ReApp'), Acceptance ('Acc'), Seeking Distraction ('SDistra'), Seeking Social Support ('SSSu'), and Active Approaching ('AAppr').

Overall, among all estimated no zero edges, we found more positive (96.4%) than negative (3.6%) ones. The strongest positive associations emerged between Seeking Distraction (SDistra) and Ignoring (Ignor; 0.27), two subscales of the BERQ questionnaire. There are relatively strong associations between Locus of Control (PSM) and Optimism (LOTR; 0.25), as well as between Reappraisal (ReApp) and Active Approaching (AAppr; 0.24) and Acceptance (Acc; 0.24). Self-efficacy (GSE) was similarly correlated to Resilience (BRS; 0.23). We identified some strong negative correlations, the strongest being between Seeking Social Support (SSSu) and Ignoring (Ignor; 0.24), two subscales of the BERQ questionnaire as well as Resilience (BRS) and Intolerance of Uncertainty (IUS; 0.15), and

Catastrophizing (Cata; 0.13). Lastly, Persistent Thinking (PTQ) was similarly correlated to Locus of control (PSM; 0.13)

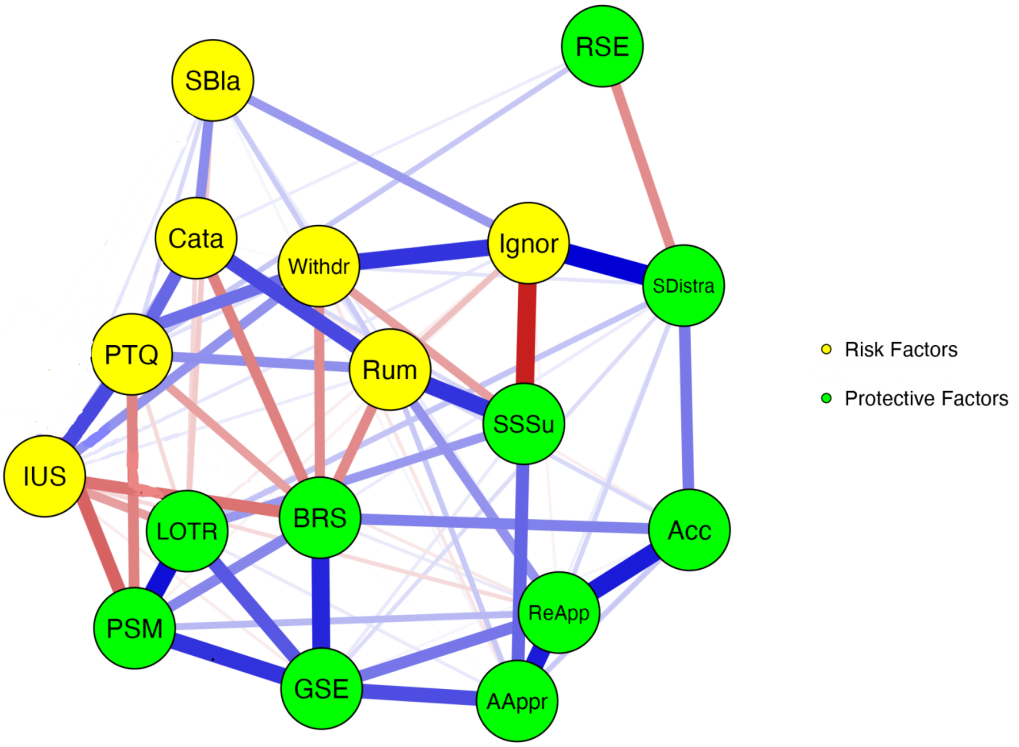


FIGURE 2 Risk and Protective Factors for Depression network after visually removing the edges between predictive factors and current depressive symptoms

Additionally, we examined unexpected findings, i.e., which protective factors are negatively correlated to other protective factors; which risk factors are negatively correlated to other risk factors; and which risk and protective factors are positively related. Self-esteem (RSE) was negatively related to Seeking Distraction (SDistra; 0.12). There were no risk factors negatively correlated. The strongest positive association between risk and protective factors emerged between Seeking Distraction (SDistra) and Ignoring (Ignor; 0.27), a correlation mentioned above as the strongest in the network. There was also a relatively strong positive relationship between Reappraisal (ReApp) and Rumination (Rum; 0.11).

We also calculated standardized centrality metrics to address this research question (Figure 3). We used expected influence (EI) to list the five most and least connected nodes below. Self-efficacy (GSE; EI = 2.08), Resilience (BRS; EI = 1.76), Self-esteem (RSE; EI = 1.51), Positive Reappraisal (ReApp; EI = 1.47), and Active Approaching (AAppr; EI = 0.97), serve as core features in the network. The least central nodes are Seeking Distraction

(SDistra; EI = 0.35), Withdrawal (Withdr; EI = 0.27), Catastrophizing (Cata; EI = 0.23), Locus of control (PSM; EI = 0.14), and Self-blame (SBla; EI = 0.07).

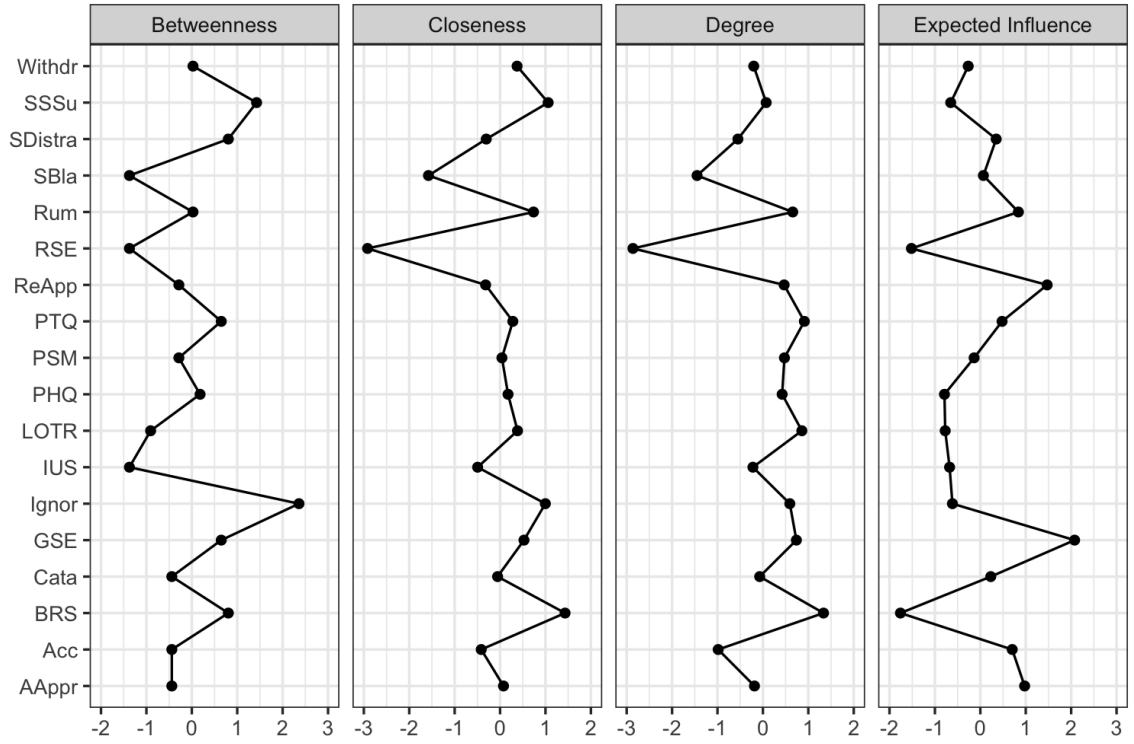


FIGURE 3 Centrality Estimates for the estimated network. Larger numbers indicate that the item is more central to the network

### 3.3. Research Question 2

This section of the thesis project tests if dynamic risk and protective factors measured in WARN-D relate to current depressive symptoms, as prior studies suggest. The estimated 18-item network structure, the same as above, is presented in Figure 1. One may also refer to Figure 4, where only the edges between the predictive factors and the current depressive symptoms are highlighted. The edges between the risk and protective factors nodes are only visually removed to ease the reader's focus on the edges relevant to this research question.

Overall, among all estimated no zero edges, we found more positive (55.6%) than negative (44.4%) ones. The strongest associations emerged between Current Depressive Symptoms (PHQ) and Persistent Thinking (PTQ; 0.21), Optimism (LOTR; 0.18), Locus of Control (PSM; 0.16), Withdrawal (Withdr; 0.15), and Self-blame (SBla; 0.09). The strongest positive associations were between PHQ and Persistent Thinking (PTQ; 0.21), as well as Withdrawal (Withdr; 0.15). We also identified strong negative relations, the strongest being between PHQ and Locus of Control (PSM; 0.16), as well as Optimism (LOTR; 0.18).

Interestingly, Rumination, Seeking Social Support, Catastrophizing, Ignoring, Self-esteem, Self-efficacy, Acceptance, and Seeking Distraction showed no partial correlation with PHQ after controlling for all the other factors.

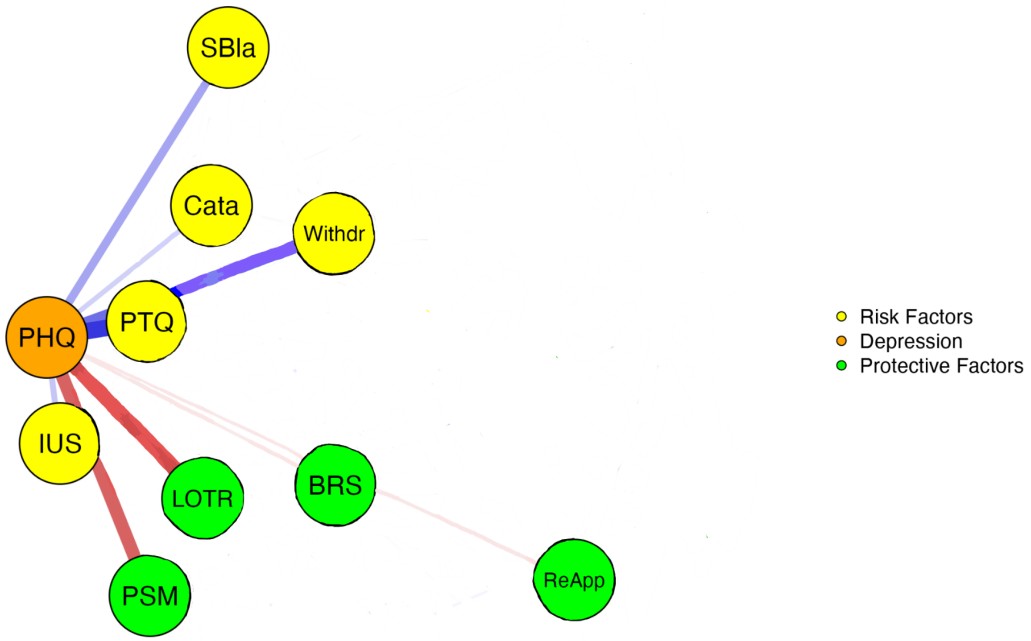


Figure 4 Risk and Protective Factors for Depression network after visually removing the edges between risk and protective factors

### 3.4. Network Accuracy and Stability

Regarding the accuracy and stability of the estimated network, the results from the edge weight bootstrap showed that the network was fairly accurately estimated, with the mean of the actual sample closely overlapping with the mean of all bootstraps (Figure 5). However, note that the bootstrap confidence area (CIs) is moderately large. Unfortunately, clear benchmarks to interpret CIs in networks are missing in the literature.

For the stability of the order of the centrality measures, 52% of participants could be dropped to retain, with 95% probability, a correlation of at least 0.7 between the centrality order of all centrality metrics in the bootstrapped datasets and the original order of all centrality metrics in the entire dataset (Figure 6). The centrality stability coefficient should be at least 0.25 and preferably above 0.5; thus, our network with a CS-coefficient of 0.52 is considered to have a stable order of centrality (Epskamp, Borsboom, & Fried, 2018). There

are no clear thresholds for the edge stability between the edge weights in the bootstrapped datasets and the original edge weights (Vervaet et al., 2020). Still, the edge weight bootstrap results show that the network model is relatively stable, with the mean of the actual sample closely overlapping with the mean of all bootstraps (Figure 5).

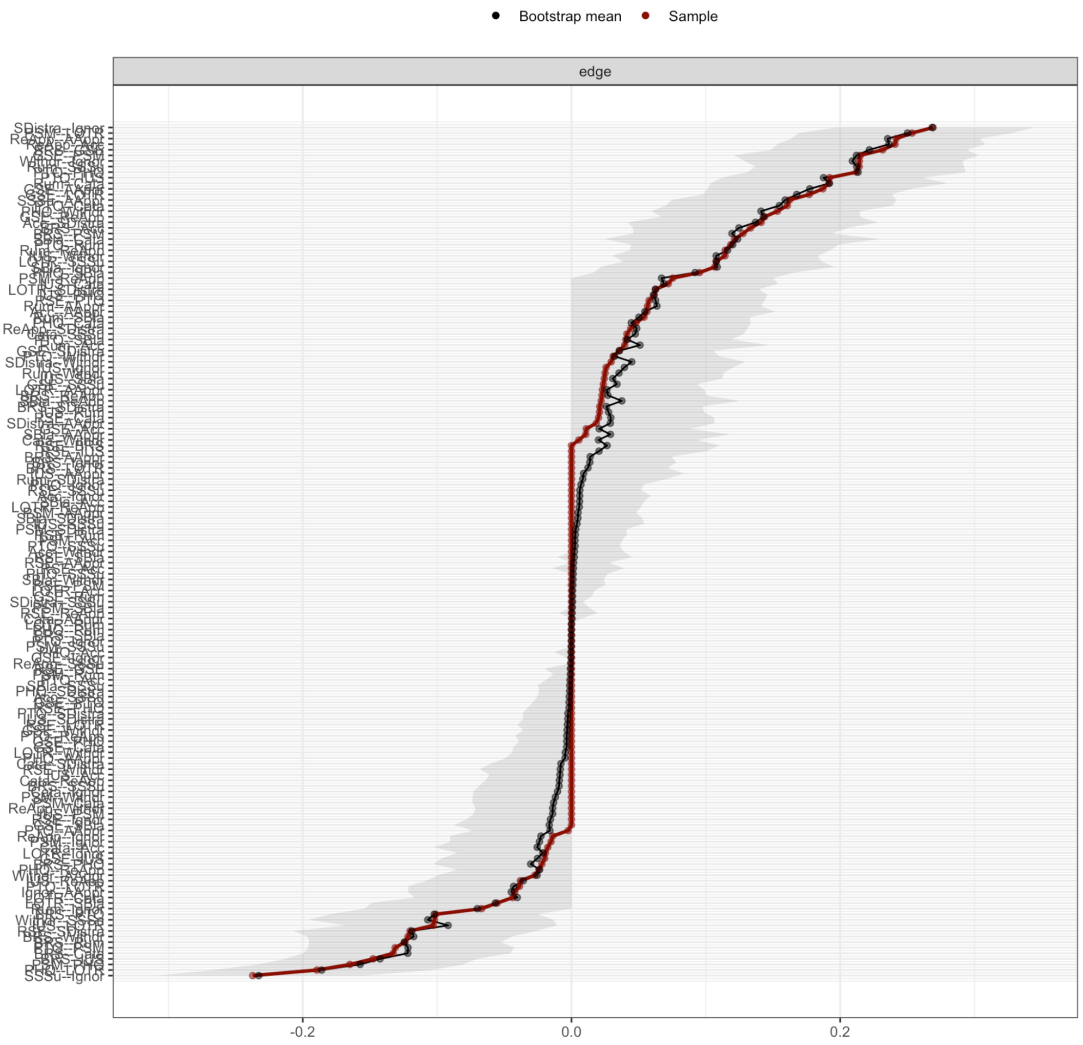


FIGURE 5 Edges Weight non-parametric bootstrap. Black dots indicate the bootstrap mean, and red dots the sample mean.

We also aimed to present the difference test for expected influence and edges weights. However, as EI is a relatively newer centrality metric, the JASP package (Version 0.16) only supports the function of calculating the difference test for all centrality metrics but EI. Additionally, the JASP package (Version 0.16) does not support the edges weight difference test calculation, so it will not be reported. For the results of the available difference tests, you may refer to Figure 7 in Appendix B.

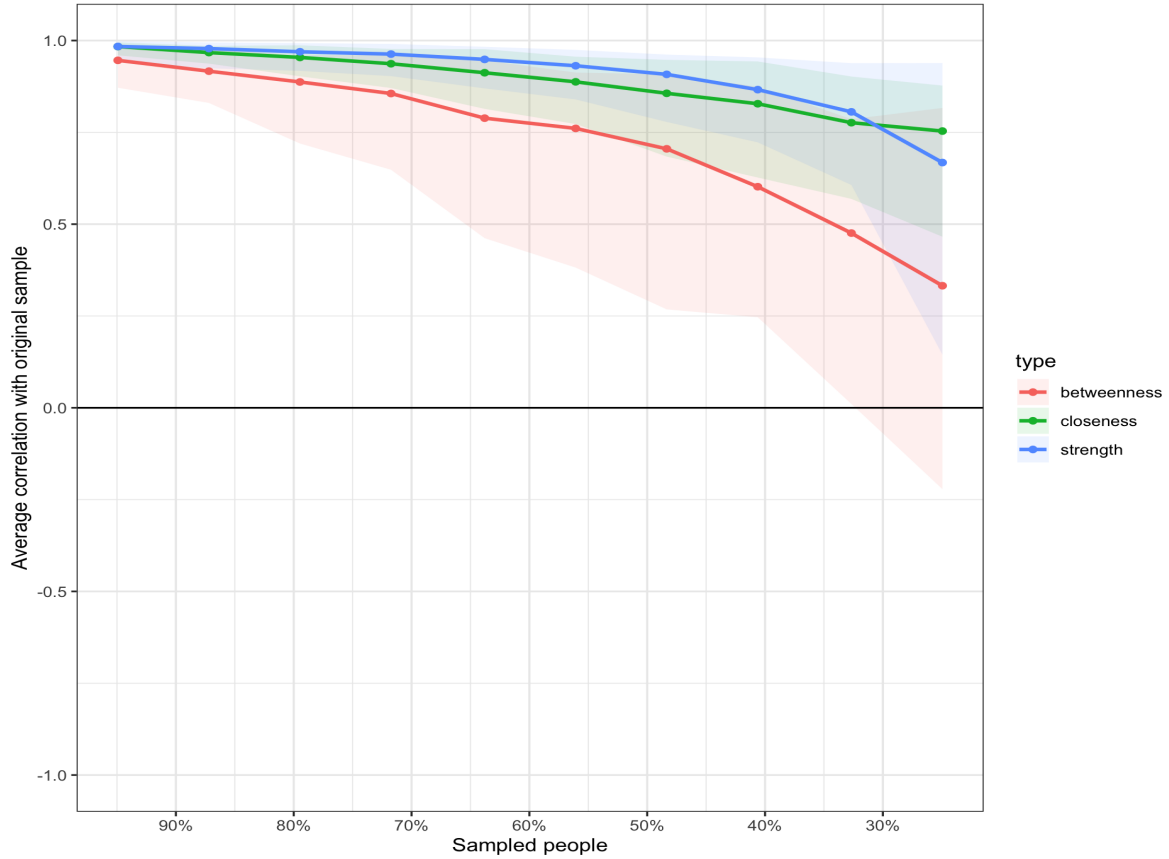


FIGURE 6 Centrality metrics case-dropping bootstrap.

## Discussion

Although we cannot definitively predict whether an individual will develop depression, investigating some of the complex interactions of risk and protective factors can enable us to predict who *might* more accurately. Using the network approach, this study explores how dynamic psychological risk and protective factors for depression interact (Research Question 1) and tests if dynamic risk and protective factors measured in WARN-D relate to current depressive symptoms as prior studies suggest (Research Question 2).

### 4.1. Research Question 1

The first research question was an exploratory one since the method of network analysis specifically for the interaction of dynamic psychological risk and protective factors, to our knowledge, has not been used before. The strongest positive association emerged between Seeking Distraction and Ignoring, two subscales of the BERQ questionnaire. Kraaij and Garnefski (2019) also estimated a correlation between the two ($r$=0.18). Based on the

definitions they provided for these skills, seeking distraction could potentially be interpreted as an initially adaptive skill reinforcing however, in the long term, the development of the maladaptive ignoring coping mechanism. Namely, distracting yourself with irrelevant activities gives space to continuously ignore an adverse event or emotion, securing distress relief and positively reinforcing the maintenance of the mechanism.

Furthermore, there was a relatively strong positive correlation between Locus of Control and Optimism. Previous research on medically vulnerable populations has identified them as predictors for positive health outcomes (Gruber-Baldini et al., 2009; Sherman & Cotter, 2013). To our knowledge, only a few papers have explored the direct association between the two constructs. Specifically, optimism was correlated positively with internal LOC and negatively with external LOC in the areas of affiliation and health of the elderly (Guarnera & Williams, 1987). It was suggested that viewing control of their health and interpersonal relationships accounts for much of the optimism that remains in the advanced years. One possibility is that these factors positively correlate because they attach positive emotional valence to any distressing symptoms giving a sense of capability to control the future and thus secure a better turn of events.

We also found relatively strong positive relations between Positive Reappraisal and both Active Approaching and Acceptance and Self-efficacy and Resilience. Kraaij and Garnefski (2019) also calculated the correlations among these subscales identifying small and moderate correlations. One may refer to the Acceptance and Commitment Therapy model by Steven Hayes (2006) as a conceptual framework linking these three variables. The model suggests that psychological flexibility, as an ultimate goal for a meaningful life, derives from six core processes, three of which are acceptance, cognitive defusion, and committed action. This means that without judgment embracing one's experience, challenging the cognitions, and promoting deliberate patterns of action, may be connected and reinforce each other serving the same goal. The relation between Self-efficacy and Resilience is also supported by a prior systematic review of physically ill populations (Stewart & Yuen, 2011), suggesting that the capacity to bounce back after encountering difficulties correlates with the individual's belief in that capacity.

Only a few negative correlations were observed, and this could be because they are, in nature, fewer or weaker than positive correlations among risk or protective factors. The strongest negative relations were between Seeking Social Support and Ignoring two subscales of the BERQ questionnaire, as well as Resilience and Intolerance of Uncertainty, and Catastrophizing. Kraaij and Garnefski (2019) estimated a significant moderate correlation

between the two first ($r$= -0.35). Seeking support refers to actively sharing emotions and asking for advice while ignoring refers to behaving as if nothing has happened (Kraaij & Garnefski, 2019). Thus, it makes sense that these mutually excluded behaviors are negatively associated. The correlation between Resilience and Catastrophizing is also supported by prior research on pain catastrophizing (Ong et al., 2010), while few and only recent studies suggest the correlation between Resilience and Intolerance of Uncertainty (Karataş & Tagay, 2021; Lee, 2018). One can expect that a person scoring high on Resilience has an increased capacity to tolerate uncertainty as part of adverse experiences and engages mostly in adaptive thoughts not explicitly emphasizing the experienced terror.

Similarly, Persistent Thinking was negatively correlated to internal Locus of control (LOC). Repetitive negative thinking comprises repetitive and intrusive thoughts and a persistent focus on one's problems or negative experiences. It typically focuses on disorder-specific content such as rumination about past experiences (Ehring et al., 2011). The correlation has also been supported by the Netherlands Study of Depression and Anxiety (NESDA), where at baseline, higher internal LOC was negatively associated with rumination (r=0.43) (Struijs et al., 2018). With increased internal LOC, one probably does not need to ruminate as much on the symptoms feeling capable of coping with them.

Self-esteem was negatively related to Seeking Distraction, while both are presented as protective factors for depression most of the time in the literature. Previous research in evaluative contexts had also found that participants with lower self-esteem reacted defensively to the threat of failure by seeking more short-term relief via distraction over the long-term benefit of reappraisal as perceived failure increases (Shafir et al., 2016). In the case of depression, a similar explanation can be given, suggesting that people with lower self-esteem engage more in short-term relieving destructive behavior having no confidence they can handle the distress with more effort and time-demanding skills as positive reappraisal.

Lastly, a relatively strong relationship was found between Positive Reappraisal and Rumination, also supported in the initial paper developing the CERQ questionnaire ($r$=0.25) (Garnefski & Kraaij, 2006b). There was no explanation regarding this finding, which is quite unexpected according to the provided skills definitions. Namely, thinking about the feelings associated with a negative event would be expected to leave no room for attaching a positive connotation to this event. However, it could be the case that while ruminating about disorder-specific content, one has the chance to take a step back and consider a positive

personal growth meaning. This would not be the case if one would opt for the ignoring coping mechanism instead, leaving no space for reflections and alternative explanations.

### 4.2. Centrality Measures

Self-efficacy, Resilience, Self-esteem, Positive Reappraisal, and Active Approaching are the most central features in the network. A recent meta-analysis also supports the importance of these variables, among other risk and protective factors identifying large to moderate effect sizes (Tang et al., 2020). Researchers adopting the network approach suggest that nodes central to the network are assumed to have the greatest influence on symptoms and thus be a logical intervention starting point (Bos et al., 2017; Borsboom & Cramer, 2013; Fried et al., 2016). Others argue that centrality is a metric that serves as an exploratory tool to guide future research and needs to be interpreted with great care due to statistical and substantive concerns (Fried, 2019). Supporting this second approach and understanding that transferring results from cross-sectional network analyses to treatment data is unlikely to be straightforward (Rodebaugh et al., 2018), we propose that the five most central variables found in this project should be used only as an exploratory tool to guide future research and not as a logical intervention starting point.

### 4.3. Research Question 2

The second research question is based on the hypothesis that all risk and protective factors included in the dataset will be related to current depressive symptoms. The results of this study do not support this hypothesis since only some of the factors correlated with current depressive symptoms. The strongest positive association emerged between Current Depressive Symptoms (PHQ) and Persistent Thinking, as well as Optimism. These results comply with prior research suggesting that repetitive negative thinking (RNT) is positively related to depressive symptoms (Aldao et al., 2010; Ehring et al., 2011; Garnefski & Kraaij, 2006b; Hong, 2007; Kovács et al., 2020; McLaughlin & Nolen-Hoeksema, 2011; Nolen-Hoeksema, 2000; O'Connor et al., 2007; Sarin et al., 2005).

Other strong associations emerged between Current Depressive Symptoms (PHQ) and Withdrawal, Locus of Control, and Optimism. Kraaij and Garnefski (2019) had previously proven that higher use of withdrawal is related to more depressive symptoms. Similarly to withdrawal as a way of drawing oneself back, in meta-analyses, the habitual use of suppression of emotional expressions has been associated with detrimental depressive outcomes (Aldao et al., 2010; Cameron & Overall, 2018; Visted et al., 2018). The negative relations with Locus of Control and Optimism, were also previously supported by Schueller and Seligman (2008) and Yu and Fan (2014) correspondingly.

However, Rumination, Catastrophizing, Ignoring, Resilience, Reappraisal, Active Approach, Self-esteem, Self-efficacy, Acceptance, Seeking Distraction, and Seeking Social Support showed no partial correlation with current depressive symptoms. This could be because contrary to prior research the network approach was used, modeling edges akin to partial correlation coefficients rather than zero-order correlations (Gentes & Ruscio, 2011; Muris et al., 2001; Tang et al., 2020). Also, the least absolute shrinkage and selection operator (LASSO; Tibshirani, 1996) was used, setting very small edges to zero. This might suggest that although these correlations possibly exist, they were very small and thus set to zero. Lastly, it could be that, contrary to this study, prior studies did not focus specifically on current depressive symptoms but included episodes of MDD or lifetime diagnosis. Considering the above, one may suggest that our hypothesis was not plausible and, in the future, should be better phrased considering that prior research is not based on the network approach and therefore has not controlled for all the factors included.

### 4.4. Limitations and Future Research Suggestions

Despite some strengths of the study, such as including a substantial sample of students with various levels of symptom severity, the inclusion of both protective and risk factors, the exploration of the among them correlations, and the use of validated measurement scales, several methodological and statistical limitations need to be discussed.

These include the cross-sectional nature of the data, which does not allow us to transfer the results to treatment in a straightforward manner (Rodebaugh et al., 2018). Due to statistical (differential variability, shared variances, conditioning on colliders) and substantive concerns (unknown where to intervene), centrality needs to be interpreted with great care and in the context of what we know about the sample, the network characteristics, and its elements (Fried, 2019). It is currently unknown where and how to intervene in causal systems, e.g., on relations among variables or variables directly (Fried & Cramer, 2017), since the future behavior of complex systems, like network psychometric models, is difficult to predict (Henry et al., 2021). Further, network models are between-subjects models estimated on groups of people, and how well their results will generalize to individual persons will have to be studied empirically, for instance, by collecting and analyzing time-series data (Epskamp, van Borkulo, et al., 2018).

Additionally, the current network model is based on pairwise, linear relationships, which according to Vervaet et al. (2020), should be seen as a lower bound on the true complexity of the modeled system. Therefore, they will not successfully recover more complicated relationships between variables such as non-linear effects, higher-order

interactions, or threshold effects such that A only starts influencing B when A is at a certain minimum or quadratic correlations among others (Vervaet et al., 2020).

Other methodological limitations can be the question of which variables should have been considered in the network and the gender representativeness. Data on other risk and protective factors (biological, demographic, social-environmental, and more static psychological factors such as previous episodes and personality aspects) were not included, although they may play important roles (APA, 2013; Dobson & Dozois, 2008). Network models can only explore variance between items included in the model. Another limitation might be the gender representativeness of the sample, with the majority of the participants identified as females regarding their sex (84%) and gender identity (80%), with heterosexual orientation (60.9%). Future investigations should examine how replicable the centrality results of the study are to variations of included items and populations. Lastly, one must remember that, besides the concentration check questions and the possibility of having a break, this study was long (75 minutes), which might have affected the respondents' answers.

Regarding the statistical limitations of this study, as mentioned in the results section, the current study faces some limitations regarding the conduct and the results of difference tests. The JASP package (Version 0.16) does not support the Expected Influence (EI) and edges weight difference test calculation, so this was also not reported. Future research should aim to include these types of test measurements.

## References

Aarts, J. W. F., Deckx, L., van Abbema, D. L., Tjan-Heijnen, V. C. G., van den Akker, M., & Buntinx, F. (2015). The relation between depression, coping and health locus of control: differences between older and younger patients, with and without cancer. *Psycho-Oncology*, *24*(8), 950–957. https://doi.org/10.1002/pon.3748

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, *87*(1), 49–74. https://doi.org/10.1037/0021-843x.87.1.49

Aldao, A., Gee, D. G., de Los Reyes, A., & Seager, I. (2016). Emotion regulation as a transdiagnostic factor in the development of internalizing and externalizing psychopathology: Current and future directions. *Development and Psychopathology*, *28*(4pt1), 927–946. https://doi.org/10.1017/s0954579416000638

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

American Psychiatric Association. (2013). Diagnostic and Statistical Manual of Mental Disorders. *Diagnostic and Statistical Manual of Mental Disorders*. https://doi.org/10.1176/appi.books.9780890425596

Anderson, C. A., Miller, R. S., Riger, A. L., Dill, J. C., & Sedikides, C. (1994). Behavioral and characterological attributional styles as predictors of depression and loneliness: Review, refinement, and test. *Journal of Personality and Social Psychology*, *66*(3), 549–558. https://doi.org/10.1037/0022-3514.66.3.549

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295x.84.2.191

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122–147. https://doi.org/10.1037/0003-066x.37.2.122

Bandura, A., Pastorelli, C., Barbaranelli, C., & Caprara, G. V. (1999). Self-efficacy pathways to childhood depression. *Journal of Personality and Social Psychology*, *76*(2), 258–269. https://doi.org/10.1037/0022-3514.76.2.258

Beck, A. T. (1967). *Depression: clinical, experimental, and theoretical aspects*. HARPER & ROW.

Beck, A. T., Rush, J. A., Shaw, B. F., & Emery, G. (1979). *Cognitive Therapy of Depression (The Guilford Clinical Psychology and Psychopathology Series)* (1st ed.). The Guilford Press.

Becker-Weidman, E. G., Jacobs, R. H., Reinecke, M. A., Silva, S. G., & March, J. S. (2010). Social problem-solving among adolescents treated for depression. *Behaviour Research and Therapy*, *48*(1), 11–18. https://doi.org/10.1016/j.brat.2009.08.006

Bieling, P. J., Israeli, A. L., & Antony, M. M. (2004). Is perfectionism good, bad, or both? Examining models of the perfectionism construct. *Personality and Individual Differences*, *36*(6), 1373–1385. https://doi.org/10.1016/s0191-8869(03)00235-6

Borsboom, D., & Cramer, A. O. (2013). Network Analysis: An Integrative Approach to the Structure of Psychopathology. *Annual Review of Clinical Psychology*, *9*(1), 91–121. https://doi.org/10.1146/annurev-clinpsy-050212-185608

Bos, F. M., Snippe, E., de Vos, S., Hartmann, J. A., Simons, C. J., van der Krieke, L., de Jonge, P., & Wichers, M. (2017). Can We Jump from Cross-Sectional to Dynamic Interpretations of Networks? Implications for the Network Perspective in Psychiatry. *Psychotherapy and Psychosomatics*, *86*(3), 175–177. https://doi.org/10.1159/000453583

Bringmann, L. F., Elmer, T., Epskamp, S., Krause, R. W., Schoch, D., Wichers, M., Wigman, J. T. W., & Snippe, E. (2019). What do centrality measures measure in psychological networks? *Journal of Abnormal Psychology*, *128*(8), 892–903. https://doi.org/10.1037/abn0000446

Brunwasser, S. M., Gillham, J. E., & Kim, E. S. (2009). A meta-analytic review of the Penn Resiliency Program's effect on depressive symptoms. *Journal of Consulting and Clinical Psychology*, *77*(6), 1042–1054. https://doi.org/10.1037/a0017671

Bull, E., Al-Janabi, S., & Gittens, C. B. (2022). Are women with traits of perfectionism more likely to develop perinatal depression? A systematic review and meta-analysis. *Journal of Affective Disorders*, *296*, 67–78. https://doi.org/10.1016/j.jad.2021.09.028

Bulteel, K., Tuerlinckx, F., Brose, A., & Ceulemans, E. (2016). Using Raw VAR Regression Coefficients to Build Networks can be Misleading. *Multivariate Behavioral Research*, *51*(2–3), 330–344. https://doi.org/10.1080/00273171.2016.1150151

Burke, K. L., Joyner, A. B., Czech, D. R., & Wilson, M. J. (2000). An investigation of concurrent validity between two optimism/pessimism questionnaires: The life orientation test-revised and the optimism/pessimism scale. *Current Psychology*, *19*(2), 129–136. https://doi.org/10.1007/s12144-000-1009-5

Cameron, L. D., & Overall, N. C. (2018). Suppression and expression as distinct emotion-regulation processes in daily interactions: Longitudinal and meta-analyses. *Emotion*, *18*(4), 465–480. https://doi.org/10.1037/emo0000334

Carleton, R. N., Norton, M. P. J., & Asmundson, G. J. (2007). Fearing the unknown: A short version of the Intolerance of Uncertainty Scale. *Journal of Anxiety Disorders*, *21*(1), 105–117. https://doi.org/10.1016/j.janxdis.2006.03.014

Cheng, C., Cheung, S. F., Chio, J. H. M., & Chan, M. P. S. (2013). Cultural meaning of perceived control: A meta-analysis of locus of control and psychological symptoms across 18 cultural regions. *Psychological Bulletin*, *139*(1), 152–188. https://doi.org/10.1037/a0028596

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, *100*(3), 316–336. https://doi.org/10.1037/0021-843x.100.3.316

Clark, L. A., Watson, D., & Mineka, S. (1994). Temperament, personality, and the mood and anxiety disorders. *Journal of Abnormal Psychology*, *103*(1), 103–116. https://doi.org/10.1037/0021-843x.103.1.103

Costello, D. M., Swendsen, J., Rose, J. S., & Dierker, L. C. (2008). Risk and protective factors associated with trajectories of depressed mood from adolescence to early adulthood. *Journal of Consulting and Clinical Psychology*, *76*(2), 173–183. https://doi.org/10.1037/0022-006x.76.2.173

Daros, A. R., Haefner, S. A., Asadi, S., Kazi, S., Rodak, T., & Quilty, L. C. (2021). A meta-analysis of emotional regulation outcomes in psychological interventions for youth with depression and anxiety. *Nature Human Behaviour*, *5*(10), 1443–1457. https://doi.org/10.1038/s41562-021-01191-9

Dobson, K. S., & Dozois, D. J. A. (2008). *Risk Factors in Depression* (1st ed.). Academic Press.

Dryman, M. T., & Heimberg, R. G. (2018). Emotion regulation in social anxiety and depression: a systematic review of expressive suppression and cognitive reappraisal. *Clinical Psychology Review*, *65*, 17–42. https://doi.org/10.1016/j.cpr.2018.07.004

D'Zurilla, T. J., Nezu, A. M., & Maydeu-Olivares, A. (2004). Social problem solving: Theory and assessment. In E. C. Chang, T. J. D'Zurilla, L. J. Sanna (Eds.), *Social problem solving: Theory, research, and training* (pp. 11–27). Washington, DC: American Psychological Association. doi:10.1037/10805-001.

Eastabrook, J. M., Flynn, J. J., & Hollenstein, T. (2013). Internalizing Symptoms in Female Adolescents: Associations with Emotional Awareness and Emotion Regulation. *Journal of Child and Family Studies*, *23*(3), 487–496. https://doi.org/10.1007/s10826-012-9705-y

Egan, S. J., Wade, T. D., Fitzallen, G., O'Brien, A., & Shafran, R. (2021). A meta-synthesis of qualitative studies of the link between anxiety, depression and perfectionism: implications for treatment. *Behavioural and Cognitive Psychotherapy*, *50*(1), 89–105. https://doi.org/10.1017/s1352465821000357

Egan, S. J., Wade, T. D., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review*, *31*(2), 203–212. https://doi.org/10.1016/j.cpr.2010.04.009

Ehring, T., Zetsche, U., Weidacker, K., Wahl, K., Schönfeld, S., & Ehlers, A. (2011a). The Perseverative Thinking Questionnaire (PTQ): Validation of a content-independent measure of repetitive negative thinking. *Journal of Behavior Therapy and Experimental Psychiatry*, *42*(2), 225–232. https://doi.org/10.1016/j.jbtep.2010.12.003

Ehring, T., Zetsche, U., Weidacker, K., Wahl, K., Schönfeld, S., & Ehlers, A. (2011b). The Perseverative Thinking Questionnaire (PTQ): Validation of a content-independent measure of repetitive negative thinking. *Journal of Behavior Therapy and Experimental Psychiatry*, *42*(2), 225–232. https://doi.org/10.1016/j.jbtep.2010.12.003

Enns, M. W., Cox, B. J., Sareen, J., & Freeman, P. (2008). Adaptive and maladaptive perfectionism in medical students: a longitudinal investigation. *Medical Education*, *35*(11), 1034–1042. https://doi.org/10.1111/j.1365-2923.2001.01044.x

Epskamp, S., Borsboom, D., & Fried, E. I. (2017). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods*, *50*(1), 195–212. https://doi.org/10.3758/s13428-017-0862-1

Epskamp, S., Borsboom, D., & Fried, E. I. (2018). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods*, *50*(1), 195–212. https://doi.org/10.3758/s13428-017-0862-1

Epskamp, S., & Fried, E. I. (2018). A tutorial on regularized partial correlation networks. *Psychological Methods*, *23*(4), 617–634. https://doi.org/10.1037/met0000167

Epskamp, S., van Borkulo, C. D., van der Veen, D. C., Servaas, M. N., Isvoranu, A. M., Riese, H., & Cramer, A. O. J. (2018). Personalized Network Modeling in Psychopathology: The Importance of Contemporaneous and Temporal Connections.

*Clinical Psychological Science*, *6*(3), 416–427. https://doi.org/10.1177/2167702617744325

Evraire, L. E., & Dozois, D. J. (2011). An integrative model of excessive reassurance seeking and negative feedback seeking in the development and maintenance of depression. *Clinical Psychology Review*, *31*(8), 1291–1303. https://doi.org/10.1016/j.cpr.2011.07.014

Fried, E. (2019, January 25). *How to interpret centrality values in network structures (not)*. Psych Networks. https://psych-networks.com/how-to-not-interpret-centrality-values-in-network-structures/

Fried, E. I., & Cramer, A. O. J. (2017). Moving Forward: Challenges and Directions for Psychopathological Network Theory and Methodology. *Perspectives on Psychological Science*, *12*(6), 999–1020. https://doi.org/10.1177/1745691617705892

Fried, E. I., Eidhof, M. B., Palic, S., Costantini, G., Huisman-van Dijk, H. M., Bockting, C. L. H., Engelhard, I., Armour, C., Nielsen, A. B. S., & Karstoft, K. I. (2018). Replicability and Generalizability of Posttraumatic Stress Disorder (PTSD) Networks: A Cross-Cultural Multisite Study of PTSD Symptoms in Four Trauma Patient Samples. *Clinical Psychological Science*, *6*(3), 335–351. https://doi.org/10.1177/2167702617745092

Fried, E. I., Epskamp, S., Nesse, R. M., Tuerlinckx, F., & Borsboom, D. (2016). What are "good" depression symptoms? Comparing the centrality of DSM and non-DSM symptoms of depression in a network analysis. *Journal of Affective Disorders*, *189*, 314–320. https://doi.org/10.1016/j.jad.2015.09.005

Fried, E. I., Nesse, R. M., Zivin, K., Guille, C., & Sen, S. (2013). Depression is more than the sum score of its parts: individual DSM symptoms have different risk factors. *Psychological Medicine*, *44*(10), 2067–2076. https://doi.org/10.1017/s0033291713002900

Fried, E. I., van Borkulo, C. D., Cramer, A. O. J., Boschloo, L., Schoevers, R. A., & Borsboom, D. (2016). Mental disorders as networks of problems: a review of recent insights. *Social Psychiatry and Psychiatric Epidemiology*, *52*(1), 1–10. https://doi.org/10.1007/s00127-016-1319-z

Frye, A. A., & Goodman, S. H. (2000). Which social problem-solving components buffer depression in adolescent girls? *Cognitive Therapy and Research*, *24*(6), 637–650. https://doi.org/10.1023/a:1005583210589

Gariépy, G., Honkaniemi, H., & Quesnel-Vallée, A. (2016). Social support and protection from depression: systematic review of current findings in Western countries. *British Journal of Psychiatry*, *209*(4), 284–293. https://doi.org/10.1192/bjp.bp.115.169094

Garnefski, N., & Kraaij, V. (2006a). Cognitive emotion regulation questionnaire – development of a short 18-item version (CERQ-short). *Personality and Individual Differences*, *41*(6), 1045–1053. https://doi.org/10.1016/j.paid.2006.04.010

Garnefski, N., & Kraaij, V. (2006b). Relationships between cognitive emotion regulation strategies and depressive symptoms: A comparative study of five specific samples. *Personality and Individual Differences*, *40*(8), 1659–1669. https://doi.org/10.1016/j.paid.2005.12.009

Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to symptoms of generalized anxiety disorder, major depressive disorder, and obsessive–compulsive disorder. *Clinical Psychology Review*, *31*(6), 923–933. https://doi.org/10.1016/j.cpr.2011.05.001

Giacobbe, P., & Kennedy, S. H. (2006). Deep brain stimulation for treatment-resistant depression: A psychiatric perspective. *Current Psychiatry Reports*, *8*(6), 437–444. https://doi.org/10.1007/s11920-006-0048-5

Gilmer, W. S., & McKinney, W. T. (2003). Early experience and depressive disorders: human and non-human primate studies. *Journal of Affective Disorders*, *75*(2), 97–113. https://doi.org/10.1016/s0165-0327(03)00046-6

Gorostiaga, A., Aliri, J., Balluerka, N., & Lameirinhas, J. (2019). Parenting Styles and Internalizing Symptoms in Adolescence: A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, *16*(17), 3192. https://doi.org/10.3390/ijerph16173192

Graham, A. R., Sherry, S. B., Stewart, S. H., Sherry, D. L., McGrath, D. S., Fossum, K. M., & Allen, S. L. (2010). The existential model of perfectionism and depressive symptoms: A short-term, four-wave longitudinal study. *Journal of Counseling Psychology*, *57*(4), 423–438. https://doi.org/10.1037/a0020667

Gross, J. J. (2009). *Handbook of Emotion Regulation, First Edition* (First ed.). The Guilford Press.

Gruber-Baldini, A. L., Ye, J., Anderson, K. E., & Shulman, L. M. (2009). Effects of optimism/pessimism and locus of control on disability and quality of life in Parkinson's disease. *Parkinsonism & Related Disorders*, *15*(9), 665–669. https://doi.org/10.1016/j.parkreldis.2009.03.005

Guarnera, S., & Williams, R. L. (1987). Optimism and Locus of Control for Health and Affiliation Among Elderly Adults. *Journal of Gerontology*, *42*(6), 594–595. https://doi.org/10.1093/geronj/42.6.594

Gutman, D. A., & Nemeroff, C. B. (2003). Persistent central nervous system effects of an adverse early environment: clinical and preclinical studies. *Physiology & Behavior*, *79*(3), 471–478. https://doi.org/10.1016/s0031-9384(03)00166-5

Hamlyn-Wright, S., Draghi-Lorenz, R., & Ellis, J. (2007). Locus of control fails to mediate between stress and anxiety and depression in parents of children with a developmental disorder. *Autism*, *11*(6), 489–501. https://doi.org/10.1177/1362361307083258

Hawton, K., Casañas I Comabella, C., Haw, C., & Saunders, K. (2013). Risk factors for suicide in individuals with depression: A systematic review. *Journal of Affective Disorders*, *147*(1–3), 17–28. https://doi.org/10.1016/j.jad.2013.01.004

Hayes, S. C. (2016). Acceptance and Commitment Therapy, Relational Frame Theory, and the Third Wave of Behavioral and Cognitive Therapies – Republished Article. *Behavior Therapy*, *47*(6), 869–885. https://doi.org/10.1016/j.beth.2016.11.006

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, *64*(6), 1152–1168. https://doi.org/10.1037/0022-006x.64.6.1152

Henry, T. R., Robinaugh, D. J., & Fried, E. I. (2021). On the Control of Psychological Networks. *Psychometrika*. https://doi.org/10.1007/s11336-021-09796-9

Holman, M. S., & Williams, M. N. (2020). Suicide Risk and Protective Factors: A Network Approach. *Archives of Suicide Research*, 1–18. https://doi.org/10.1080/13811118.2020.1774454

Hong, R. Y. (2007). Worry and rumination: Differential associations with anxious and depressive symptoms and coping behavior. *Behaviour Research and Therapy*, *45*(2), 277–290. https://doi.org/10.1016/j.brat.2006.03.006

Ibrahim, A. K., Kelly, S. J., Adams, C. E., & Glazebrook, C. (2013). A systematic review of studies of depression prevalence in university students. *Journal of Psychiatric Research*, *47*(3), 391–400. https://doi.org/10.1016/j.jpsychires.2012.11.015

Ketcham, A., Matus, A., & Riegel, B. (2020). Resilience and Depressive Symptoms in Adults With Cardiac Disease. *Journal of Cardiovascular Nursing*, *Publish Ahead of Print*. https://doi.org/10.1097/jcn.0000000000000781

Khazaie, H., Zakiei, A., McCall, W. V., Noori, K., Rostampour, M., Sadeghi Bahmani, D., & Brand, S. (2020). Relationship between Sleep Problems and Self-Injury: A Systematic Review. *Behavioral Sleep Medicine*, *19*(5), 689–704. https://doi.org/10.1080/15402002.2020.1822360

Kocalevent, R. D., Hinz, A., & Brähler, E. (2013). Standardization of a screening instrument (PHQ-15) for somatization syndromes in the general population. *BMC Psychiatry*, *13*(1). https://doi.org/10.1186/1471-244x-13-91

Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, *136*(5), 768–821. https://doi.org/10.1037/a0020327

Kovács, L. N., Takacs, Z. K., Tóth, Z., Simon, E., Schmelowszky, G., & Kökönyei, G. (2020). Rumination in major depressive and bipolar disorder – a meta-analysis. *Journal of Affective Disorders*, *276*, 1131–1141. https://doi.org/10.1016/j.jad.2020.07.131

Kraaij, V., & Garnefski, N. (2019). The Behavioral Emotion Regulation Questionnaire: Development, psychometric properties, and relationships with emotional problems and the Cognitive Emotion Regulation Questionnaire. *Personality and Individual Differences*, *137*, 56–61. https://doi.org/10.1016/j.paid.2018.07.036

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

LeMoult, J., Humphreys, K. L., Tracy, A., Hoffmeister, J. A., Ip, E., & Gotlib, I. H. (2020). Meta-analysis: Exposure to Early Life Stress and Risk for Depression in Childhood and Adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry*, *59*(7), 842–855. https://doi.org/10.1016/j.jaac.2019.10.011

Limburg, K., Watson, H. J., Hagger, M. S., & Egan, S. J. (2016). The Relationship Between Perfectionism and Psychopathology: A Meta-Analysis. *Journal of Clinical Psychology*, *73*(10), 1301–1326. https://doi.org/10.1002/jclp.22435

Lombardo, C., Mallia, L., Battagliese, G., Grano, C., & Violani, C. (2013). Perfectionism mediates the relationship between insomnia and depressive symptoms. *Sleep and Biological Rhythms*, *11*(2), 90–98. https://doi.org/10.1111/sbr.12009

Maciejewski, P. K., Prigerson, H. G., & Mazure, C. M. (2000). Self-efficacy as a mediator between stressful life events and depressive symptoms. *British Journal of Psychiatry*, *176*(4), 373–378. https://doi.org/10.1192/bjp.176.4.373

Mazure, C. M. (1998). Life stressors as risk factors in depression. *Clinical Psychology: Science and Practice*, *5*(3), 291–313. https://doi.org/10.1111/j.1468-2850.1998.tb00151.x

McLaughlin, K. A., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, *49*(3), 186–193. https://doi.org/10.1016/j.brat.2010.12.006

McNally, R. J., Robinaugh, D. J., Wu, G. W. Y., Wang, L., Deserno, M. K., & Borsboom, D. (2014). Mental Disorders as Causal Systems. *Clinical Psychological Science*, *3*(6), 836–849. https://doi.org/10.1177/2167702614553230

Muris, P., Schmidt, H., Lambrichs, R., & Meesters, C. (2001). Protective and vulnerability factors of depression in normal adolescents. *Behaviour Research and Therapy*, *39*(5), 555–565. https://doi.org/10.1016/s0005-7967(00)00026-7

National Research Council. (2009). *Preventing Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities*. National Academies Press.

Nezu, A. M. (2004). Problem solving and behavior therapy revisited. *Behavior Therapy*, *35*(1), 1–33. https://doi.org/10.1016/s0005-7894(04)80002-9

Nierenberg, A. A., Trivedi, M. H., Fava, M., Biggs, M. M., Shores-Wilson, K., Wisniewski, S. R., Balasubramani, G., & Rush, A. J. (2007). Family history of mood disorder and characteristics of major depressive disorder: A STAR∗D (sequenced treatment alternatives to relieve depression) study. *Journal of Psychiatric Research*, *41*(3–4), 214–221. https://doi.org/10.1016/j.jpsychires.2006.02.005

Nieto, I., Robles, E., & Vazquez, C. (2020). Self-reported cognitive biases in depression: A meta-analysis. *Clinical Psychology Review*, *82*, 101934. https://doi.org/10.1016/j.cpr.2020.101934

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100*(4), 569–582. https://doi.org/10.1037/0021-843x.100.4.569

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, *109*(3), 504–511. https://doi.org/10.1037/0021-843x.109.3.504

O'Connor, D. B., O'Connor, R. C., & Marshall, R. (2007). Perfectionism and psychological distress: evidence of the mediating effects of rumination. *European Journal of Personality*, *21*(4), 429–452. https://doi.org/10.1002/per.616

Orth, U., & Robins, R. W. (2013). Understanding the Link Between Low Self-Esteem and Depression. *Current Directions in Psychological Science*, *22*(6), 455–460. https://doi.org/10.1177/0963721413492763

Patil, P. A., Porche, M. V., Shippen, N. A., Dallenbach, N. T., & Fortuna, L. R. (2018). Which girls, which boys? The intersectional risk for depression by race and ethnicity, and gender in the U.S. *Clinical Psychology Review*, *66*, 51–68. https://doi.org/10.1016/j.cpr.2017.12.003

Paykel, E. S. (2003). Life events and affective disorders. *Acta Psychiatrica Scandinavica*, *108*, 61–66. https://doi.org/10.1034/j.1600-0447.108.s418.13.x

Pearlin, L. I., & Schooler, C. (1978). The Structure of Coping. *Journal of Health and Social Behavior*, *19*(1), 2. https://doi.org/10.2307/2136319

Robinaugh, D. J., LeBlanc, N. J., Vuletich, H. A., & McNally, R. J. (2014). Network analysis of persistent complex bereavement disorder in conjugally bereaved adults. *Journal of Abnormal Psychology*, *123*(3), 510–522. https://doi.org/10.1037/abn0000002

Robinaugh, D. J., Millner, A. J., & McNally, R. J. (2016). Identifying highly influential nodes in the complicated grief network. *Journal of Abnormal Psychology*, *125*(6), 747–757. https://doi.org/10.1037/abn0000181

Rock, P. L., Roiser, J. P., Riedel, W. J., & Blackwell, A. D. (2013). Cognitive impairment in depression: a systematic review and meta-analysis. *Psychological Medicine*, *44*(10), 2029–2040. https://doi.org/10.1017/s0033291713002535

Rodebaugh, T. L., Tonge, N. A., Piccirillo, M. L., Fried, E., Horenstein, A., Morrison, A. S., Goldin, P., Gross, J. J., Lim, M. H., Fernandez, K. C., Blanco, C., Schneier, F. R., Bogdan, R., Thompson, R. J., & Heimberg, R. G. (2018). Does centrality in a cross-sectional network suggest intervention targets for social anxiety disorder? *Journal of Consulting and Clinical Psychology*, *86*(10), 831–844. https://doi.org/10.1037/ccp0000336

Rood, L., Roelofs, J., Bögels, S. M., Nolen-Hoeksema, S., & Schouten, E. (2009). The influence of emotion-focused rumination and distraction on depressive symptoms in non-clinical youth: A meta-analytic review. *Clinical Psychology Review*, *29*(7), 607–616. https://doi.org/10.1016/j.cpr.2009.07.001

Rosenberg, M. (1965). Rosenberg Self-Esteem Scale. *PsycTESTS Dataset*. https://doi.org/10.1037/t01038-000

Rowe, A. C., Gold, E. R., & Carnelley, K. B. (2020). The Effectiveness of Attachment Security Priming in Improving Positive Affect and Reducing Negative Affect: A

Systematic Review. *International Journal of Environmental Research and Public Health*, *17*(3), 968. https://doi.org/10.3390/ijerph17030968

Rutter, M. (2006). Implications of Resilience Concepts for Scientific Understanding. *Annals of the New York Academy of Sciences*, *1094*(1), 1–12. https://doi.org/10.1196/annals.1376.002

Salk, R. H., Hyde, J. S., & Abramson, L. Y. (2017). Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychological Bulletin*, *143*(8), 783–822. https://doi.org/10.1037/bul0000102

Sarin, S., Abela, J., & Auerbach, R. (2005). The response styles theory of depression: A test of specificity and causal mediation. *Cognition & Emotion*, *19*(5), 751–761. https://doi.org/10.1080/02699930441000463

Sassaroli, S., Romero Lauro, L. J., Maria Ruggiero, G., Mauri, M. C., Vinai, P., & Frost, R. (2008). Perfectionism in depression, obsessive-compulsive disorder and eating disorders. *Behaviour Research and Therapy*, *46*(6), 757–765. https://doi.org/10.1016/j.brat.2008.02.007

Schäfer, J. Z., Naumann, E., Holmes, E. A., Tuschen-Caffier, B., & Samson, A. C. (2016). Emotion Regulation Strategies in Depressive and Anxiety Symptoms in Youth: A Meta-Analytic Review. *Journal of Youth and Adolescence*, *46*(2), 261–276. https://doi.org/10.1007/s10964-016-0585-0

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, *67*(6), 1063–1078. https://doi.org/10.1037/0022-3514.67.6.1063

Schueller, S. M., & Seligman, M. E. (2008). Optimism and Pessimism. *Risk Factors in Depression*, 171–194. https://doi.org/10.1016/b978-0-08-045078-0.00008-3

Schwarzer, R., & Jerusalem, M. (1995). General Self-Efficacy Scale. *PsycTESTS Dataset*. https://doi.org/10.1037/t00393-000

Shafir, R., Guarino, T., Lee, I. A., & Sheppes, G. (2016). Emotion regulation choice in an evaluative context: the moderating role of self-esteem. *Cognition and Emotion*, *31*(8), 1725–1732. https://doi.org/10.1080/02699931.2016.1252723

Sherman, A. M., & Cotter, K. A. (2013). Well-being among older adults with OA: direct and mediated patterns of control beliefs, optimism and pessimism. *Aging & Mental Health*, *17*(5), 595–608. https://doi.org/10.1080/13607863.2013.765831

Simon, N., Friedman, J., Hastie, T., & Tibshirani, R. (2011). Regularization Paths for Cox's Proportional Hazards Model via Coordinate Descent. *Journal of Statistical Software*, *39*(5). https://doi.org/10.18637/jss.v039.i05

Siu, A. M. H., & Shek, D. T. L. (2009). Social Problem Solving as a Predictor of Well-being in Adolescents and Young Adults. *Social Indicators Research*, *95*(3), 393–406. https://doi.org/10.1007/s11205-009-9527-5

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*(3), 194–200. https://doi.org/10.1080/10705500802222972

Smith, M. M., Sherry, S. B., Rnic, K., Saklofske, D. H., Enns, M., & Gralnick, T. (2016). Are Perfectionism Dimensions Vulnerability Factors for Depressive Symptoms after Controlling for Neuroticism? A Meta–analysis of 10 Longitudinal Studies. *European Journal of Personality*, *30*(2), 201–212. https://doi.org/10.1002/per.2053

Sowislo, J. F., & Orth, U. (2013). Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychological Bulletin*, *139*(1), 213–240. https://doi.org/10.1037/a0028931

Starr, L. R., & Davila, J. (2008). Excessive reassurance seeking, depression, and interpersonal rejection: A meta-analytic review. *Journal of Abnormal Psychology*, *117*(4), 762–775. https://doi.org/10.1037/a0013866

Stockings, E. A., Degenhardt, L., Dobbins, T., Lee, Y. Y., Erskine, H. E., Whiteford, H. A., & Patton, G. (2015). Preventing depression and anxiety in young people: a review of the joint efficacy of universal, selective and indicated prevention. *Psychological Medicine*, *46*(1), 11–26. https://doi.org/10.1017/s0033291715001725

Sullivan, P. F., Neale, M. C., & Kendler, K. S. (2000). Genetic Epidemiology of Major Depression: Review and Meta-Analysis. *American Journal of Psychiatry*, *157*(10), 1552–1562. https://doi.org/10.1176/appi.ajp.157.10.1552

Tamura, S., Suzuki, K., Ito, Y., & Fukawa, A. (2021). Factors related to the resilience and mental health of adult cancer patients: a systematic review. *Supportive Care in Cancer*, *29*(7), 3471–3486. https://doi.org/10.1007/s00520-020-05943-7

Tang, X., Tang, S., Ren, Z., & Wong, D. F. K. (2020). Psychological risk and protective factors associated with depressive symptoms among adolescents in secondary schools in China: A systematic review and meta-analysis. *Children and Youth Services Review*, *108*, 104680. https://doi.org/10.1016/j.childyouth.2019.104680

Thompson, R. A. (1994). Emotion Regulation: A Theme in Search of Definition. *Monographs of the Society for Research in Child Development*, *59*(2/3), 25. https://doi.org/10.2307/1166137

Tibshirani, R. (1996). Regression Shrinkage and Selection Via the Lasso. *Journal of the Royal Statistical Society: Series B (Methodological)*, *58*(1), 267–288. https://doi.org/10.1111/j.2517-6161.1996.tb02080.x

Titov, N., Dear, B. F., McMillan, D., Anderson, T., Zou, J., & Sunderland, M. (2011). Psychometric Comparison of the PHQ-9 and BDI-II for Measuring Response during Treatment of Depression. *Cognitive Behaviour Therapy*, *40*(2), 126–136. https://doi.org/10.1080/16506073.2010.550059

Twohig, M. P., & Levin, M. E. (2017). Acceptance and Commitment Therapy as a Treatment for Anxiety and Depression. *Psychiatric Clinics of North America*, *40*(4), 751–770. https://doi.org/10.1016/j.psc.2017.08.009

Vervaet, M., Puttevils, L., Hoekstra, R. H. A., Fried, E., & Vanderhasselt, M. (2020). Transdiagnostic vulnerability factors in eating disorders: A network analysis. *European Eating Disorders Review*, *29*(1), 86–100. https://doi.org/10.1002/erv.2805

Visted, E., Vøllestad, J., Nielsen, M. B., & Schanche, E. (2018). Emotion Regulation in Current and Remitted Depression: A Systematic Review and Meta-Analysis. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00756

Warfa, N., Harper, M., Nicolais, G., & Bhui, K. (2014). Adult attachment style as a risk factor for maternal postnatal depression: a systematic review. *BMC Psychology*, *2*(1). https://doi.org/10.1186/s40359-014-0056-x

Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. *Journal of Personality and Social Psychology*, *76*(5), 820–838. https://doi.org/10.1037/0022-3514.76.5.820

Weinberg, A., & Klonsky, E. D. (2009). Measurement of emotion dysregulation in adolescents. *Psychological Assessment*, *21*(4), 616–621. https://doi.org/10.1037/a0016669

Wermelinger Ávila, M. P., Lucchetti, A. L. G., & Lucchetti, G. (2016). Association between depression and resilience in older adults: a systematic review and meta‐analysis. *International Journal of Geriatric Psychiatry*, *32*(3), 237–246. https://doi.org/10.1002/gps.4619

Werner, K., & Gross, J. J. (2010). Emotion regulation and psychopathology: A conceptual framework. In A. M. Kring & D. M. Sloan (Eds.), *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 13–37). The Guilford Press.

Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2017a). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review*, *51*, 30–47. https://doi.org/10.1016/j.cpr.2016.10.005

Werner-Seidler, A., Perry, Y., Calear, A. L., Newby, J. M., & Christensen, H. (2017b). School-based depression and anxiety prevention programs for young people: A systematic review and meta-analysis. *Clinical Psychology Review*, *51*, 30–47. https://doi.org/10.1016/j.cpr.2016.10.005

Whisman, M. A., & Uebelacker, L. A. (2009). Prospective associations between marital discord and depressive symptoms in middle-aged and older adults. *Psychology and Aging*, *24*(1), 184–189. https://doi.org/10.1037/a0014759

Wright, A., Fisher, P. L., Baker, N., O'Rourke, L., & Cherry, M. G. (2021). Perfectionism, depression and anxiety in chronic fatigue syndrome: A systematic review. *Journal of Psychosomatic Research*, *140*, 110322. https://doi.org/10.1016/j.jpsychores.2020.110322

Yeo, J. J., Chew, Q. H., & Sim, K. (2021). Resilience and its inter‐relationship with symptomatology, illness course, psychosocial functioning, and mediational roles in schizophrenia: A systematic review. *Asia-Pacific Psychiatry*. https://doi.org/10.1111/appy.12486

Yook, K., Kim, K. H., Suh, S. Y., & Lee, K. S. (2010). Intolerance of uncertainty, worry, and rumination in major depressive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders*, *24*(6), 623–628. https://doi.org/10.1016/j.janxdis.2010.04.003

Yu, X., & Fan, G. (2014). Direct and indirect relationship between locus of control and depression. *Journal of Health Psychology*, *21*(7), 1293–1298. https://doi.org/10.1177/1359105314551624

## Appendix A

**Table 1**

*Descriptive Statistics of Raw Data for each Variable*

| | RSE | BRS | GSE | PTQ | IUS | PHQ | LOTR | PSM |
|---|---|---|---|---|---|---|---|---|
| Valid | 444 | 445 | 444 | 445 | 445 | 438 | 445 | 444 |
| Missing | 9 | 8 | 9 | 8 | 8 | 15 | 8 | 9 |
| M | 22.176 | 18.366 | 29.725 | 42.771 | 30.083 | 10.276 | 14.685 | 33.854 |
| SD | 6.060 | 4.538 | 4.374 | 12.325 | 9.289 | 6.377 | 4.325 | 7.084 |
| Min | 9.000 | 6.000 | 10.000 | 15.000 | 12.000 | 1.000 | 0.000 | 7.000 |
| Max | 36.000 | 30.000 | 40.000 | 75.000 | 59.000 | 38.000 | 23.000 | 49.000 |

**Table 2**

*Descriptive Statistics of Raw Data for each Variable*

| | Rum | SBla | Cata | ReApp | Acce | SDistra | Withdr | AAppr | SSSu | Ignor |
|---|---|---|---|---|---|---|---|---|---|---|
| Valid | 445 | 445 | 445 | 445 | 445 | 445 | 445 | 445 | 445 | 445 |
| Missing | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| M | 6.362 | 5.452 | 4.328 | 6.348 | 6.670 | 12.863 | 10.375 | 12.369 | 12.333 | 9.335 |
| SD | 2.005 | 2.110 | 1.944 | 2.125 | 2.024 | 3.330 | 4.153 | 3.682 | 4.331 | 4.304 |
| Min | 2.000 | 2.000 | 2.000 | 2.000 | 2.000 | 4.000 | 4.000 | 4.000 | 4.000 | 4.000 |
| Max | 10.000 | 10.000 | 10.000 | 10.000 | 10.000 | 20.000 | 20.000 | 20.000 | 20.000 | 20.000 |

## Appendix B

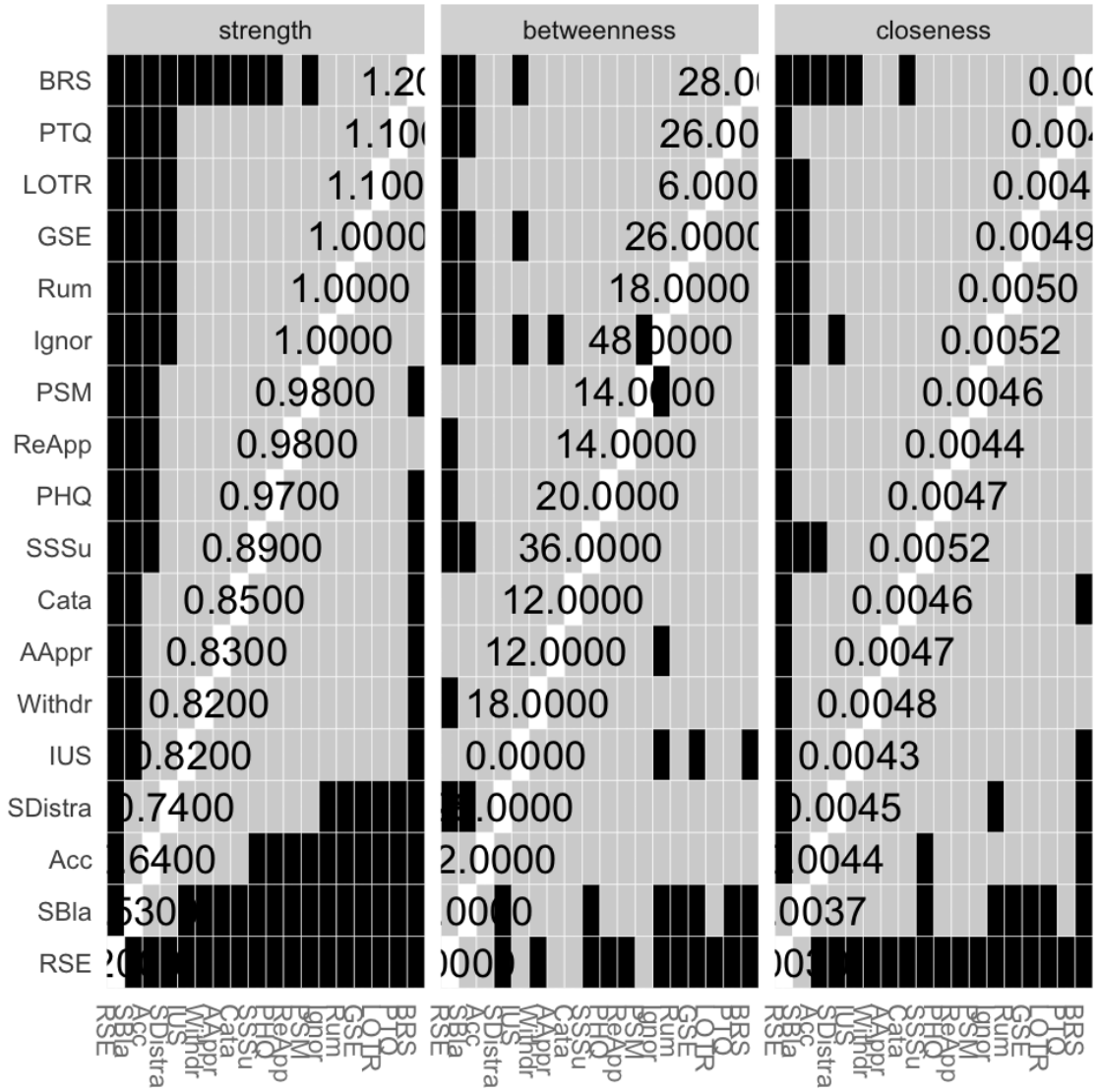


FIGURE 7 Centrality difference test for the 18-item risk and protective factors network. Gray boxes indicate nodes or edges that do not differ significantly from one another and black boxes represent nodes or edges that differ significantly from one another. White boxes in the centrality plot show the value of node strength.