

# Associations between Facets and Aspects of Big Five Personality and Affective Disorders: A Systematic Review and Best Evidence Synthesis

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**Article Title:** Associations between Facets and Aspects of Big Five Personality and Affective Disorders: A Systematic Review and Best Evidence Synthesis

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## Abstract

### Background

Big Five personality traits correlate with affective disorders, with neuroticism considered a risk factor, and conscientiousness and extroversion considered protective factors. However, the relationships between affective disorders and lower-order personality facets and aspects are less clear.

### Method

A systematic review was carried out to identify studies measuring associations between lower-order personality constructs and affective disorders. Big Five facets were measured using the NEO-PI-R, and aspects using the BFAS. PsycINFO, EMBASE, MedLine and OpenGrey were searched from January 1<sup>st</sup>, 1985 to June 30<sup>th</sup>, 2020. Fifteen studies met criteria and reported a total of 416 associations. Data were analysed using best evidence synthesis.

### Results

Most facets of neuroticism were positively associated with affective disorders. Positive emotion in extroversion, and competence and self-discipline in conscientiousness, were negatively associated with affective disorders. Trust in agreeableness, and actions in openness, were negatively associated with anxiety disorders, whereas fantasy in openness was positively associated with anxiety disorders. At the aspect level, withdrawal in neuroticism was positively associated with MDD, whereas industriousness in conscientiousness was negatively associated with MDD.

## Limitations

Due to the use the heterogenous measures between studies, a meta-analysis could not be performed. Only Big Five personality constructs were investigated, limited to BFAS personality aspects, and NEO-PI-R personality facets.

## Conclusions

Neuroticism, positive emotion, competence and self-discipline correlate with various anxiety and depressive disorders. These facets may be endophenotypes for affective disorders in general. Future research is needed to investigate mediating pathways between personality facets and affective disorders.

## Keywords

Anxiety; depression; big five; facet; aspect

## Introduction

Affective disorders are among the most common mental illnesses, with anxiety disorders being the most prevalent mental illnesses, followed by mood disorders (Stansfeld et al, 2016; Steel et al, 2014; Wittchen et al, 2011). For instance, a review of mental health population studies across thirty European countries found that anxiety disorders have a 12-month prevalence rate of 14%, whereas mood disorders have a 12-month prevalence rate of 7.8% (Wittchen et al, 2011). Affective disorders also have high economic costs. For example, mental illnesses are the third most common cause of sick leave in the UK, accounting for between £70- and £100 billion per year, much of which is accounted for by affective disorders (Mental Health Foundation, 2016). Due to their high prevalence and health cost, it is important to assess possible risk factors of affective disorders.

Within the diathesis-stress model, personality constructs can be conceptualized as diathesis, or vulnerability, factors in the development of affective disorders (Ormel et al, 2013; Watson et al, 2006). Associations between personality constructs and affective disorders may be mediated by behavioural and neurocognitive correlates of personality, such as stressful life events (Kendler et al, 2004), attentional biases (Elliott et al, 2011; Amin et al, 2004) and coping strategies (Connor-Smith & Flachsbar, 2007). Personality constructs have also been conceptualized as endophenotypes of mental illnesses (Bearden & Friemer, 2006), as they are moderately heritable (Vukasović & Bratko, 2015), and causally predict the development of affective disorders (Spinhoven et al, 2013; Struijs et al, 2018). Overall, investigating personality constructs associated with affective disorders can help to identify possible endophenotypes for affective disorders. Furthermore, affective disorders can also causally affect personality traits,

such as scar effects, in which anxiety and depression increase trait neuroticism (Ormel et al, 2013; Watson et al, 2006).

Studies of personality using factor analysis have converged on five personality traits (Davis & Panksepp, 2018; Goldberg et al, 1990). A dominant model of personality is the Big Five (DeYoung et al, 2007; Allen & DeYoung, 2016), which proposes that personality can be described across five broad personality traits: neuroticism (referring to stress-reactivity and avoidance), extroversion (referring to sociability and positive emotion), conscientiousness (referring to delayed gratification and organisation), agreeableness (referring to emotion contagion and compassion) and openness (referring to creativity and aesthetic appreciation; Costa & McCrea, 1992; Goldberg et al, 1990). A meta-analysis of 175 correlational studies of personality traits and common mental illnesses found that neuroticism positively correlates with affective disorders such as generalised anxiety, depression and panic disorder, whereas extroversion and conscientiousness negatively correlate with these affective disorders (Kotov et al, 2010). For this reason, the personality configuration of high neuroticism, low extroversion and low conscientiousness has been referred to as the “vulnerable personality” (Wardenaar et al, 2014) and the “misery triad” (Miller, 1991).

Big Five personality constructs exist within a personality hierarchy, from broad traits to narrow facets (DeYoung et al, 2016), allowing personality to be considered at different levels of specificity (DeYoung et al, 2016). Various measures of lower-order personality constructs have been developed. In the Big Five Aspect Scale (BFAS), each trait is split into its two most statistically robust components (DeYoung et al, 2007); for example, trait agreeableness is split into the aspects compassion and politeness. The Big Five Inventory – 2 (BFI-2) splits each trait into three facets; for example, trait conscientiousness is split into order, productiveness and

responsibility (Soto & John, 2017). The NEO-PI-R separates each trait into six narrow facets: for instance, extroversion is separated into the facets warmth, gregariousness, assertiveness, activity, excitement-seeking and positive emotion (Costa & McCrea, 1992).

Studying these lower-order personality constructs can provide more specific information about which components of a personality trait best explain its predictive power. For example, trait agreeableness has a non-significant relationship with MDD (Kotov et al, 2010), whereas the agreeableness facet trust moderately negatively correlates with MDD ( $r=-0.30$ , Quilty et al, 2013), indicating a specific role of this facet within the trait. Conversely, trait conscientiousness significantly negatively correlates with various affective disorders, whereas the conscientiousness facet deliberation does not (Friesen, 2008), indicating that this facet does not play an important role in this relationship.

Investigating lower-order personality constructs can therefore help to understand how personality constructs and affective disorders impact each other and can help to identify narrower endophenotypes for affective disorders. It may also help us to better understand the mechanisms underlying these associations. For instance, trait extroversion negatively correlates with various affective disorders (Kotov et al, 2010). However, extroversion includes conceptually distinct personality facets that could relate to separate mediating mechanisms: If the effect of extroversion is explained by facet positive emotion, extroversion may protect from affective disorders via positive attentional and memory biases (Amin et al, 2004; Canli et al, 2004) and goal-directed behaviour (Carver et al, 2013; Wilt et al, 2018). However, if the effect of extroversion is explained by facet sociability, the mediating mechanism may relate to social factors, such as social support. If the effect of extroversion is explained by facet assertiveness, one mediating mechanism may be negotiating skills to attain competitive goals. Therefore,

investigating associations between facets and affective disorders can help to understand how personality risk factors influence the development of affective disorders.

The aim of the current study is therefore to systematically review the literature investigating associations between lower-order personality constructs and affective disorders.

## 2 Methodology

The systematic review protocol was pre-registered on Prospero (ID: CRD42019126874).

### 2.1 Inclusion and exclusion criteria

To be included in the review, studies had to report statistical tests of relationships between personality facets or aspects and affective disorder measures. This could be simple associations between the personality and affective disorder scores, or tests of difference in which mean personality scores were compared between groups that differed in the presence or severity of a given affective disorder. Affective disorders could be coded using affective disorder status, such as a clinical diagnosis (as defined by the DSM-IV (APA, 2000) and onwards); by affective disorder severity, measured with a standardised quantitative tool, including questionnaires; or quantitatively coded interviews such as the Mini International Neuropsychiatric Interview (MINI: Sheehan et al, 1998).

Both cross-sectional and longitudinal study designs were included. Studies using correlations were only included if they reported both correlation coefficients and p-values; studies using tests of difference were only included if they reported both effect sizes and p-values. If these statistics were not provided in an otherwise eligible study, then the primary



author was contacted, and these data requested. If associations between lower-order personality constructs and affective disorder scores were reported in a subsample of a larger study, only the data from the relevant subsample was extracted.

To ensure consistency of constructs across studies, studies were only included if they measured personality aspects using the Big Five Aspect Scale (BFAS; DeYoung et al, 2007) or personality facets with the NEO-PI (Costa & McCrea, 1985) or variations of this questionnaire, such as the NEO-PI-R (Costa & McCrea, 1992). These questionnaires were chosen as they represent the predominant models of aspects and facets in the existing literature, and therefore provided the greatest body of literature for review (Soto & John, 2017; Xie & Cobb, 2020). Studies that derived personality aspects or facets from a factor analysis of one or more of the above scales, plus additional scales of both Big Five and non-Big Five measures, were excluded due to a lack of direct comparability between the resultant measures and those captured by the BFAS and NEO-PI-R.

Studies testing both clinical and non-clinical populations were included. As personality is more flexible in adolescence than adulthood (Srivastava et al, 2003), studies were excluded if any participants were younger than 18 years old.

## 2.2 Literature search

The databases PsycINFO, EMBASE and MedLine were initially searched from 1<sup>st</sup> January 1985 (the year that the first questionnaire to measure Big Five facets, the Neuroticism Extroversion Openness – Personality Inventory (NEO-PI; Costa & McCrea, 1985) was published) to 28<sup>th</sup> February 2019. This search was then updated to include literature published until 30<sup>th</sup> June 2020. Searches were performed using the following search strategy applied to the

OVID platform: (*Personality OR NEO-PI\* OR BFI\* OR BFAS OR big five*) AND (*facet\* OR primary trait OR aspect\**) AND (*(affect\* AND disorder\*) OR (mental AND disorder\*) OR (mental AND health) OR (mental AND condition) OR anx\* OR depress\* OR obsessive-compulsive OR agoraphobia OR phobia*) AND (*assoc\* OR correlate\* OR regress\* OR predict\**).

To combat publication bias, literature was also search in OpenGrey from January 1<sup>st</sup>, 1985 to 28<sup>th</sup> February 2019, then extended to 30<sup>th</sup> June 2020. As OpenGrey only allowed access to the first 2,000 search results, the total number of hits could not be displayed. To reduce the number of hits below 2,000, results were limited to the “psychology” domain, and a new search strategy was developed: (*“Personality” OR “big five” OR “NEO-PI\*”*) AND (*“facet\*” OR “primary trait” OR “aspect”*) AND (*“affect\*” AND “disorder\*”*) OR (*“mental” AND “health”*)) AND (*“correlate\*” OR “regress\*”*). All 2,000 results were screened in the initial search. OpenGrey allows searches to be specified by year, but not by date, therefore the extended search included studies from 1<sup>st</sup> January 2019 to 30<sup>th</sup> June 2020. The extended search did not produce any hits, therefore all results from OpenGrey are from the original search.

The combined search of PsycINFO, EMBASE, MedLine, and OpenGrey produced a total of 12,722 records. After de-duplication, 11,289 records remained. These studies were first screened by titles and abstracts. For this, two reviewers independently screened a subset comprising 1,200 records by title and abstract, with any discrepancies between reviewers resolved by discussion. One reviewer included 13 studies while another included 9 studies, meaning a consistency rate of 67.8%. However, the resolution of discrepancies revealed that all disagreements were cases in which the second reviewer had retained a study that it was subsequently agreed could have been excluded at this stage. There were no cases where the

primary reviewer had incorrectly excluded a relevant study, suggesting a high level of screening accuracy by the primary reviewer. The remainder of the records were therefore screened by title and abstract by the primary reviewer. After screening by title and abstract, the search was reduced to 61 records (figure 1).

[Figure 1 about here]

Of these 61 records, three were French doctoral theses, for which full texts were unavailable in English (Bresson, 2006; Jourdy, 2013; Kim, 2012). The method sections of these theses were therefore translated into English by an experienced translator, fluent in French. The full text of three records (Leong et al, 2003; Moghanloo & Aguilar-Vafaie, 2009; Sells et al, 2012) were not available, and so were excluded at this stage. The full texts of the remaining 58 records were then independently assessed against the inclusion and exclusion criteria by two reviewers, with 100% agreement. Through this process, the search was reduced to thirteen publications, one of which described two separate studies (Kaplan et al, 2015). The most common reason for exclusion at this stage was that studies did not correlate personality facets with affective disorders (k=20). In addition, several papers used novel measures of personality facets (k=7), meaning their results could not be mapped onto existing research or the personality hierarchy. Five papers did not measure affective disorders, and five papers did not measure Big Five facets or aspects (figure 1).

The reference lists of all included publications were then hand-searched for relevant studies, from which one additional article (describing one study) was identified as meeting the inclusion criteria (Wolfstein & Trull, 1997). This led to a final sample of fifteen studies, described within fourteen publications (Allen et al, 2018; Bagby et al, 1995; Cox et al, 2000; Friesen, 2008; Hayward et al, 2013; Jourdy & Petot, 2017; Kaplan et al, 2015; Khoo & Simms,

2018; Osma et al, 2016; Naragon-Gainey & Simms, 2017; Newby et al, 2017; Quilty et al, 2013; Rees et al, 2005; Wolfstein & Trull, 1997; figure 1).

### 2.3 Quality assessment

Quality assessment of studies was performed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (NIH, 2019). This tool assesses fourteen study characteristics, including the clarity of the research question, sample size and sample details, appropriateness of measures, and analysis of potential confounding variables. Rather than simply rating the studies according to the number of criteria met, reviewers assess the strengths and limitations of each study according to these characteristics, and then use their reflections on these ratings to make a global judgment of study quality as “good,” “fair” or “poor.” For this review, quality assessment was performed by two reviewers, who each came to an independent judgement of overall study quality, and then met to compare their ratings. The two reviewers initially agreed on the ratings awarded to eleven of the fifteen studies (73.3% agreement). All disagreements were resolved through discussion.

### 2.4 Best evidence synthesis

After all included studies were quality assessed, results were synthesized using a best evidence synthesis process adapted from Terwee et al (2007) and Faudzi et al (2019). In best evidence synthesis, each association (in this case, each association between a specific aspect/facet and a specific affective disorder) is assigned an overall value based on the quality, number, and consistency of studies reporting a correlation co-efficient for this association (Slavin et al, 1986). Specifically, if a result for an association was reported in one study of good quality, or consistently in multiple studies of fair quality, the association was considered to have

“strong evidence” and coded as “++” for positive associations, “--” for negative correlations and “00” for non-significant associations at  $p < 0.05$ . If a result for an association was reported in one study of fair quality or consistently in multiple studies of poor quality, the association was reported to have “weak evidence,” coded as “+” for positive associations, “-” for negative associations and “0” for non-significant associations at  $p < 0.05$ . If a result for an association was only reported in one study of poor quality or otherwise not investigated, the result was reported to have “absence of evidence,” and left blank. All instances in which results for an association conflicted between studies were reported as “conflicting evidence” and coded as “±”. As aspects and facets refer to different levels of specificity within the personality hierarchy, associations between facets and affective disorders, and between aspects and affective disorders, were synthesized in separate best evidence syntheses. Several poor-quality studies were statistically underpowered (Jourdy & Petot, 2017; Osma et al, 2016), which may have led to false negative results, which may in turn unduly affect the results of the best evidence synthesis. Therefore, where a synthesis included one or more studies of poor quality, an additional synthesis was performed of only those studies of good or fair quality, so that any undue impact of the poor-quality studies could be determined. All evidence synthesis ratings were made by one author (KL).

### 3 Results

Eleven studies used a sample of current or recovering psychiatric patients; four studies used a sample of undergraduate students. The sample size ranged from fourteen (Rees et al, 2005) to 1,079 (Friesen, 2008), with a mean sample size of 303.60 (SD = 281.03). Across the

fifteen studies, the total sample comprised 4,554 participants. Four studies were rated as being of “good” quality; eight of “fair” quality; and three studies of poor quality (Table 1).

Several studies did not provide details regarding the age range of their sample (Bagby et al, 1995; Cox et al, 2000; Hayward et al, 2013; Kaplan et al, 2015; Newby et al, 2017; Osma et al, 2016; Quilty et al, 2013; Rees et al, 2005; Wolfstein & Trull, 1997) or the proportions of male and female participants (Hayward et al, 2013; Khoo & Simms, 2017). In addition, three studies only provided this information for their total sample, but not for smaller subsets used in the analyses reported here (Friesen et al, 2008; Naragon-Gainey & Simms, 2017; Rees et al, 2005). Age and gender characteristics that were reported for studies are displayed in Table 1.

The most common disorder investigated was MDD, which was investigated in ten of the studies making up the final sample. The second most common disorder studied was social anxiety, investigated by five studies across four articles. The other disorders investigated included persistent depressive disorder (PDD; k = 1), generalized anxiety disorder (GAD; k = 2), panic disorder (k = 3), obsessive-compulsive disorder (OCD; k = 2), post-traumatic stress disorder (PTSD; k = 2), illness anxiety disorder (IAD; k = 1) and agoraphobia (k = 1). As see in table 1, there was low consistency across the outcome measures used for affective disorders. For example, the most common measure of depression was the Beck Depression Inventory, which was only used in five of the ten studies investigating MDD.

[Table 1 about here]

Two studies investigated the associations between personality aspects and MDD (Allen et al, 2018; Quilty et al, 2013), consisting of 16 extracted associations. Fourteen studies measured personality facets using variations of the NEO-PI-R, with a total of 400 extracted associations

between personality facets and affective disorder measures. Associations between facets of conscientiousness and affective disorder measures were reported most often, making up 110 of the extracted associations (27.50%).

### 3.1 Best evidence synthesis: personality aspects

Best evidence synthesis at the aspect level found strong evidence that the neuroticism aspect withdrawal was positively associated with MDD; associations between volatility and MDD found conflicting results. Studies into extroversion aspects and MDD also yielded conflicting results. There was strong evidence that the conscientiousness aspect industriousness was negatively associated with MDD; tests of association between orderliness and MDD yielded conflicting results. There was weak evidence that the agreeableness aspect compassion was negatively associated with MDD, and weak evidence that politeness was not significantly associated with MDD. There was weak evidence that the aspect openness (relating to creativity) was not significantly associated with MDD, however there was weak evidence that the openness facet intellect was negatively associated with MDD (table 2). As neither of the studies investigating associations between personality aspects and affective disorder scores had poor quality, a subsequent best evidence synthesis excluding poor-quality studies was not performed.

[Table 2 about here]

### 3.2 Best evidence synthesis: personality facets

Two poor-quality studies investigated associations between all personality facets and MDD (Jourdy & Petot, 2017; Rees et al, 2005), and one poor-quality study investigated associations between personality all facets and panic disorder (Osma et al, 2016). Therefore, two best evidence syntheses were performed: one in which all studies of personality facets were

included; and one in which poor-quality studies were excluded. When poor-quality studies were included in the best evidence synthesis, there was conflicting evidence regarding the associations between most facets of neuroticism and extroversion and panic disorder. When poor-quality studies were excluded, there was weak evidence that all facets of neuroticism positively correlated with panic disorder, and that all facets of extroversion, except activity, negatively correlated with panic disorder. When poor-quality studies were included, there was also conflicting evidence regarding the associations between MDD and facets anxiety, positive emotion, and dutifulness. When poor-quality studies were excluded, there was strong evidence of a positive association between facet anxiety and MDD, strong evidence of a negative association between positive emotion and MDD, and strong evidence on a negative association between dutifulness and MDD (table 3).

### 3.2.1 *Neuroticism*

There was strong evidence that most facets of neuroticism were positively correlated with MDD and social anxiety, and weak evidence that most facets of neuroticism positively associated with GAD, OCD, PTSD and IAD; these results were not affected by excluding poor-quality studies. When including poor-quality studies, there was conflicting evidence regarding associations between most facets of neuroticism and panic disorder; when excluding poor-quality studies, there was weak evidence that all facets of neuroticism positively correlated with panic disorder.

### 3.2.2 *Extroversion*

Studies of facets of extroversion and MDD mostly yielded conflicting results. Nevertheless, there was weak evidence that positive emotion negatively associated with various



distress disorders such as GAD, social anxiety, OCD, PTSD and IAD. There was also weak evidence that warmth and gregariousness negatively associated with GAD, social anxiety, OCD and PTSD, and that assertiveness negatively associated with GAD, social anxiety, OCD and IAD. Removing poor-quality studies did not affect these results. When including poor quality studies, there was conflicting evidence regarding the association between positive emotion and MDD; when excluded poor-quality studies, there was also strong evidence of a negative association between positive emotion and MDD. When including poor-quality studies, there was conflicting evidence regarding associations between most facets of extroversion and panic disorder; when excluding poor-quality studies, there was weak evidence that that all facets of extroversion, except activity, negatively correlated with panic disorder.

### 3.2.3 *Conscientiousness*

This review found strong evidence that the conscientiousness facets competence and self-discipline negatively associated with MDD, PDD, GAD, social anxiety and PTSD. There was also strong evidence that competence negatively associated with OCD, and weak evidence that competence negatively associated with IAD. There was also strong evidence that the conscientiousness facets dutifulness and achievement-striving negatively associated with PDD, GAD and social anxiety. When including poor quality studies, there was conflicting evidence regarding the association between dutifulness and MDD; when excluded poor quality studies, there was also strong evidence of a negative association between dutifulness and MDD.

### 3.2.4 *Agreeableness*

Studies of all facets of agreeableness and MDD yielded conflicting results. There was strong evidence that trust negatively associated with social anxiety, and weak evidence that trust

negatively associated with GAD, panic disorder, OCD, PTSD and IAD. There was weak evidence that straightforwardness, modesty and tendermindedness were positively associated with PTSD, and that tendermindedness also positively associated with social anxiety, panic disorder and OCD. Removing poor-quality studies did not affect these results.

### 3.2.5 *Openness*

There was conflicting evidence regarding all facets of openness and MDD. There was weak evidence that most facets of openness did not significantly associated with GAD, social anxiety, panic disorder and IAD. Best evidence synthesis found weak evidence that fantasy positively associated with GAD, social anxiety and panic disorder; and weak evidence that actions negatively associated with GAD, social anxiety, panic disorder, OCD and PTSD. This review also found weak evidence that fantasy, aesthetics and feeling positively associated with OCD. As with facets of agreeableness, removing poor-quality studies did not affect the results of associations between facets of openness and affective disorders.

[Table 3 about here]

## 4 Discussion

The aim of this systematic review was to determine which personality facets were significantly associated with affective disorders. Fifteen studies were identified across fourteen publications, most of which focused on MDD or social anxiety. Fifteen studies investigated personality facets, and two investigated correlations between personality aspects and MDD. There was strong evidence that aspect withdrawal in neuroticism, and most facets of neuroticism, positively associated with various affective disorders; and that aspect industriousness, facet

competence and facet self-discipline in conscientiousness, negatively associated with various affective disorders. There was weak evidence that facet positive emotion in extroversion, facet trust in agreeableness, and facet actions in openness negatively correlated with several affective disorders.

Several studies investigating the associations between personality facets and affective disorder scores had poor quality (Jourdy & Petot, 2017; Osma et al, 2016; Rees et al, 2005). As several poor-quality studies were statistically underpowered (Jourdy & Petot, 2017; Osma et al, 2016; Rees et al, 2005), their results may have been false negatives, and their inclusion may have unduly affected the final results. Therefore, a subsequent best evidence synthesis was performed in which poor-quality studies were excluded. Excluding poor-quality studies affected fourteen associations, ten of which were associations between personality facets and panic disorder: when including poor-quality studies, associations into most facets of neuroticism and extroversion and panic disorder yielded conflicting results. However, when excluding poor-quality studies, best evidence synthesis found weak evidence that all facets of neuroticism positively associated with panic disorder, and that most facets of extroversion negatively associated with panic disorder.

There was strong evidence that all facets of neuroticism were positively correlated with social anxiety, and weak evidence that all facets of neuroticism were positively correlated with GAD, OCD, panic disorder and IAD. There was also strong evidence that most neuroticism facets were positively associated with MDD. Taken together, and in line with findings that broad trait neuroticism is positively associated with various affective disorders (Kotov et al, 2010), these findings suggest that trait neuroticism may be a transdiagnostic risk factor in affective disorders. This suggests that strategies focusing on any narrow facet of neuroticism,

such as facet anxiety or facet self-consciousness, may be effective in reducing symptoms of affective disorders.

While the majority of evidence suggested that broad trait neuroticism was positively associated with affective disorder, all other traits showed a more mixed pattern, with significant associations for some facets and aspects but not for others. For example, within extroversion, there was strong evidence that positive emotion negatively correlated with MDD. This is unsurprising, as MDD is marked by high negative emotion and low positive emotion (Verstraeten et al, 2009); positive emotion also negatively associated with anxiety disorders such as GAD, social anxiety, panic disorder, OCD, PTSD and IAD. Positive emotion is maintained through movement toward goals (Carver & Scheier, 2013; Wilt et al, 2017). Therefore, individuals high in facet positive emotion may be more motivated to overcome challenges and engage in more active coping, thus reducing the risk of affective disorders. Positive attentional and memory biases may also mediate the relationship between positive emotion and affective disorders. Trait extroversion is associated with both active coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007) and positive affective cognitive biases (Amin et al, 2004; Canli et al, 2004), however we are unaware of any studies which have correlated those possible mediators with facet positive emotion.

There was weak evidence that the extroversion facets warmth, gregariousness and assertiveness were negatively associated with several anxiety disorders. Warmth and gregariousness refer to motivation toward socializing (Costa & McCrea, 1992), suggesting that individuals high in these facets may receive more social support, reducing the risk of anxiety disorders. Assertiveness, defined as competitiveness and social dominance (Costa & McCrea, 1992; Ellis & Torochuk, 2013), may reduce the risk of affective disorders through social

interaction; furthermore, assertiveness also positively correlates with active coping (Tankamani & Jalali, 2018). Overall, various facets of extroversion, referring to socializing, assertiveness and positive emotion, were associated with lower affective disorder scores. This is confirmed by a study measuring personality using composites of FI-FFM facet scores, suggesting that both the sociability and assertiveness components of extroversion significantly negatively correlate with depression (Watson et al, 2019a).

This review found strong evidence that the conscientiousness facets competence and self-discipline were negatively associated with various affective disorders, including MDD, PDD, GAD, social anxiety and PTSD. Competence, also called generalised self-efficacy, is defined as an individual's perception of their ability to solve a given problem (Costa & McCrea, 1985, 1995). Competence beliefs determine whether stressors are appraised as challenges or threats (Folkman, 1984), and therefore both regulate negative emotion (Bandura, 1994; 1997, pp. 153) and facilitate active coping (Hahn, 2000), thus reducing the severity of affective disorders (Bjørkløf et al, 2013; Sawhney et al, 2018). Furthermore, competence is positively correlated with attentional and memory biases to positive information (Brown et al, 2012; Karademas et al, 2007), which are also negatively associated with affective disorders. Self-discipline refers to both persistence and productivity, which may promote active coping, and is also associated with improved emotion regulation (Eisenberg et al, 2014). Additionally, the significant effect of self-discipline may be explained by competence: competence is derived from reflections of experiences of problem-solving. Individuals with higher self-discipline are more effective problem-solvers, and therefore have higher competence (DeClerck et al, 2006). Overall, competence and self-discipline may be associated with lower affective disorder scores via both active coping and emotion processing and regulation.

This review found strong evidence that the agreeableness facet trust was negatively correlated with social anxiety, and weak evidence that trust was negatively associated with GAD, panic disorder, OCD, PTSD and IAD. One possible mediator is social support seeking, as individuals high in trust use more incremental and emotional social support, which significantly reduces the severity of affective disorders (Bjørkløf et al, 2013; Sawhney et al, 2018). One study found that several facets of agreeableness positively associated with PTSD, however this study used a small sample of individuals within this patient group (Friesen, 2008; n = 78), meaning these may be anomalous results. While trust significantly correlates with various affective disorders, the correlation between broad trait agreeableness and affective disorders is non-significant (Kotov et al, 2010). This highlights the importance of investigating lower-order personality facets, as significant associations can go unobserved when only measuring personality traits.

There was weak evidence that most facets of openness did not significantly associate with anxiety disorders. Nevertheless, there was weak evidence that the openness facet actions negatively associated with GAD, social anxiety, panic disorder, OCD and PTSD. Individuals high in openness to actions are willing to carry out novel behaviours (Costa & McCrea, 1985, 1995). Therefore, it is possible that openness to actions may facilitate active coping. Conversely, there was weak evidence that openness to fantasy positively associated with various anxiety disorders. One possible explanation for this is that openness to fantasy leads to more frequent worrying and wishful thinking, rather than effective planning, which may increase affective disorder scores. Future research into openness and affective disorders should therefore focus on the facets actions and fantasy.

Best evidence synthesis yielded several conflicting results, especially in associations between facets of extroversion and neuroticism, and MDD and panic disorder. Many conflicting results were explained by study quality, as poor-quality studies used statistically underpowered samples, meaning some of their results may have been false negatives (Jourdy & Petot, 2017a; Osma et al, 2016; Rees et al, 2005). While underpowered samples did not explain all conflicting results, future researchers should ensure to use statistically powered samples, to reduce the chances of false negatives and conflicting results between studies.

This review highlights some important gaps in the current literature. Firstly, three studies had poor quality due to underpowered samples (Jourdy & Petot, 2017; Osma et al, 2016; Rees et al, 2005). This resulted in conflicting results, as significant effects in statistically powered studies were often non-significant in underpowered studies. Secondly, all studies used a cross-sectional design, meaning that it is not possible to determine causation. For instance, personality traits may be vulnerability factors predicting affective disorders (Ormel et al, 2013; Watson et al, 2006). Evidence in line with this explanation comes from longitudinal studies that have found that high trait neuroticism, low extroversion, and low conscientiousness temporally precede both anxiety and depressive disorders (Koffel et al, 2016; Spinhoven et al, 2016; Struijs et al, 2018). However, associations may also be due to “scar” effects, whereby affective disorders causally affect personality constructs (Ormel et al, 2013; Watson et al, 2006), as suggested by evidence showing that the onset and development of MDD is followed by an increase in trait neuroticism, and a decrease in trait conscientiousness (Karsten et al, 2012). It is also possible that affective disorders may have state effects on personality, as trait neuroticism increases due to MDD onset but decreases during remission from MDD (Spinhoven et al, 2013). It is also possible that there are multiple causal effects, or that there are different causal effects explaining different

associations. By using cross-sectional designs, the existing research into lower-order personality constructs is unable to distinguish between these models of causation. Longitudinal studies will help to distinguish between vulnerability, scar, and state effects.

This review has several limitations. Firstly, a meta-analysis could not be performed, due to the use of heterogeneous measures of affective disorders. Therefore, it was not possible to calculate average effect sizes of associations between personality constructs and affective disorder measures, or to weight these measures by sample size (Center for Reviews and Dissemination, 2008). Secondly, this review only included studies using the Big Five model of personality, meaning it is not clear how affective disorders correlate with facets across other models of personality. Nevertheless, limiting the review to one model of personality maintains construct validity, meaning that results can be meaningfully synthesized across studies. Thirdly, the review was limited to studies measuring personality facets with the NEO-PI-R (Costa & McCrea, 1992). While this is the predominant measure of personality facets (Xie & Cobb 2020), there are alternative validated measures of personality facets, such as the BFI-2, with three facets per trait (Soto & John, 2017) and the FI-FFM, with between three and five facets per trait (Watson et al, 2019b). Furthermore, several studies have investigated correlations between affective disorder scores and Big Five facets derived from factor analyses of various measures of lower-order facets (Naragon-Gainey et al, 2009; Naragon-Gainey, 2011). Again, limiting this review to a single model of personality facets ensures construct validity.

There are also some strengths to this review. One strength of this review is that it was not limited to studies published in English, with several articles being translated by an experienced translator (Bresson, 2006; Jourdy, 2013; Kim, 2012). This ensures that the conclusions of this review reflect the wider research community, rather than just research published in English.



Another strength is that this review controlled for poor-quality studies, by performing an additional best evidence synthesis excluding poor-quality studies. Therefore, the results of this review are unlikely to be unduly affected by poor-quality studies.

Future research should focus on possible mediating pathways between lower-order personality constructs and affective disorders. One possible mediator is the use of emotion regulation strategies, as neuroticism predicts avoidant coping (Carver & Connor-Smith, 2010; Connor-Smith & Flachsbart, 2007; Hahn, 2000). Another possible mediator is affective cognition, as competence is associated with positive attentional and memory biases, while neuroticism is associated with negative attentional and memory biases (Amin et al, 2004; Brown et al, 2012; Canli et al, 2004).

## 5 Conclusion

This systematic review reveals that a range of affective disorders are associated with high trait neuroticism, low positive emotion in extroversion, and low competence and self-discipline in conscientiousness. Furthermore, anxiety disorders are associated with low trust and low openness to actions, along with high openness to fantasy. Investigating these personality facets may help to improve our understanding of the development of affective disorders. Future research is needed to investigate possible mediating mechanisms, such as emotion regulation strategies and affective cognition. This will improve our understanding of how personality may contribute to affective disorders, and how affective disorders may impact personality.

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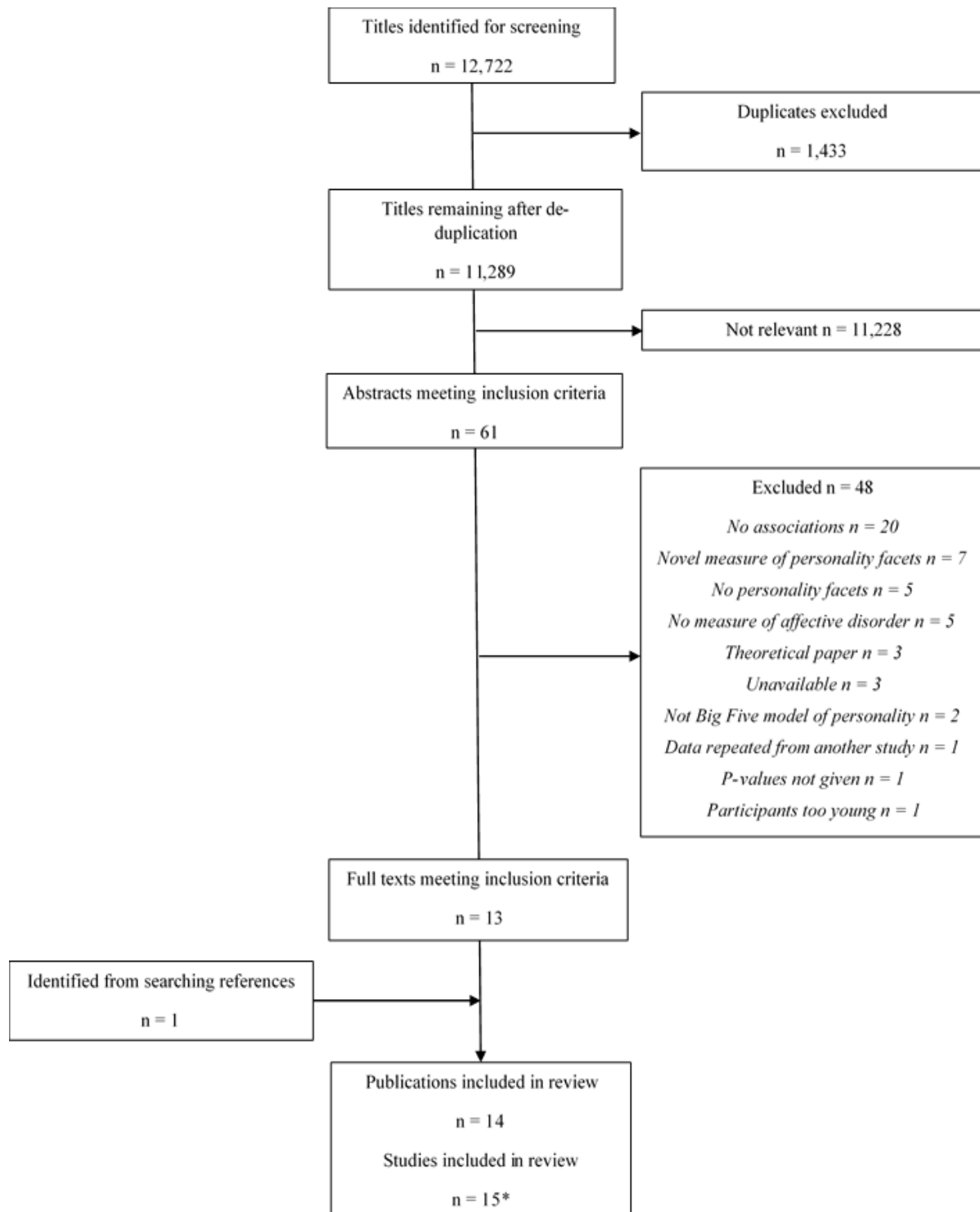


Figure 1. Flow chart of the study selection process for the original search

\*One publication consisted of two correlational studies (Kaplan et al, 2015).

Table 1. Included studies by participant characteristics, affective disorder measures, personality measures and quality

Article	Country	Sample size	Participant characteristics	Affective disorder(s) studied	Affective disorder measures	Personality measure used	Lower-order personality construct measures	Results summary	Quality rating
Allen et al (2018)	Canada	354	Psychiatric outpatients, from three randomized controlled trials. Mean age = 38.09 (SD = 12.08) 63.60% female	MDD	BDI	BFAS Administered 100 items: complete questionnaire. Only performed correlations for neuroticism, extroversion and conscientiousness aspects	2 neuroticism aspects: withdrawal and volatility 2 extroversion aspects: enthusiasm and assertiveness 2 conscientiousness aspects: industriousness and orderliness	Withdrawal positively correlated with MDD Industriousness negatively correlated with MDD	Fair
Bagby et al (1995)	Canada	57	Psychiatric outpatients. Mean age = 40.10 (SD = 10.02) 64.91% female	MDD	HamD BDI	NEO-PI Administered 144: neuroticism, extroversion and conscientiousness	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	All facets of neuroticism positively correlated with MDD. Positive emotion negatively correlated with MDD. Fantasy, aesthetics and feelings positively correlated with MDD	Fair
Cox et al (2000)	Canada	309	Undergraduates from the University of Manitoba Mean age = 19.84 (SD = 3.52) 61.49% female	IAD	IAS	NEO-PI-R Administered 240 items: complete questionnaire	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tendermindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	All facets of neuroticism positively correlated with IAD. Assertiveness, activity, positive emotion, competence, dutifulness, achievement striving, self-discipline, trust, modesty, tendermindedness and ideas negatively correlated with IAD	Fair
Friesen (2008)	Canada	1,079	Psychiatric outpatients Major depressive disorders = 803 (MDD: 788; PDD = 12; major depression not otherwise specified = 3); GAD = 23; panic disorder = 62; social anxiety = 60; PTSD = 78; OCD = 53 Mean and standard deviation of age, and with proportions of sexes, not reported	MDD <sup>1</sup> GAD Panic disorder Social anxiety PTSD OCD	SCID-I/P	NEO-PI-R. Administered 240 items: complete questionnaire. Personality scores of clinical groups were compared with normative personality scores provided from Costa & McCrea (1992)	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tendermindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	MDD, GAD, PTSD, social anxiety, and panic disorder and OCD patients scored higher on all facets of neuroticism. MDD patients scored lower on all facets of extroversion. GAD and OCD patients scored lower on facets warmth, gregariousness, assertiveness, and positive emotion. Social anxiety patients scored lower on all facets of extroversion except excitement-seeking. Panic disorder patients scores lower on all facets of extroversion except activity. PTSD patients scores lower on all facets of extroversion except assertiveness. MDD patients scored lower on all facets of conscientiousness. GAD, social anxiety and panic disorder patients scores lower on all facets of conscientiousness except deliberation. PTSD patients scored lower on the conscientiousness facets competence, order, self-discipline, and scored higher in deliberation. OCD patients scored lower on conscientiousness facets competence, dutifulness, achievement striving and self-discipline. MDD patients scored lower on trust, straightforwardness, altruism and compliance, and higher on modesty and tender-mindedness. GAD patients scored lower on trust, altruism, and compliance. Social anxiety patients scored lower on trust and altruism and scored higher on modesty and tender-mindedness. Panic disorder patients scored lower on trust and compliance and scored higher on tender-mindedness. PTSD patients	Fair

								scored lower on trust, and higher on straightforwardness, modesty, and tender-mindedness. OCD patients scores lower on trust, altruism, compliance, and higher on tender-mindedness. MDD patients scored lower on actions, and higher on fantasy, aesthetics, feelings and values. GAD, social anxiety and panic disorder patients scores higher on fantasy and lower on actions. PTSD patients scores lower on fantasy, aesthetics, actions, and ideas. OCD patients scored higher on fantasy, aesthetics and feelings, and lower on actions.	
Hayward et al (2013)	USA	216	112 psychiatric outpatients with MDD; 104 healthy controls. Mean age = 70.41 (SD = 5.94)	MDD	MADRS	NEO-PI-R. Administered 240 items: complete questionnaire	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tender-mindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	MDD patients scores higher on all facets of neuroticism MDD patients scores lower on facets assertiveness, activity and positive emotion MDD patients scored lower on facets competence, order, dutifulness and self-discipline	Fair
Jourdy & Petot (2017)	France	58	All diagnosed with major depression without psychotic features Mean age = 41.79 (SD = 11.26) 60.34% female	MDD	BDI-II	NEO-PI-R Administered 240 items: complete questionnaire	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tender-mindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	Facets hostility, depression, self-consciousness and vulnerability positively correlated with MDD Facets competence and self-discipline negatively correlated with MDD	Poor
Kaplan et al (2015) <sup>2</sup>	USA	Study 1: 502 Study 2: 698	Undergraduate students. Study 1: Mean age = 19.04 (SD = 1.04) 69.50% female Study 2: Mean age = 19.03 (SD = 1.58) 64.30% female	Social anxiety	Study 1: S-SAIS Study 2: SPS	NEO-PI-3 Administered 10 items: facet trust	1 agreeableness facet: trust	Trust negatively correlated with social anxiety	Study 1: Good Study 2: Good
Khoo & Simms (2018)	USA	260	Current or past outpatients' psychiatric clinic in the past 2 years Mean age = 37.70 (SD = 11.90) Proportion of sexes not reported	MDD	MINI	NEO-PI-3 Administered 48 items: openness	6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	Actions, ideas, and values negatively correlated with MDD	Good
Naragon-Gainey & Simms (2017)	USA	266	Sample of psychiatric patients, part of a larger dataset for which demographic information is reported.	MDD PDD GAD Social anxiety Panic disorder OCD PTSD Agoraphobia	MINI	NEO-PI-3HF Administered 24 items: conscientiousness	6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation	All conscientiousness facets except order negatively correlated with MDD, PDD, social anxiety and PTSD. Competence, dutifulness, achievement-striving and self-discipline negatively correlated with GAD. Competence and deliberation negatively correlated with OCD. No facet of conscientiousness significantly correlated with panic disorder or agoraphobia.	Good

			Mean and standard deviation of age, and with proportions of sexes, not reported						
Newby et al (2017)	Canada	271	Participants were recruited online from Survey Monkey. 208 undergraduates; 63 from the community Mean age = 24.25 (SD = 9.19) 79.70% female	Social anxiety	SPS	NEO-PI-R Administered 48 items: neuroticism	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability	All facets of neuroticism positively correlated with social anxiety	Fair
Osma et al (2016)	Spain	52	Participants meeting criteria for panic disorder using the Anxiety Disorders Interview Schedule, Lifetime Version Mean age = 32.02 (SD = 10.39) 50.00% female	Panic disorder	PDSS	NEO-PI-R Administered 96 items: neuroticism and extroversion	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion	Only the neuroticism facet anxiety positively correlated with panic disorder	Poor
Quilty et al (2013)	Canada	275	All participants were diagnosed with a mood disorder using the Structured Clinical Interview for DSM-IV, Axis I Disorders, Patient Version (SCID-I/P). Major depressive disorder = 119; dysthymic disorder = 18; depressive disorder not otherwise specified = 1; bipolar I disorder = 110; bipolar II disorder = 21; bipolar disorder not otherwise specified = 6 Mean age = 43.02 (SD = 11.58) 63.64% female	MDD	HamD	BFAS Administered 100 items: complete questionnaire NEO-PI-R Administered 240 items: complete questionnaire	2 neuroticism aspects: withdrawal and volatility 2 extroversion aspects: enthusiasm and assertiveness 2 conscientiousness aspects: industriousness and orderliness 2 agreeableness aspect: compassion and politeness 2 openness aspects: openness (aspect) and intellect 6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tendermindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	Both aspects of neuroticism positively correlated with MDD. Both aspects of extroversion, and both aspects of conscientiousness, negatively correlated with MDD. Compassion in agreeableness and intellect in openness negatively correlated with MDD. All facets of neuroticism positively correlated with MDD. All facets of extroversion, and all facets of conscientiousness except order, negatively correlated with MDD. Trust, straightforwardness, altruism, modesty, actions and values also negatively correlated with MDD	Fair
Rees et al (2005)	Australia	14	Psychiatric outpatients with a diagnosis of a non-OCD affective disorder Mean age = 38.59 (SD = 10.21) Proportions of sexes are not reported for the correlational analysis	MDD	BDI	NEO-PI-R Administered 240 items: complete questionnaire. Only performed correlations for facets competence and self-discipline	6 neuroticism facets: anxiety, angry hostility, depression, self-consciousness, impulsivity, vulnerability 6 extroversion facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, positive emotion 6 conscientiousness facets: competence, order, dutifulness, achievement striving, self-discipline, deliberation 6 agreeableness facets: trust, straightforwardness, altruism, compliance, modesty, tendermindedness 6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	Competence and self-discipline negatively correlated with MDD	Poor
Wolfstein & Trull (1997)	USA	143	Current depression: n=46; past depression: n=50; never-depressed control: n=47. Correlations performed on the entire sample.	MDD	IDD BDI	NEO-PI-R Administered 48 of 240 items: openness	6 openness facets: fantasy, aesthetics, feelings, actions, ideas, values	Aesthetics positively correlated with MDD	Fair



			Mean and standard deviation of age not reported 51.05% female						
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BDI = Beck Depression Inventory. BDI-II = Beck Depression Inventory – Second Edition. HamD = Hamilton Rating Scale for Depression. IAS = Illness Anxiety Scale. IDD = Inventory to Diagnose Depression. MINI = Mini-international Neuropsychiatric Interview. SCID = Structured Clinical Interview for DSM-IV. SPS = Social Phobia Scale. S-SAIS = Straightforward Social Interaction Anxiety Scale.

Personality measures: BFAS: Big Five Aspect Scale. NEO-IPIP = Neuroticism Extroversion Openness - International Personality Item Pool. NEO-PI = Neuroticism Extroversion Openness – Personality Inventory. NEO-PI-R = Neuroticism Extroversion Openness – Personality Inventory – Revised.

<sup>1</sup> This study compared the personality scores of the “major depressive disorders” group with population norms described by Costa & McCrea (1992). The vast majority of participants in this group had a diagnosis of MDD (788 out of 803 participants), therefore the results for this group are reported as associations between personality facets and MDD status.

<sup>2</sup> Kaplan et al (2015) consisted of two correlational studies

Table 2. Best evidence synthesis of personality aspects and MDD

	Personality aspect	MDD
Neuroticism	Withdrawal	++
	Volatility	±
Extroversion	Enthusiasm	±
	Assertiveness	±
Conscientiousness	Industriousness	--
	Orderliness	±
Agreeableness	Compassion	-
	Politeness	0
Openness	Openness (aspect)	0
	Intellect	-

MDD: Major Depressive Disorder

++ or - or 00      Strong evidence of a positive correlation (++) , negative correlation (- -) or no correlation (00) i.e. consistent findings in multiple studies “fair” methodological quality or in one study of “good” methodological quality

+ or - or 0      Weak evidence of a positive correlation (+) , negative correlation (-) or no correlation (0) i.e. in reported in one study of “fair” methodological quality, or consistently in multiple studies of poor quality

±      Conflicting evidence

Table 3. Best evidence synthesis of personality facets and affective disorders

Personality trait	Personality facet	Depressive disorders		Anxiety disorders						
		MDD	PDD	GAD	Social anxiety	Panic disorder	OCD	PTSD	IAD	Agoraphobia
Neuroticism	Anxiety	± (++)		+	++	+	+	+	+	
	Hostility	++		+	++	± (+)	+	+	+	
	Depression	++		+	++	± (+)	+	+	+	
	Self-consciousness	++		+	++	± (+)	+	+	+	
	Impulsivity	± (++)		+	++	± (+)	+	-	+	
	Vulnerability	++		+	++	± (+)	+	+	+	
Extroversion	Warmth	±		-	-	± (-)	-	-	0	
	Gregariousness	±		-	-	± (-)	-	-	0	
	Assertiveness	±		-	-	± (-)	-	0	-	
	Activity	±		0	-	0	0	-	-	
	Excitement-seeking	±		0	0	± (-)	0	-	0	
	Positive emotion	± (--)		-	-	± (-)	-	-	-	
Conscientiousness	Competence	--	--	--	--	±	--	--	-	00
	Order	±	00	±	±	±	00	±	0	00
	Dutifulness	± (--)	--	--	--	±	±	±	-	00
	Achievement striving	±	--	--	--	±	±	±	-	00
	Self-discipline	--	--	--	--	±	±	--	-	00
	Deliberation	±	--	00	±	00	±	±	±	0
Agreeableness	Trust	±		-	--	-	-	-	-	
	Straightforwardness	±		0	0	0	0	+	0	
	Altruism	±		-	-	0	-	0	0	
	Compliance	±		-	0	-	-	0	0	
	Modesty	±		0	+	0	0	+	-	
	Tendermindedness	±		0	+	+	+	+	-	
Openness	Fantasy	±		+	+	+	+	-	0	
	Aesthetics	±		0	0	0	+	-	0	
	Feelings	±		0	0	0	+	0	0	
	Actions	±		-	-	-	-	-	0	
	Ideas	±		0	0	0	0	-	-	
	Values	±		0	0	0	0	0	0	

MDD: Major Depressive Disorder. PDD: persistent depressive disorder. GAD: generalised anxiety disorder. OCD: obsessive compulsive disorder. PTSD: post-traumatic stress disorder. IAD: illness anxiety disorder

++ or - or 00 Strong evidence of a positive correlation (++) , negative correlation (- -) or no correlation (00) i.e. consistent findings in multiple studies “fair” methodological quality or in one study of “good” methodological quality

+ or - or 0 Weak evidence of a positive correlation (+) , negative correlation (-) or no correlation (0) i.e. in reported in one study of “fair” methodological quality, or consistently in multiple studies of poor quality

± Conflicting evidence

Blank cells indicate absence of evidence i.e. only studies of “poor” methodological quality, or lack of relevant information reported

Poor-quality studies investigated the associations between all personality facets and MDD, and between all personality facets and panic disorder. In cases where excluding poor-quality studies affected the results, the level of evidence when excluding poor-quality studies is shown in brackets

Supplementary table 1

Summary of results: associations between personality aspects and affective disorders

	Study	Allen et al (2018)	Quilty et al (2013)
	Affective disorder	MDD	MDD
Neuroticism	Withdrawal	0.29**	0.42**
	Volatility	0.09	0.59**
Extroversion	Enthusiasm	-0.07	-0.39**
	Assertiveness	-0.04	-0.29**
Conscientiousness	Industriousness	-0.13*	-0.50**
	Orderliness	-0.02	-0.19**
Agreeableness	Compassion		-0.13**
	Politeness		-0.03
Openness	Openness (aspect)		-0.03
	Intellect		-0.24**

\* Significant at  $p < 0.05$

\*\* Significant at  $p < 0.01$

Supplementary table 2

Summary of results: associations between personality facets and affective disorders

	Study	Friesen (2008) <sup>1*</sup>								Hayward et al (2013) <sup>2</sup>		Jourdy & Petot (2017) <sup>3</sup>	Kaplan et al (2015) Study 1	Kaplan et al (2015) Study 2	Kho0 & Simms (2018)	Naragon-Gailey & Simms (2017) <sup>4</sup>							Newby et al (2017) <sup>5</sup>	Osma et al (2016) <sup>6</sup>	Quilty et al (2013)	Rees et al (2005) <sup>7*</sup>	Wolfstein & Trull (1997) <sup>10</sup>
		Affective disorder	MDD	IAD	MDD <sup>†</sup>	GAD	Social anxiety	Panic disorder	PTSD	OCD	MDD	MDD	Social anxiety	Social anxiety	MDD	MDD	PDD	GAD	Social anxiety	Panic disorder	OCD	PTSD	Agoraphobia	Social anxiety	Panic disorder	MDD	MDD
Neuroticism	Anxiety	0.62**	0.60**	1.21*	2.04*	1.74*	1.68*	0.80*	1.70*	1.11**	0.40												0.50**	0.41*	0.54**		
	Hostility	0.56**	0.37**	0.91*	1.32*	0.96*	1.02*	0.35*	1.10*	1.07**	0.44**												0.37**	0.04	0.33**		
	Depression	0.43**	0.52**	1.95*	1.80*	1.79*	1.34*	0.97*	1.59*	1.16**	0.70**												0.50**	0.16	0.56**		
	Self-consciousness	0.57**	0.46**	1.10*	1.46*	2.23*	1.05*	0.38*	1.36*	1.06**	0.47**												0.61**	0.00	0.40**		
	Impulsivity	0.43**	0.26**	0.46*	0.61*	0.33*	0.38*	-0.27*	0.73*	1.11**	0.39												0.19**	0.14	0.16**		
	Vulnerability	0.40**	0.48**	1.58*	2.48*	2.00*	1.64*	0.88*	1.90*	1.12**	0.67**												0.50**	0.18	0.49**		
Extroversion	Warmth	0.14	-0.10	-0.84*	-1.27*	-1.64*	-0.70*	-0.81*	-0.97*	0.96	-0.27													0.11	-0.35**		
	Gregariousness	0.16	-0.06	-0.43*	-0.48*	-0.97*	-0.43*	-0.63*	-0.44*	1.00	-0.24													-0.09	-0.34**		
	Assertiveness	-0.09	-0.26**	-0.60*	-0.44*	-1.43*	-0.36*	-0.19	-0.73*	0.95*	-0.33													0.19	-0.18**		
	Activity	0.07	-0.12*	-0.62*	-0.55	-0.63*	-0.25	-0.34*	-0.11	0.93**	0.35													0.23	-0.26**		
	Excitement-seeking	-0.04	-0.10	-0.22*	-0.23	0.02	-0.45*	-0.53*	-0.16	1.03	0.09													-0.11	-0.17**		
	Positive emotion	-0.33**	-0.12*	-1.16*	-1.47*	-1.04*	-0.87*	-0.96*	-0.13*	0.95**	-0.35													0.06	-0.37**		
Conscientiousness	Competence		-0.28**	-1.01*	-1.63*	-1.54*	-0.77*	-0.57*	-1.14*	0.94*	-0.44*					-0.43**	-0.35**	-0.25**	-0.28**	-0.10	-0.22**	-0.39**	-0.03		-0.38**	-0.69**	
	Order		-0.03	-0.58*	-0.72*	-0.74*	-0.53*	-0.40*	-0.11	0.94*	-0.26					-0.08	0.01	0.03	-0.03	-0.01	0.00	-0.01	0.01		-0.08		
	Dutifulness		-0.21**	-0.66*	-0.50*	-0.56*	-0.49*	-0.21	-0.58*	0.94*	-0.37					-0.28**	-0.24**	-0.14*	-0.16*	0.00	-0.09	-0.26**	-0.04		-0.37**		
	Achievement striving		-0.21**	-0.81*	-0.67*	-1.00*	-0.55*	-0.03	-0.66*	0.97	-0.36					-0.30**	-0.23**	-0.14*	-0.22**	0.07	-0.09	-0.22**	-0.10		-0.31**		
	Self-discipline		-0.36**	-1.34*	-1.94*	-1.58*	-1.14*	-0.46*	-1.50*	0.93*	-0.45**					-0.34**	-0.25**	-0.21**	-0.21**	-0.09	-0.11	-0.27**	-0.05		-0.46**	-0.60*	
	Deliberation		-0.08	-0.19*	-0.13	-0.02	-0.16	0.36*	-0.09	0.96	-0.31					-0.27**	-0.22**	-0.08	-0.15*	-0.04	-0.18**	-0.30**	-0.05		-0.22**		
Agreeableness	Trust		-0.31**	-0.79*	-1.59*	-1.15*	-0.84*	-0.57*	-0.91*	0.95	-0.25	-0.20**	-0.22**												-0.30**		
	Straightforwardness		-0.07	-0.03*	-0.23	0.02	0.17	0.51*	-0.06	0.99	-0.05														-0.12*		
	Altruism		-0.09	-0.26*	-0.55*	-0.46*	-0.18	0.15	-0.39*	0.99	-0.30														-0.13*		
	Compliance		0.02	-0.33*	-0.70*	-0.10	-0.52*	-0.22	-0.48*	0.97	-0.03														-0.04		
	Modesty		-0.13*	0.51*	-0.29	0.48*	0.24	0.59*	0.06	1.02	0.14														0.18*		
	Tendermindedness		-0.12*	0.23*	-0.07	0.42*	0.29*	0.34*	0.42*	1.01	-0.14														-0.04		
Openness	Fantasy		0.40**	0.09	0.31*	0.52*	0.40*	0.58*	-0.46*	0.62*	1.00			-0.07											0.08		-0.01
	Aesthetics		0.34**	0.03	0.15*	0.17	-0.06	0.20	-0.41*	0.37*	0.99			0.00											-0.07		0.35*
	Feelings		0.37**	0.11	0.20*	0.03	-0.05	0.21	-0.09	0.29*	1.00			-0.10											0.03		0.14
	Actions		-0.18	-0.10	-0.17*	-0.58*	-0.74*	-0.37*	-0.48*	-0.55*	0.98			0.00											-0.26**		-0.15
	Ideas		0.12	-0.20**	0.02	0.12	-0.20	0.07	-0.48*	0.02	0.97			-0.14*											-0.04		0.02
	Values		0.12	0.08	0.32*	-0.02	-0.06	0.16	-0.23	0.22	0.99			-0.20**											-0.12*		0.08

\* Significant at p<0.05

\*\* Significant at p<0.01

Blank if not reported/investigated

<sup>1</sup>Data were collected at two times, measuring depression with both the Beck Depression Inventory and the Hamilton Depression Rating Scale. Correlations are reported for time 1, using the Beck Depression Inventory

<sup>2</sup>This study investigated correlations between personality facets and Health Anxiety and Health Behaviour, as subscales of the Illness Anxiety Scale. Correlations are reported for the Health Anxiety subscale

<sup>3</sup>This study only stated whether results were significant at p<0.05

<sup>4</sup>This study used Hedges' g effect size differences, comparing personality facet scores of psychiatric outpatients with population norms described by Costa & McCrea (1992)

<sup>5</sup>The vast majority of this subsample consisted of patients with major depressive disorder (N=788); this subsample also included several patients with persistent depressive disorder (N=12) and major depression not otherwise specified (N=3)

<sup>6</sup>This study used odds ratios, of depressed vs non-depressed participants

<sup>7</sup>This study only stated whether results were significant at the Bonferroni-corrected p<0.0016

<sup>8</sup>This study measured semipartial correlations between affective disorders and facets of conscientiousness, controlling for trait neuroticism

<sup>9</sup>This study measured social phobia with both the Social Interaction Anxiety and the Social Phobia Scale, with similar results. Correlations using the Social Phobia Scale are reported

<sup>10</sup>This study measured depression with both the Inventory to Diagnose Depression and the Beck Depression Inventory. Correlations using the Beck Depression Inventory are reported