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The Relationship Between the Big-Five Personality Traits and Depressive Symptoms: A Meta-Analysis

Parisa Chavoshi, *The University of Western Ontario*

Supervisor: Tremblay, Paul F., *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Psychology

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Abstract

Depression is one of the most common mental disorders worldwide. While multiple etiological factors contribute to depressive symptoms, personality traits have been hypothesized to play a crucial role. To determine the strengths of this association and provide a new approach compared to prior meta-analyses, we conducted a set of meta-analyses to examine the association of the Big-Five personality traits as the most widely accepted personality model and depressive symptoms. We also examined the effects of the facets of each personality dimension in addition to the effects of the moderating variables, including the proportion of females and the type of depression measures, to address the heterogeneity problem of depressive symptoms. A total of two hundred forty-three studies with correlations between personality and depressive symptoms from 2000 to 2022 were included. Depressive symptoms showed a significant positive correlation with Neuroticism and a significant negative correlation with Extraversion, Conscientiousness, and Openness. None of the moderators were found to be significant. While the analyses at the facet level provided valuable information, they should be explored further in the future.

Keywords

Personality traits, Big-Five, depressive symptoms, heterogeneity of depression, meta-analysis

Summary for Lay Audience

Depression is one of the most common chronic mental health problems that can create feelings of sadness, thoughts of hopelessness, and loss of interest in activities. Multiple factors contribute to developing depressive symptoms, and personality traits are among the factors that play an essential role. According to the Five Factor Model, there are five general personality traits (Neuroticism, Extraversion, Conscientiousness, Agreeableness, and Openness to Experience), and measures of these traits often include facets representing more in-depth aspects of each personality factor. Neuroticism refers to a tendency to experience negative feelings such as sadness, embarrassment, anger, and guilt. Extraversion refers to the extent people are sociable, outgoing, and energetic. Conscientiousness describes the extent to which people are careful, deliberate, self-disciplined, and organized. Agreeableness measures how well individuals get along with others and how they cooperate and interact within a team. Lastly, Openness to Experience describes the extent to which people enjoy new experiences and are imaginative and creative.

In this study, we investigated how these broad personality dimensions and their facets are associated with depressive symptoms. Therefore, we did a systematic search in research databases and gathered studies that had information on the relations between personality traits and symptoms of depression and conducted meta-analyses to provide overall summaries of the strength of these relationships. We also investigated whether the results depended on the specific depressive symptom measures and the gender composition of the samples. We found that depressive symptoms were associated with increases in the personality factor Neuroticism and decreases in all other personality

traits. Neuroticism had the strongest and Openness the weakest (close to 0) association with depressive symptoms. Further, no support was found for the influence of the type of depressive symptom measure or gender composition. While the analyses at the facet level provided valuable information, with many relationships that were expected, some of these results were not expected. Given that the facet-level analyses were based on a smaller number of studies (6-10) compared to the number of studies for the personality traits (243), it is recommended that future studies include facet-level information.

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1 Introduction

In recent decades, depression has been recognized as a severe health problem worldwide. According to the World Health Organization, depression is one of the most common mental disorders, and it is estimated that 300 million people of all ages worldwide suffer from depression (World Health Organization 2018). Major depressive disorder (MDD) is a significant public health problem that is characterized by symptoms of either sad mood or loss of interest in addition to five or more of the following symptoms: changes in appetite, changes in sleeping patterns, psychomotor changes, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, diminished ability to think or concentrate, and recurrent thoughts of death. As part of the diagnosis of MDD, these symptoms must exist for a period of at least two weeks and cause significant impairment in functioning (American Psychiatric Association, 2013).

Depression has been linked to a wide range of problems, from mortality risk by suicide and cardiovascular death to functional impairment and disability by decreasing workplace productivity and absenteeism (Theorell et al., 2015). It also significantly and negatively impacts the quality of life and causes a significant burden to both those afflicted and society (Lépine and Briley 2011). Therefore, considering the severe consequences of depression, it is crucial to investigate its etiological factors. It is important to note that the term depression is used in different ways. For example, it can be used as a general construct or as a diagnostic category, including MDD and other types of depression such as dysphoria and bipolar depression. The term depression is also often used in our common language and in research as a general state described by depressive symptoms. It should also be noted that a high score on a measure of symptoms

of depression does not by itself mean a diagnosis of depression. Therefore, while measures of depression such as the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) are valid indicators of a general depression construct, they do not refer to a diagnosis of depression. This thesis focuses on measures that assess symptoms of depression.

There is not a single necessary cause for depression or depressive symptoms, but multiple etiological pathways that can be organized within models of interacting factors such as the stress-diathesis model (e.g., Colodro-Conde et al. 2018). In terms of diathesis, personality traits have been associated with depressive symptoms, and understanding these associations has implications for elucidating etiology, identifying at-risk individuals, and tailoring treatment (Klein, Kotov, and Bufferd, 2010; Quilty et al., 2013; Bagby et al., 2008, 2016; Joyce et al., 2007; Zinbarg et al., 2008; Lengel et al., 2016). In fact, a number of meta-analyses have synthesized empirical studies investigating the association between personality traits and depressive symptoms (Kotov, Gamez, Schmidt & Watson, 2010; Hakulinen et al., 2015). However, these meta-analyses are dated, and it would be valuable to conduct an up-to-date meta-analysis and include a more detailed focus not only on major personality dimensions but also on their narrower facets. Also, no previous meta-analysis has investigated moderators, such as a comparison of the depressive symptom measures that were used in the studies. That is the aim of my research. In the following sections, I will begin by describing personality dimensions and their association with depressive symptoms and give a review of the previous meta-analyses on this topic. I will also discuss the moderators that I intend to investigate.

1.1 Personality Trait Dimensions and Measures

Personality traits are typically viewed to be relatively stable and consistent patterns of behaviour, attitudes, feelings and habits in individuals (McCrae & Costa, 2003). Both biologically based and social environmental factors explain these dispositions or personality traits. Evidence of a genetic influence is based on behavioural genetics of twin studies showing that the Big Five personality traits are estimated to have a heritability of 40-60% (e.g., Power & Pluess, 2015). Social factors such as how individuals have been raised, their early interpersonal experiences, or cultural influences also play essential roles in shaping these traits (e.g., Lazarus, 1961). As an example of personality trait taxonomy, I will discuss the Five-Factor Model (FFM) as the most widely accepted personality model, and then I will discuss how we expect these traits to be related to depressive symptoms. We will see that a large body of literature has investigated the association between the Big Five personality traits and symptoms of depression.

In the FFM, the broad personality domains consist of Neuroticism, Extraversion, Conscientiousness, Agreeableness and Openness to Experience. These reflect specific patterns of behaviour and experience, such as being sensitive to stress and negative emotional triggers for Neuroticism or a tendency to want to have several interpersonal relationships for Extraversion. Each personality trait represents a continuum, and individuals can fall anywhere on the continuum. For each of these five domains, narrower traits have been conceptualized, referred to as "facets," that reflect specific aspects of the broader domains. For instance, the widely used Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992b) breaks down the five domains into six facets.

These facets are as follows in the NEO; **Neuroticism**: Anxiety, Depression, Angry Hostility, Self-Consciousness, Impulsiveness, and Vulnerability. **Extraversion**: Warmth, Gregariousness, Assertiveness, Activity, Excitement-seeking, and Positive Emotions. **Conscientiousness**: Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, and Deliberation. **Agreeableness**: Trust, Straightforwardness, Altruism, Compliance, Modesty, and Tender-Mindedness. **Openness to Experience**: Fantasy, Actions, Aesthetics, Feelings, Ideas, and Values. Accordingly, there are different possible relationships between these broad and narrower personality traits and depression that will be discussed in this meta-analysis study.

1.2 The Relationships Between Personality Dimensions and Depressive Symptoms

Klein, Kotov, and Bufferd (2010) proposed the Classical Model of Personality-Depression Relations. They discuss seven major models that have been proposed to explain the association between personality and depressive symptoms. These models can be summarized in three different broad categories. The first three models, the **common cause**, the **continuum model**, and the **precursor model**, refer to the hypothesis that personality and depression have similar causal influences. In the common cause model, a personality trait and depression could be related because they have the same underlying etiologies or common features. For example, the common factor between Neuroticism and Depressive symptoms would include the frequent negative emotions and affect common to both. Specifically for Neuroticism and depressive symptoms, the common factor is certainly at play, as it is evident in the items that are used in self-report measures of both Neuroticism and depression. In other words, the items assessing negative affect are present in both.

Similar to the common cause model, the continuum model assumes that personality and depression have a similar etiology, and both exist on a continuum such that people who are diagnosed with depression would have the highest scores on a related trait such as Neuroticism. However, the trait-disorder relationship in this model is fairly specific and non-linear and is more like a diathesis-stress model that also considers the combination of other factors. In other words, individuals with an underlying diathesis such as specific personality traits (e.g., high scores in Neuroticism) are more likely to be predisposed to depressive symptoms than those without the diathesis to develop depressive symptoms when they are faced with stressful events.

The precursor model also proposes that personality and depression have similar etiological factors and views personality traits as precursors or early manifestations of depressive symptoms. This model posits a specific developmental sequence such that the personality traits (e.g., Neuroticism) have been assumed to be evident prior to the onset of depressive symptoms, and they escalate from traits to disorders in individuals over time.

The following two models discuss how personality has causal effects on the onset or maintenance of depression. **Predisposition** and **pathoplasticity** models suggest that personality plays a causal role in the onset of depression. Specifically, the predisposition model suggests that personality contributes to the "onset" of depression, and other variables mediate or moderate this link. However, the pathoplasticity model posits that personality influences the "expression" and variation in presentation of depressive symptoms after onset, which refers to the course of depression, outcomes or response to

treatment. For example, studies have shown that high neuroticism scores generally predict a worse response to treatment in depressed people (Mulder, 2002).

The last two models, the **concomitants model** and the **consequences or the scar model**, suggest that depression has a causal influence on personality. The concomitants model indicates that the individual's mood state colours the personality assessment. Hence, personality traits are altered during a depressive episode. However, this model implies that personality returns to a premorbid level after recovering from depression. It is also possible that experiencing a depressive episode leaves scars on individuals after a depressive episode such that it changes people's personalities which is referred to as the consequences or the scar model. However, even after recovery, the changes in personality persist over time.

1.3 Review of the Previous Meta-Analysis Studies

There have only been a few meta-analysis studies conducted on the relationship between personality traits and depression. Kotov, Games, Schmidt, and Watson's (2010) meta-analysis study reviewed associations between the personality domains in the Big Three (Eysenck's extraversion, neuroticism, and psychoticism) and Big Five models and specific depressive, anxiety, and substance use disorder. The meta-analysis included 175 studies published from 1980 to 2007, focusing on broad higher-order traits but not the lower-order traits. They analyzed three categories of depression; unipolar depression, specific dysthymic disorder, and MDD and the number of studies were $K = 18, 15,$ and $65,$ respectively. In their review, the correlations with MDD were most robust for Neuroticism, with a mean positive correlation of $.47$. Conscientiousness emerged as the second most powerful trait correlated with MDD with a correlation of $-.36$. Extraversion

appeared to be the third most powerful trait with a negative correlation of $-.25$ with MDD. However, associations between Agreeableness and Openness and depressive symptoms were not significant.

The meta-analysis of Hakulinen and colleagues (2015) is an individual-participant meta-analysis of 10 cohort studies. Accordingly, they pooled data from 10 prospective community cohort studies with 117,899 participants to examine the relationship between personality traits of the FFM and depressive symptoms. The main findings from the Hakulinen et al. (2015) meta-analysis study were in line with the Kotov et al. (2010) study, with Neuroticism being the most influential personality trait correlated with major depressive disorder. However, the associations of Extraversion and Conscientiousness were 72% and 75% smaller compared to the Kotov et al. meta-analysis (Hakulinen et al., 2015). This second meta-analysis found that the correlations with major depressive disorders (adjusted for age, sex, race and other personality traits) were $.37$ for Neuroticism, $-.07$ for Extraversion, and $-.09$ for Conscientiousness. They mentioned that the reasons for these differences between this study and the study done by Kotov et al. (2010) study are unknown; however, they stated it could be due to the methodological differences or publication bias that contributed to higher effects in previous meta-analyses.

Conducting a new meta-analysis on the relation between personality traits and depressive symptoms would be valuable for a number of important reasons. First, there is a need for a more up-to-date synthesis of the published empirical research in general. Second, the inclusion of facets in this thesis plays an important role in understanding the association between personality and depression. For example, although facets within a

personality domain are substantially intercorrelated, they are not identical and could have differing relations with depressive symptoms. For instance, although we would expect Conscientiousness to be associated with low depressive symptoms based on one of the previous meta-analyses, the facet Achievement Strivings is sometimes related to perfectionism, which in turn is sometimes positively related to depressive symptoms (Noble, Ashby, and Gnilka, 2014).

Third, meta-analytic procedures and software have improved over the years and provide improved flexibility for investigating moderators. Moderator variables within a meta-analysis are variables that influence the magnitude of the effect size of each study. The inclusion of moderators such as different depression measures (e.g., BDI-II vs. CESD) will be described in a later section on heterogeneity. Fourth, sample characteristics such as the proportion of females in the sample or the differentiation between university student samples vs. community samples can also be investigated as moderators. Fifth, meta-analysis methods and software easily implement the possibility of investigating potential bias due to the omission of null finding studies with tools such as funnel plots.

1.4 The Heterogeneity of Depression

Depression is highly heterogeneous even when using formal diagnostic criteria. For example, given that only five out of nine DSM-5 criteria are necessary for a diagnosis of depression, it is possible for two individuals with depression to share only one symptom. In other words, it is possible that two individuals have virtually nothing in common but both be eligible for a diagnosis of depression. (Dozois & Dobson, n.d.; Fried, 2017). A large body of scientific evidence has shown that depression is a

heterogeneous disorder with different sources of heterogeneity (Newson, Hunter & Thiagarajan, 2020; Hori et al., 2017; Fried & Nesse, 2015; Goldberg, 2011). There have been many attempts to subtype individuals with depression and parse depression into smaller subtypes. Therefore, depression encompasses several subtypes (e.g., persistent depressive disorder (PDD), psychotic depression, melancholic depression, atypical depression, recurrent depression, etc.). The subtypes heterogeneity of depression makes it possible to diagnose individuals with both MDD and PDD. These multiple diagnoses could imply that these two diagnoses are rooted in different etiological sources, which is not always true; therefore, it has been suggested not to make these distinctions between various subtypes of depression. As an alternative, it has been suggested to consider these disorders the waxing and waning of the same underlying sources and consider the severity and course of symptoms in order to prevent additional diagnoses.

Apart from the subtype heterogeneity, another source of heterogeneity of depression refers to different depressive symptom measures. This type of depression heterogeneity hinders progress in research (Fried, Flake & Robinaugh, 2022). Therefore, the current meta-analysis study will investigate the heterogeneity of depressive symptoms. In my thesis study, we will consider the type of depression measure as a moderator to see whether types of depression measure influences the strength or direction of the relationship between personality and depression. We expect different measures of depression to have a moderating impact because measures differ in the symptoms that are assessed. For example, the BDI-II includes an item on suicidal ideation, whereas the CESD does not. This difference alone seems to have a big impact on the definitions of concepts across measures.

1.4.1 Different types of depression measures

In this section, I will explain different depression measures used as moderators in this meta-analysis and represent the items/symptoms they target. There are a lot of inconsistencies in the scales that measure depressive symptoms. These inconsistencies in depression assessment tools cause a challenge when comparing studies, and while we do not know if this would have an impact on the correlations between personality traits and depressive symptoms, it is important to explore this. As our aim is only to explore different depression measures, we will compare the studies with a large number of depression measures. Here, I will describe the items in some of the depression measures.

The Beck Depression Inventory-II (BDI-II) scale is one of the most frequently cited measures in the literature to assess the presence and severity of depressive symptoms (Beck, Steer, & Brown, 1996; Joe et al., 2008). The BDI-II is a 21-item self-report questionnaire, and its items measure symptoms that correspond to the criteria for diagnosing depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). The items assessed by this type of depression measure are as follows: Sadness, pessimism, past failure, loss of pleasure, guilty feelings, punishment feelings, self-dislike, self-criticism, suicidal thoughts or wishes, crying, agitation, loss of interest, indecisiveness, worthlessness, loss of energy, changes in sleeping pattern, irritability, change in appetite, concentration difficulty, tiredness or fatigue, and loss of interest in sex.

The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) is another scale that measures depressive symptoms. The CES-D is a self-report questionnaire consisting of 20 items that ask how individuals have felt or behaved over

the past week. The items are as follows: I was bothered by things that usually don't bother me, I did not feel like eating; my appetite was poor, I felt that I could not shake off the blues even with help from my family or friends, I felt I was just as good as other people, I had trouble keeping my mind on what I was doing, I felt depressed, I felt that everything I did was an effort, I felt hopeful about the future, I thought my life had been a failure, I felt fearful, My sleep was restless, I was happy, I talked less than usual, I felt lonely, People were unfriendly, I enjoyed life, I had crying spells, I felt sad, I felt that people disliked me, and I could not get going.

Furthermore, the Hospital Anxiety and Depression Scale (HADS) (Snaith, 2003) is a self-administered measure used to screen for the presence of depression and anxiety. This measure has 14 items asking about the past week's mood. Seven items assess depression, including five items as indicators for anhedonia or an inability to experience pleasure and two items for appearance and feeling of slowing down. Also, there are seven items that measure anxiety, 2 of which assess panic and butterflies in the stomach, and the remaining 5 assess tension and restlessness (Dunbar, Ford, Hunt, & Der, 2000). These items are as follows: I feel tense or wound up, I feel as if I am slowed down, I still enjoy the things I used to enjoy, I get a sort of frightened feeling like 'butterflies' in the stomach, I get a sort of frightened feeling as if something awful is about to happen, I have lost interest in my appearance, I can laugh and see the funny side of things, I feel restless as I have to be on the move, Worrying thoughts go through my mind, I look forward with enjoyment to things, I feel cheerful, I get sudden feelings of panic, I can sit at ease and feel relaxed, and I can enjoy a good book or radio or TV program.

1.5 Delineating Hypothesized Relationships Between Personality Traits and Depressive Symptoms

Here I will closely examine the personality dimensions and their facets to explain my hypotheses. I will go into the details of the lower-order facets to base my hypotheses at the facet level instead of a general description of the higher-order traits (e.g., Extraversion). For some personality traits, some facets may act as a protective factor against depressive symptoms, while the other facets of the same trait act as a risk factor for depressive symptoms. It is important to note that although I hypothesize that some personality traits may influence depressive symptoms in this meta-analysis study, I recognize that much of the work is correlational and that I am limited in the cause-and-effect statements that I can make. It is also important to note that in some cases, the correlation between personality traits and depression could represent common causes, especially in the case of Neuroticism. Therefore, when we hypothesize a robust positive correlation between Neuroticism and depression, it is important to note that the relationship could be due to the conceptual overlap. In the following sections, I will describe my hypotheses in more detail.

1.5.1 Neuroticism

I hypothesized that Neuroticism would have a strong positive correlation with depression based on previous studies (e.g., Lyon, Juhasz, Brown & Elliott, 2020). Neuroticism is a fundamental domain of personality that predisposes individuals to experience negative affect, including anger, sadness, anxiety, irritability, and depression (Widiger & Oltmanns, 2017). Given the central importance of Neuroticism, it may not come as a surprise that this fundamental domain is evident within various predominant

models of personality, including the Big Five. Costa & McCrae (1995) present six lower-order facets of Neuroticism, including Anxiety, Depression, Angry Hostility, Self-Consciousness, Impulsiveness, and Vulnerability. It is important to note that there are different ways to measure Big Five personality traits, such as the NEO-PI-R and International Personality Item Pool. The facets we will review in this section are from the NEO-PI-R.

By looking at the Neuroticism facets, we expect a strong correlation with depressive symptoms because, as we will discuss, there is much conceptual overlap between the Neuroticism facets and depressive symptoms. Also, many Neuroticism measures, such as the NEO-PI, often include depression-like subscales (Costa, 1992). Meticulously investigating the Neuroticism facets, the Anxiety facet refers to a predisposition to be easily afraid, worried and tense and the extent to which people tend to interpret situations as dangerous or tense. This facet especially comes into play when an individual's needs or wishes do not come true as they would like to. The next facet of Neuroticism in NEO-PI-R is Depression, and I believe the label "Depression" in the NEO is not the best choice since it adds to the depression heterogeneity problem and blurs the definition of depression. High levels of this facet encompass a tendency to feel sad and to be discouraged. It refers to a disposition to feel guilt and have low motivation and energy when starting tasks. High levels of the Angry Hostility facet, another facet of Neuroticism, refer to a tendency to be irritable, the extent to which people are sensitive to being treated fairly and the tendency to feel anger and frustration quickly.

The next facet is Self-Consciousness; individuals with high levels of this facet are not comfortable in interpersonal communications and feel ashamed and shy in social situations. This facet refers to a tendency to be sensitive about people's negative evaluations. Individuals high in the Impulsiveness facet have difficulty controlling and resisting their impulses, urges, and temptations (e.g., food, cigarettes, sexual relations, etc.). Lastly, high levels of Vulnerability are related to the inability to cope with daily stressors. These individuals tend to have unhealthy responses to stress which makes symptoms of depression feel more intense. Therefore, by looking at these facets and their content, anticipating a strong correlation with depressive symptoms is almost guaranteed because of the overlapping constructs. Thus, all of these facets would be expected to correlate positively with depression.

1.5.2 Extraversion

According to the literature, we hypothesize that depression would have a significant negative correlation with Extraversion (Olawa & Idemudia, 2020; Klinger-König et al., 2018). The first facet of Extraversion that I will investigate is the facet of Warmth. High levels of this facet refer to individuals who make friends quickly, tend to be kind to people they know and do not know and have an easy time forming intimate relationships. The Warmth facet refers to a general desire to create friendships; therefore, they benefit from this social support that acts as a protective factor against depression. On the other hand, individuals low in this facet tend not to reach out to initiate a friendship and tend to remain more reserved. Gregariousness is the next facet of Extraversion, and individuals high on this facet are interested in relating to numerous people at the same time (e.g., at a party or in a crowd) since they like the stimulation they receive from

gathering with many people. Unlike the facet Warmth, which specifically looks at the tendency to closeness, the Gregariousness facet looks at the tendency to interact with many people.

The next facet, Assertiveness, refers to a predisposition to speak out, take charge, take control of activities and be the leaders in groups. Therefore, there is a high chance that these people build more self-esteem, which studies have shown to be negatively correlated with depression (Dai & Feng, 2008). High levels of the facet Activity refer to energetic, active individuals who tend to try to stay moving most of the time. I also expect this facet to be negatively related to depression, as fatigue or loss of energy is one of the symptoms of depression. High levels of the facet Excitement-seeking refer to individuals who are easily bored and are interested in experiencing high levels of stimulation. Last but not least, the Positive Emotions facet relates to mood and positive feelings. Therefore, individuals high on this facet have a lot of positive feelings, including happiness, joy, enthusiasm, and optimism, and this positive effect act as a robust protective factor against depression and, specifically, a sad mood. As we look at the facets of Extraversion, I expect that all of these items would negatively correlate with depressive symptoms.

1.5.3 Conscientiousness

The first facet of Conscientiousness in NEO-PI-R is Competence. This facet is related to the ability and tendency to accomplish things and achieve tasks. Individuals high in this facet believe they are competent and are in control of their lives. Individuals with depression often feel that they cannot control their lives, and this belief can evoke the feeling that they are worthless, which is a symptom of depression. The next facet is

Order; individuals high in this facet are well organized, whereas individuals low in this facet have a hard time making plans and are disorganized, which can act as a risk factor for depression. The next facet, Dutifulness, refers to an individual's strong sense of moral obligation. Individuals high in this facet are interested in rules and regulations, whereas individuals low in this facet are sometimes considered unreliable or irresponsible, which is a risk factor for depressive symptoms.

Next, we have the facet Achievement Striving, which is the facet I expect to move independently. Individuals with high levels of Achievement Striving tend to work diligently to achieve success and perform well in their fields. Whereas some levels of this facet are needed for career success, too high scores in this facet are related to perfectionism, which is a risk factor for depression (Egan, Wade, Fitzallen, O'Brien & Shafran, 2021; Noble, Ashby & Gnilka, 2014). Therefore, I expect this facet to be positively correlated with depression.

Self-Discipline is another facet of Conscientiousness, and individuals high in this facet tend to persist on tasks and stick to solving the tasks and problems. Lastly, the Deliberation facet refers to individuals who tend to be cautious, try not to make hasty decisions, and analyze the consequences of actions to avoid getting in trouble. I expect all of these facets to be negatively correlated with depression (Jenkins, Allison, Innes, Violanti & Andrew, 2018), except for the Achievement Striving facet, with a positive correlation.

1.5.4 Agreeableness

The first facet of Agreeableness in NEO-PI-R is the facet of Trust. Individuals high in this facet are predisposed to believe that people have good intentions and are

honest. They also tend to trust other people, whereas individuals low in facets tend to think of other people as potentially dangerous. Although some levels of this facet are beneficial to get along with people, too high scores can put people in trouble as they might easily trust individuals who do not have good intentions in reality. The next facet, Straightforwardness, is related to the tendency to manipulate in conversations and relationships instead of being sincere and candid. Individuals high in this facet tend to be frank, and my hypothesis for this facet is similar to the Trust facet, where although this facet can be beneficial to interpersonal relations, too high levels of it can make people vulnerable and act as a risk factor for depression. The next facet is Altruism, which refers to a tendency to help others. These individuals help others and have a positive attitude towards helping other people, and find it enjoyable to do so. People high in this facet tend to get along and cooperate reasonably with other people. Therefore, these people are able to build a social network that acts as a protective factor against depression (Domènech-Abella et al., 2017; Okamoto et al., 2011).

The next facet of Agreeableness is Compliance. Individuals high in facet tend to cooperate and compromise, whereas individuals who score low in this facet tend to be more competitive and concerned with their own needs. As the facet Compliance describes a person's ability to put other people's needs above their own, it is possible that people who score too high on this facet would let other people boss them, and they might compromise a lot that I expect to put people at risk for developing depressive symptoms. Modesty is the next facet of Agreeableness that refers to a tendency to claim to be better, and individuals who score too low in this facet might sometimes be viewed as arrogant. Since individuals scoring low on this facet do not tend to consider themselves superiors, I

expect this facet to have a negative correlation with depressive symptoms as they usually get along with others more easily. Lastly, the Tender-Mindedness facet refers to a predisposition to be compassionate and empathetic. Therefore, people who score high in this facet tend to have high sympathy towards other individuals. As this facet is generally related to a tendency to communicate with others, I expect this to be a protective factor against depression.

1.5.5 Openness to Experience

Individuals open to new experiences are more willing to embrace new things and ideas. The first facet of Openness to Experience in NEO-PI-R is the facet of Fantasy. Individuals high in this facet tend to often fantasize versus those who score low and rely more on factual information. I expect that people who score too high on openness to Fantasy engage in maladaptive daydreaming or fantasizing, which puts them at greater risk for depression as they might replay memories repeatedly in their head, causing a diminished ability to concentrate, which is a symptom of depression. Therefore, I expect this facet to have a positive correlation with depression. However, by looking at the facet of openness to Actions, I expect a negative correlation with depression (Carrillo, Rojo, Sánchez-Bernardos & Avia, 2001) since people low on this facet might be uncomfortable when their schedule changes; therefore, they might face challenges and not adapt to new experiences quickly and adequately.

The next facet, Aesthetics, refers to a deep appreciation of art and beauty. Individuals high on the facet of Feelings, another facet of Openness, have a good understanding of their feelings and can sincerely express them. The Ideas facet refers to a tendency to be interested in intellectual challenges. Lastly, the Values facet refers to the

readiness to review personal values. I do not expect the facets of Aesthetics, Feelings, Ideas and Values to negatively correlate with depression.

1.6 The Present Project

The aim of this meta-analysis is to fill the gap in the relationships between personality traits and depression, incorporating some novel meta-analytic steps. My primary aim is to gather studies with correlation data on each of the Big Five personality traits and facets and conduct a separate analysis for each dimension and facet. I also intended to include the Honesty-Humility domain and facets from HEXACO, which is, to some extent, an additional personality factor that the Big Five Factor model does not incorporate. However, there have been very limited studies on HEXACO and depression (just one unpublished study out of 243 studies that I coded for 2022 to 2000). Therefore, I had to adjust the study and not include the HEXACO.

I also want to consider the type of depression measure as a moderator to refer to the heterogeneity of depression measures to explore if we get different results for various measures. Lastly, one of the vital aims of this meta-analysis is to emphasize the importance of taking into account the facets when discussing broad personality traits and their relation to depressive disorders. As previously discussed in the hypotheses section, there are several different ways that facets can relate to depressive symptoms. Subsequently, the research question is whether different results would emerge for these different possible relationships. Thus, by investigating the existing literature, we want to clarify the specific facets that contribute to the differences in depressive symptoms. Furthermore, I wanted to see if this relationship would be stronger/weaker when entering a particular depression measure as a moderator.

Concerning the existence of various measures, there are also different measures that assess personality dimensions or their facets that will likely be used in the meta-analysis, and I will provide a brief description of them. The NEO-PI-R was developed and revised a number of times by Costa and McCrae (Costa & McCrae 1985; McCrae & Costa, 2010), and in addition to the five personality dimensions, the NEO-PI-R includes six facets for each dimension. NEO-FFI was also developed by Costa and McCrae (McCrae & Costa, 2004). However, this measure only assesses the personality domains and does not include the facets. The Big Five Inventory-44 (BFI-44) was developed by Oliver John (John, Donahue & Kentle, 1991), focusing on measuring the Big Five dimensions. The Eysenck Personality questionnaire was developed by Hans J. Eysenck (Eysenck, 1964) and measures two dimensions Extraversion-Introversion (E) and Neuroticism-Stability (N). The International Personality Item Pool (IPIP) was developed by John A. Johnson (Johnson, 2014; Goldberg, 1999). The IPIP includes the personality dimension as well as the personality facets. The Ten-Item Personality Inventory (TIPI) was created by Sam Gosling, Jason Rentfrow, and William Swan (Gosling et al., 2003) and only measures the Big Five traits. Finally, The Mini-Markers created by Goldberg included the Big-Five factors (Saucier, 1994).

2 Method

The current study used a meta-analysis to investigate the effect size of personality traits on depressive symptoms and to investigate the influence of moderators such as the type of depressive symptom measure. In this thesis, the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement was used to help conduct the meta-analysis. In the following sections, I will describe the different steps of conducting this meta-analysis, such as literature search, selecting the studies to include, the procedure of data coding, and data analysis. I have preregistered the study in the Open Science Framework (OSF), and the screenshots of the preregistration are presented in Appendix E.

2.1 Literature Search

Databases and other sources. The following databases were searched concurrently within ProQuest: APA PsycInfo, ERIC, MEDLINE, and ProQuest Dissertations and Thesis Global to also include findings of unpublished studies relevant to this meta-analysis study.

Keywords. The following keywords were used to perform a comprehensive literature search for the meta-analysis:

(ti(personality) OR ti,ab,if("big five" OR "five factor" OR "personality traits" OR "personality facets" OR "personality dimensions" OR "personality scales" OR "personality measures" OR HEXACO OR NEO-PI-R))AND ti,ab,if(depress* OR BDI*)

The above keywords include not only the titles but the abstract and keywords. We have experimented with several keyword combinations to ensure that we would capture

all the relevant articles. In fact, the current keywords are overly inclusive of studies that will not be usable.

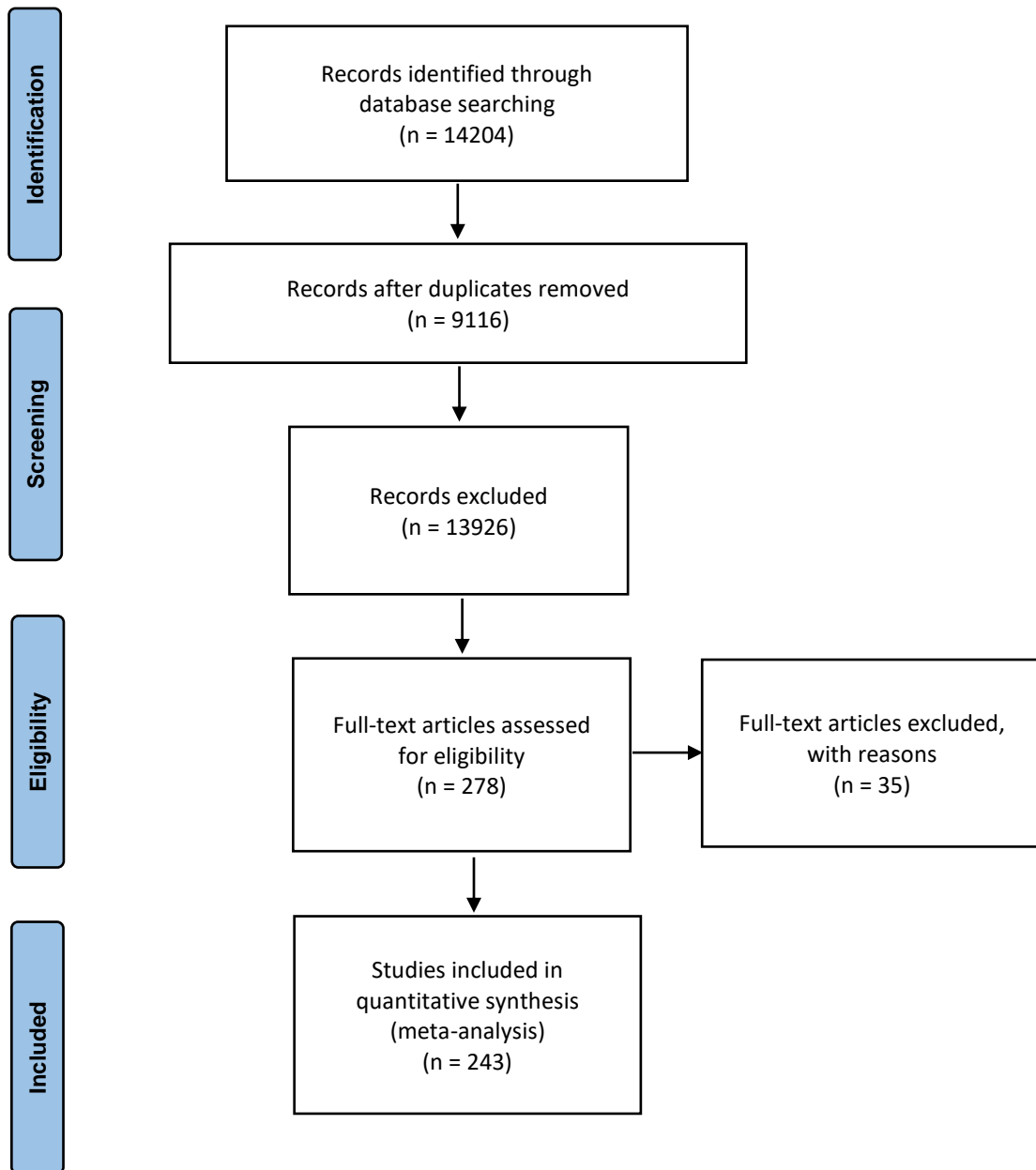
2.2 Inclusion and Exclusion Criteria

Studies gathered in this meta-analysis were eligible if they had the following inclusion criteria: *Types of studies to be included.* Correlational, *Main outcome.* Depressive symptom measures. *Explanatory variables.* Self-report of personality traits including major dimensions (e.g., Five-Factor Model (i.e., Big Five) or six-factor models (i.e., HEXACO) and facets. *Samples.* In terms of the targeted population, this study focused on adolescents, young adults, middle-aged and older adults. Concerning the exclusion criteria, personality disorder measures such as borderline personality disorder and scales that assess personality disorders and other DSM-based measures such as Millon Clinical Multiaxial Inventory or MMPI were not included.

2.3 Selecting the Studies to Include

Following the PRISMA method protocol, as seen in the Figure 2-1, I first went through all the titles and abstracts identified by the key search terms to identify relevant studies. Second, I removed the duplicates. Third, I identified and excluded studies that did not meet our criteria. In the fourth stage, I looked at the full-text articles to check if they were eligible and code the information. At this stage, I have again excluded many studies, mainly studies that do not provide the necessary information. In the fifth stage, I looked at the coded studies and decided which ones should be added or excluded in the meta-analysis to reach the point where I could determine the included studies.

Figure 2-1 PRISMA Flowchart of Meta-Analysis Phases



Concerning the large set of abstracts, I have divided the downloaded studies into different years separately to simplify the process. The entire selection of abstracts from 2022 to 2000 was downloaded within ProQuest and coded. A separate Excel file was downloaded for each year to screen the abstracts and full-text documents. The titles of studies were ordered alphabetically in the Excel files in order to identify the duplicates and the databases they come from. A new variable was created in the databases to indicate the status of the cases using the following codes:

0 = duplicate.

1 = selected. This means that the study had useful information, and we downloaded the article.

2 = not selected because no relevant information/ the correlations were not available.

3 = not selected because the journal article was not available.

4 = not selected because the article was not translated.

5 = not selected, unsure.

For this preliminary coding, I have worked simultaneously with the Excel file and the results in ProQuest. First, I looked at the abstracts to see if they looked promising and had some relevant information, then I opened the articles with relevant information electronically to check for usable information. I wrote a code in the Excel file as above and a short reason for not selecting the abstract for each study. The selected studies were downloaded in folders for each year. This procedure was conducted for each year, and the selected studies were saved into a smaller Excel file to use for the next coding stage.

2.4 Data Coding

After searching the literature and screening the cases, the final step is to code the selected studies. We used version 2.2 of the JAMOVI project (2021), retrieved from <https://www.jamovi.org>. The MAJOR module was used to conduct the meta-analysis, which is based on the R metafor package (Viechtbauer, 2010). This module was developed by Kyle Hamilton, and information can be found at <https://github.com/kylehamilton/MAJOR>. The selected studies were coded for different information such as authors, year of the study, sample size, correlations, type of personality and depression measures, and ethnicity.

2.5. Reliability

The interrater reliability was calculated by having a second coder for studies of the year 2003. Cohen's Kappa was calculated as .49, which is considered moderate, but the results indicated that a small proportion of studies were missed. Given the large set of studies that have been included in the meta-analysis, these omitted studies represent a small proportion of the total population of studies and would have minimal impact on the overall results, given the very large number of studies that were included. Evidence of this comes from the funnel plots, which will be discussed in the results and indicate no systematic bias in omitted studies. Prior to submission of this meta-analysis for publication in a peer-reviewed journal, we intend to do an updated iteration of the analysis, including a complete inspection of all the years by a second coder.

2.6 Statistical Analytic Methods

We will most likely use a random-effects model. While fixed-effects models assume the exact same population value for all studies in the meta-analysis, random-effect: assumes that instead of one overall population value, it is more realistic to think about a set of population values that can be averaged. models allow differences among studies and participants to vary across studies (Schmidt, Oh, and Hayes, 2009). Therefore, we will use a random-effects model as a recommended meta-analytic approach to consider the differences between studies.

2.7 Description of the NEO-PI Facets

The following paragraphs are indented to provide information on the six facets of each of the five personality domains. These descriptions of the facets are based on the NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992b).

The Neuroticism facets are as follows in the NEO; *(N1) Anxiety*. Anxious individuals are fearful, nervous, tense, and have a tendency to worry. *(N2) Angry Hostility*. Angry hostility reflects the tendency to experience anger and related states such as frustration and bitterness. *(N3) Depression*. This scale measures individual differences in the tendency to experience feelings of guilt, sadness, hopelessness, and loneliness and their readiness to be discouraged. *(N4) Self-Consciousness*. Self-conscious individuals have feelings of shame and embarrassment, are uncomfortable around others, and tend to feel inferior. *(N5) Impulsiveness*. Impulsiveness demonstrates an inability to control cravings and urges. These individuals cannot resist their desires (e.g., for food, cigarettes, possessions), despite regretting them later. *(N6) Vulnerability*. Vulnerable people believe

that they are not able to cope with stress, be dependent, and tend to panic during emergencies.

The Extraversion facets are as follows in the NEO; *(E1) Warmth*. The core of this facet is mainly about interpersonal intimacy. Warm people form close attachments to others and tend to be affectionate and friendly. *(E2) Gregariousness*. Gregarious people enjoy the company of other people and believe in the slogan “the more, the merrier”. *(E3) Assertiveness*. This scale assesses the extent to which people are dominant and forceful. They are often the group leaders and speak without hesitation. *(E4) Activity*. Active people need to keep themselves busy and have a fast-paced life. *(E5) Excitement-Seeking*. This facet measures a willingness to get excited, stimulated, and enjoy noisy environments. *(E6) Positive Emotions*. Positive Emotions refer to the tendency to experience positive emotions such as joy, happiness, love, and excitement. It is also related to the degree people are cheerful and optimistic.

The Conscientiousness facets are as follows in the NEO; *(C1) Competence*. Competence refers to a belief that one is capable, sensible, and effective. This scale measures a sense of being well-prepared to deal with life. *(C2) Order*. High scorers on this scale are neat, tidy, and well-organized and like to keep things in their proper places. *(C3) Dutifulness*. This scale speaks about an inclination to adhere to ethical principles and moral obligations strictly. Individuals high in this core are more likely to be seen as dependent and reliable. *(C4) Achievement Striving*. This facet measures a proneness to work hard to achieve goals. High scores are diligent, purposeful and have a sense of direction in life. However, very high scorers might invest too much in their careers and become workaholics. *(C5) Self-Discipline*. Self-Disciplined individuals are able to begin

and complete tasks even if the task seems boring or there are other distractions. These people can motivate themselves until the job is done. *(C6) Deliberation*. Deliberation refers to the ability and tendency to think carefully and consider a decision's consequences before acting.

The Agreeableness facets are as follows in the NEO; *(A1) Trust*. This facet assesses people's propensity to believe that others are honest and well-intentioned. *(A2) Straightforwardness*. High scores are frank, sincere, and ingenuous and do not like to manipulate others through flattery and deception. *(A3) Altruism*. Individuals high in this facet are concerned about others' welfare and are willing to assist people in need of help. *(A4) Compliance*. This facet measures a tendency to defer to others, inhibit aggression, and forgive and forget. *(A5) Modesty*. Modesty represents a tendency to be humble and self-effacing. *(A6) Tender-Mindedness*. Measures attitudes of sympathy and concern for others.

The Openness to Experience facets are as follows in the NEO; *(O1) Fantasy*. Individuals open to fantasy have a vivid imagination and tend to elaborate on their fantasies. They like to daydream in order to create a rich life and an interesting inner world for themselves. *(O2) Aesthetics*. Aesthetics refers to having a deep appreciation for art and beauty. High scores are highly inspired by poetry and music and intrigued by art, even if they do not have artistic talent. *(O3) Feelings*. Openness to feelings refers to the receptivity and evaluation of one's own feelings and emotions. High scorers tend to have more differentiated emotional states. *(O4) Actions*. Openness to Actions implies a willingness to try different activities and go to new places and a tendency to prefer novelty and variety over routines. *(O5) Ideas*. Openness to Ideas demonstrates an active

pursuit of intellectual interests and a willingness to consider new, perhaps unconventional, ideas. However, this facet does not necessarily mean high intelligence; it can contribute to the development of intellectual potential. (*O6*) *Values*. Lastly, Openness to Values assesses the readiness to re-evaluate social, political, and religious values.

3 Results

In this section, I will present the meta-analysis results of the correlations between depressive symptoms and the Big-Five personality domains and their facets. I will also discuss the results of the moderation analyses by type of depression measure and by the proportion of females in the samples. A random-effects meta-analysis model was used. The application of fixed-effects models depends on assuming that samples are homogeneous or come from the same population. However, a random-effects model does not hold this assumption; rather, it takes into account the heterogeneity of the effect sizes across samples and assumes that instead of one overall population value, it is more realistic to think about a set of population values that can be averaged. The analyses were carried out using the Fisher r -to- z transformed correlation coefficient as the outcome measure. This approach can be used when pooling correlation coefficients because the distribution of high correlations is somewhat skewed. The meta-analytic pooled coefficients were then reconverted in the correlation metric. The amount of heterogeneity (i.e., τ^2) in the individual study effect sizes was estimated using the restricted maximum-likelihood estimator (Viechtbauer 2005).

3.1 Personality Dimensions

The results of the meta-analysis for each of the Big Five personality dimensions are presented in Table 3-1. The effect sizes were evaluated using the Fisher z transformed correlations. The table shows the mean values across all studies of Fisher z transformed correlations (r_z) with confidence intervals and tests of significance. We also converted the r_z mean values back to r . τ^2 (i.e., τ^2) represents the population variability in the effect sizes (i.e., r_z) of the individual studies. The publication bias was also tested using the

funnel plots presented in Appendix A. In these plots, evidence of bias would exist in very asymmetric distributions of study points on both sides of the mean effect size, suggesting the omission of studies with non-significant results. However, as seen in Appendix A, all the funnel plots for the Big Five dimensions of personality show a relatively symmetric distribution and no evidence of bias.

Table 3-2 Meta-analysis statistics for each scale of the Five Dimensions of Personality

Scales	<i>k</i>	<i>r_z</i> (<i>p</i> -value)	95% CI for Lower Bound	95% CI for Upper Bound	<i>r</i>	τ^2 (<i>p</i> -value)
Neuroticism	234	0.5320 (0.001)	0.5052	0.5589	0.487	0.0385 (0.0001)
Extraversion	210	-0.2742 (0.001)	-0.2956	-0.2528	-0.268	0.0200 (0.0001)
Agreeableness	170	-0.1973 (0.001)	-0.2189	-0.1756	-0.195	0.0161 (0.0001)
Conscientiousness	179	-0.2387 (0.001)	-0.2611	-0.2163	-0.234	0.0186 (0.0001)
Openness	167	-0.0884 (0.001)	-0.1104	-0.0663	-0.088	0.0164 (0.0001)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.1.1 Neuroticism

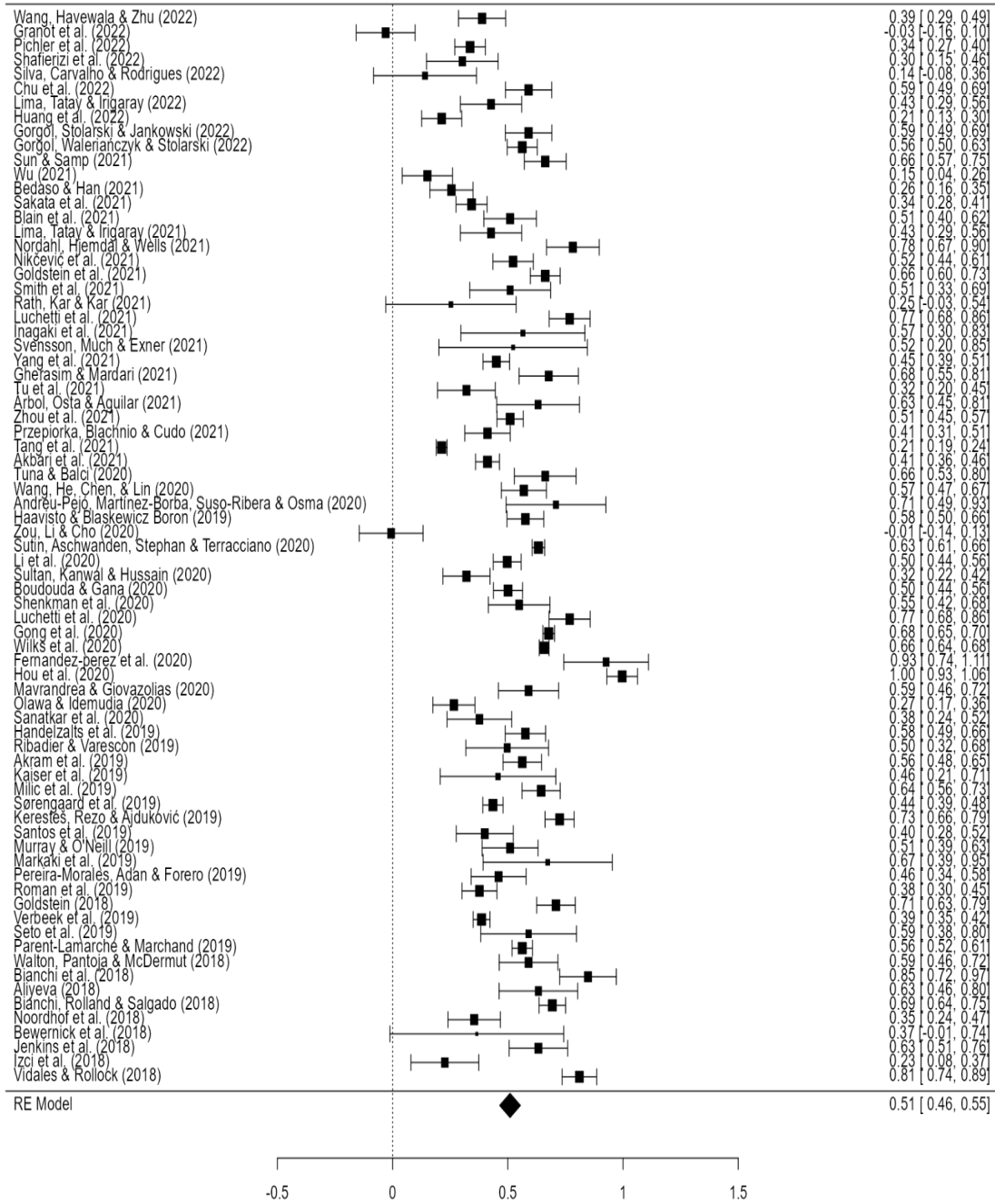
A total of $k = 234$ studies were included in the meta-analysis of the correlation between Neuroticism and depressive symptoms. The overall correlation coefficient was $r = .487$ and significantly different from 0. We can also see very narrow confidence intervals of the r_z values due mainly to the very large number of studies. The $\tau^2 = 0.0385$ represents the variability of effect sizes across studies. The square root of $\tau^2 = 0.1962$, which is a standard deviation, provides an idea of the expected deviation of a study from

the overall average correlation (r_z). The forest plot of individual study correlations for Neuroticism is presented in Figure 1. In all forest plots, each row presents a title of the study, the value of the r_z with confidence intervals, and a box with whiskers and hinges. Studies that have large sample sizes have smaller confidence intervals and larger boxes to show that they have more weight in the meta-analysis. Note that the axis at the bottom of the plots goes up to 1.5 because we are using r_z for the plot. Bewernick et al. (2018) and Oliveira Chardosim et al. (2018) had the smallest sample sizes, $N = 30$, and the Andreassen et al. (2018) study had the largest sample size, $N = 23537$. (This range of sample sizes for the studies also applies to the other four personality dimensions.)

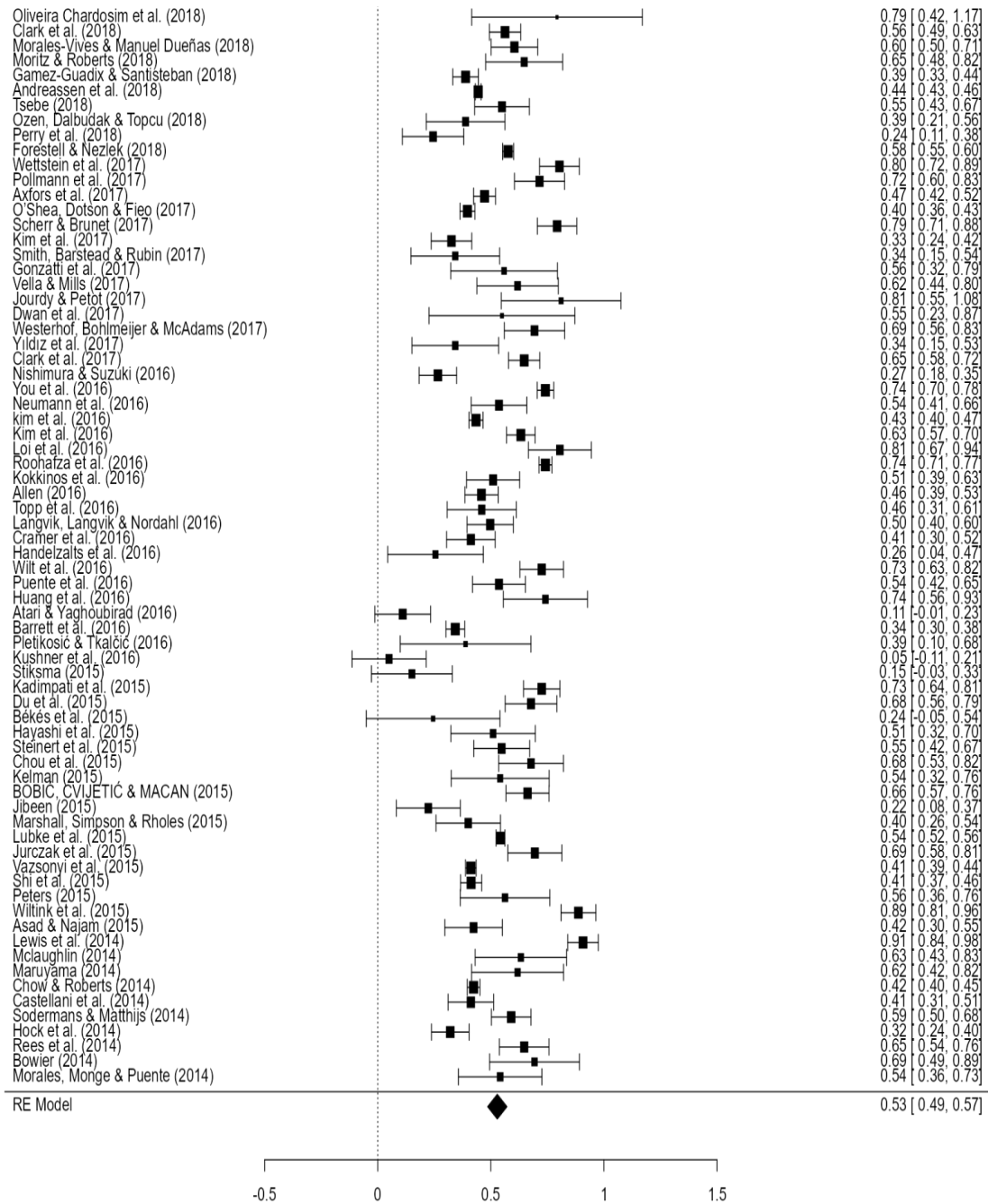
Any strange result for a given study, such as a correlation that differs largely in direction and magnitude from the other studies, could potentially represent an outlier and be removed. An example of this is the study by Duberstein et al. (2001), with a value of Neuroticism $r = -.290$. However, we opted not to remove any studies from the analyses at this stage, considering that they will not have a substantial impact due to the large number of studies.

Different types of personality measures were used across studies. Most of them used the NEO-FFI ($n = 71$), BFI-44 ($n = 43$), and NEO-PI ($n = 38$). Other personality measures that were frequently used are as follows: EPI ($n = 16$), IPIP ($n = 7$), IPIP-mini ($n = 7$), TIPI ($n = 6$), Mini-Markers ($n = 5$), and BFI-10 ($n = 3$). There were also various depression measures used across studies, with the majority use of CES-D ($n = 50$). Other depression measures that were frequently used are as follows: BDI-II ($n = 23$), HADS ($n = 22$), BDI ($n = 20$), PHQ-9 ($n = 15$), EPDS ($n = 12$), DASS ($n = 7$), GDS ($n = 6$), DASS-21 ($n = 5$), PHQ-8 ($n = 3$), HDRS ($n = 4$), and SDS ($n = 3$).

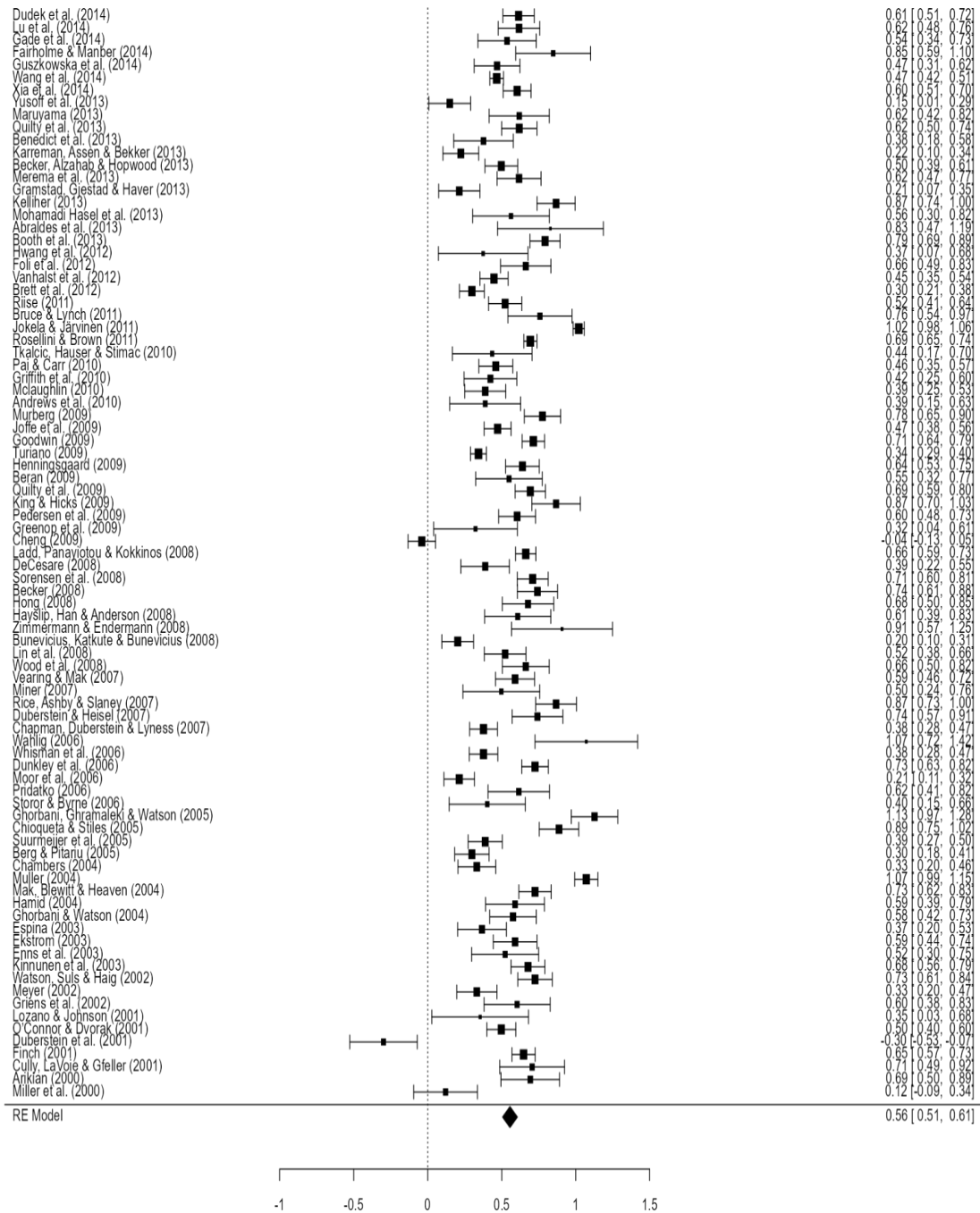
Figure 3-1 Forest Plot for Neuroticism



Note: Neuroticism part 1. Diamond above the bottom r_z axis represents the average r_z value for the entire set of studies (i.e., part1 + part2 + part3)



Note: Neuroticism part 2

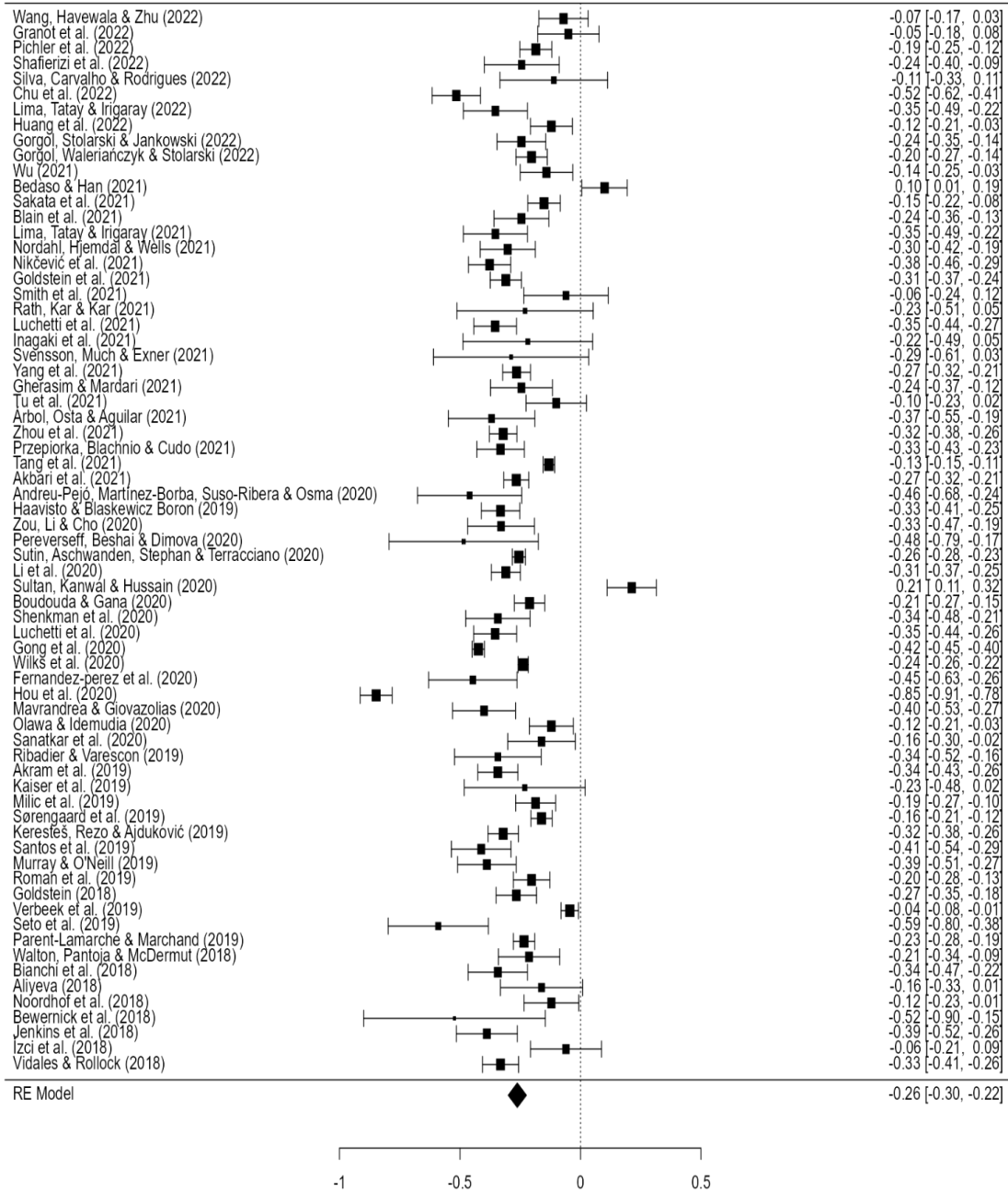


Note: Neuroticism part 3

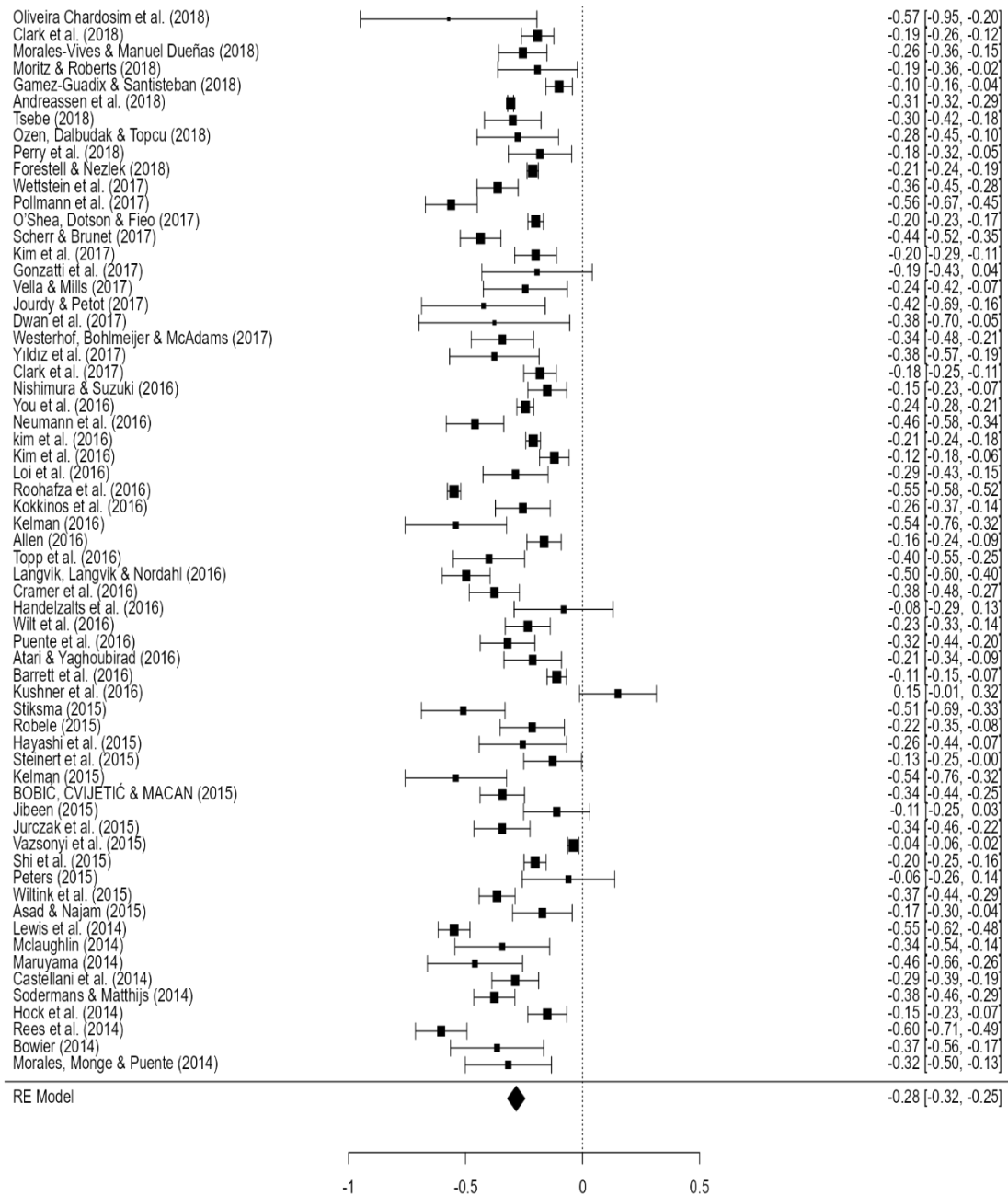
3.1.2 Extraversion

A total of $k = 210$ studies were included in the Extraversion analysis, and the overall correlation coefficient effect size between Extraversion and depressive symptoms was $r = -.268$ and significantly different from 0. The $I^2 = 0.0200$ represents the variability of effect sizes across studies. The square root of $I^2 = 0.141$, which is a standard deviation, provides an idea of the expected deviation of a study from the overall average correlation (r_z). The forest plot of individual study correlations for Extraversion is presented in Figure 2. There were only a few studies with positive correlations (6 out of 210) in the Extraversion analysis ranging from $r = 0.030$ to 0.210 . As shown in Figure 2, four of these studies included 0 in their confidence intervals and are not significant (Kushner et al., 2016; Karreman, Assen & Bekker, 2013; Cheng, 2009; Storer & Byrne, 2006). Nevertheless, these studies were not considered outliers, as we did not want to rule out the possibility of legitimate positive correlations between Extraversion and depressive symptoms in some cases. Moreover, these studies were individually inspected, and no obvious problems were detected.

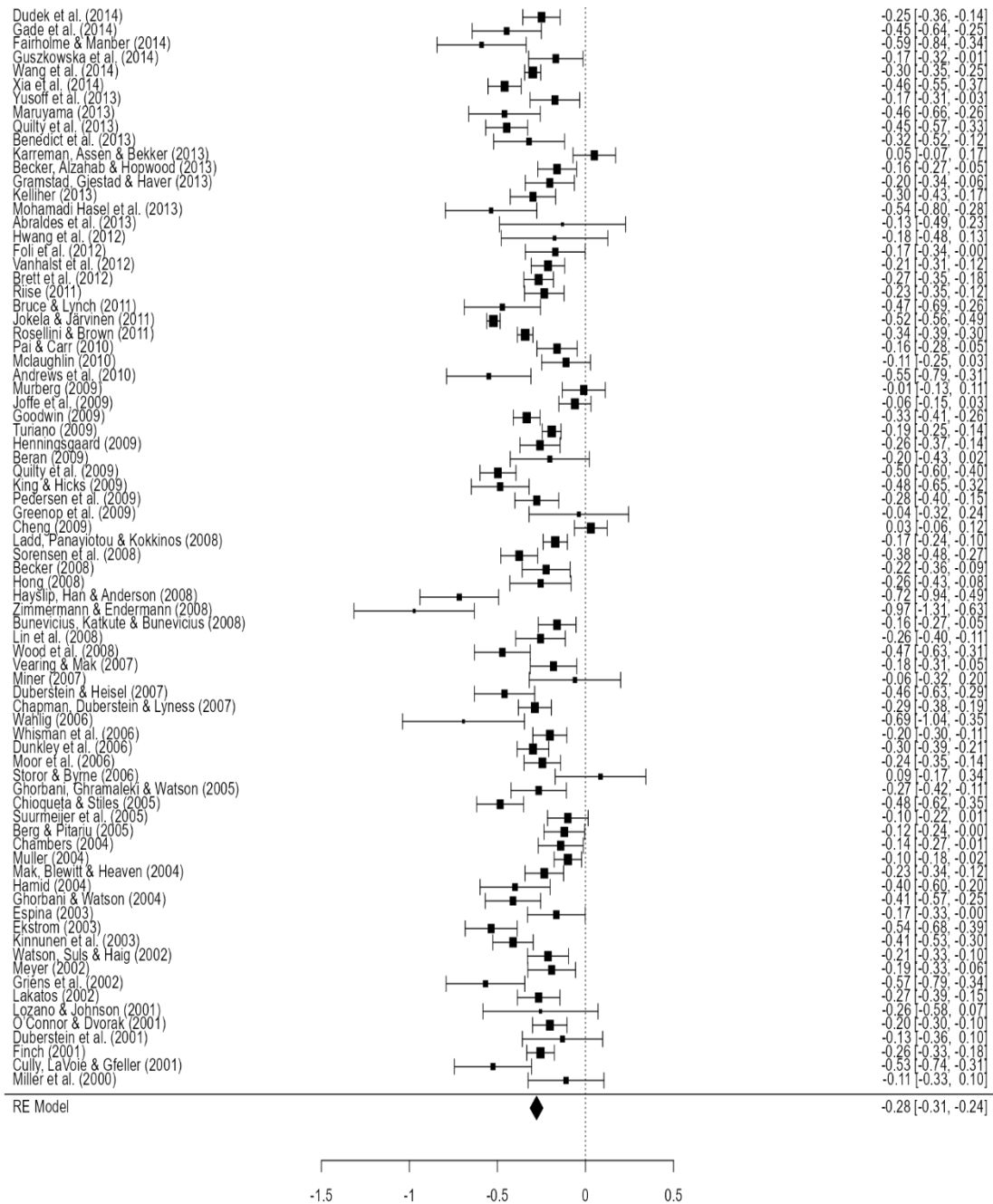
Figure 3-2 Forest Plot for Extraversion



Note: Extraversion part 1



Note: Extraversion part 2

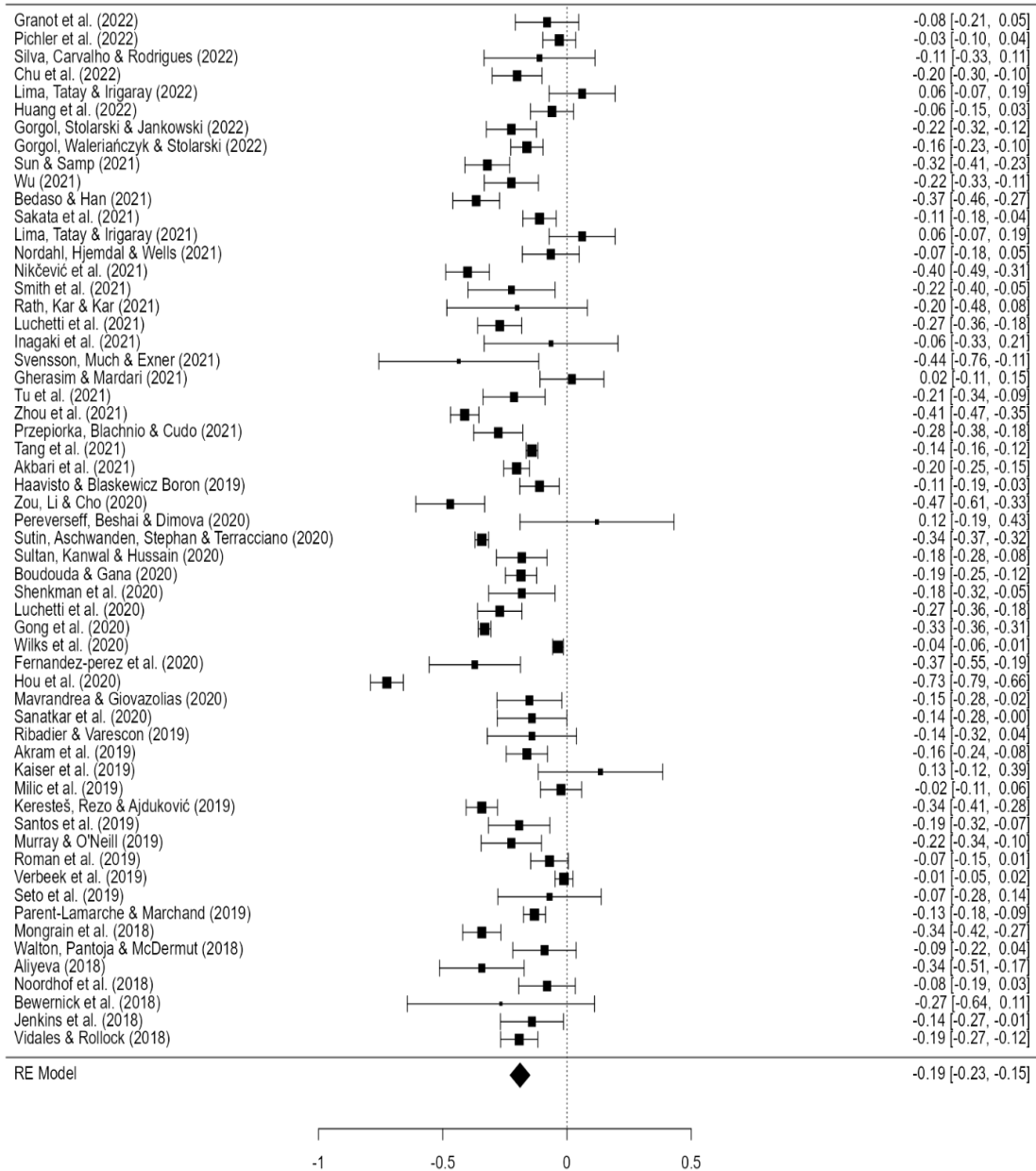


Note: Extraversion part 3

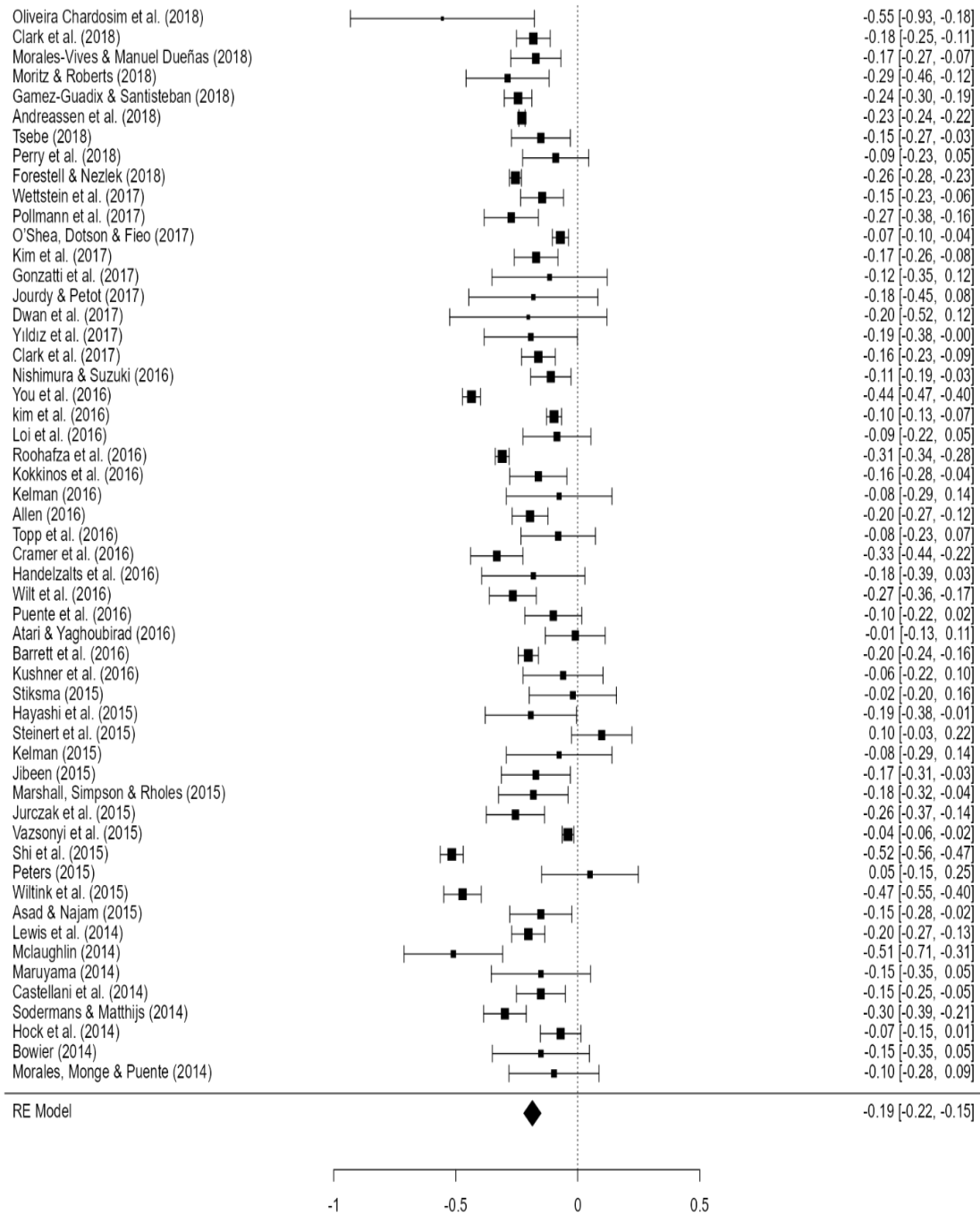
3.1.3 Agreeableness

A total of $k = 170$ studies were included in the Agreeableness analysis, and the overall correlation coefficient effect size between Agreeableness and depressive symptoms was $r = -.195$ and significantly different from 0. The $I^2 = 0.0161$ represents the variability of effect sizes across studies. The square root of $I^2 = 0.126$, which is a standard deviation, provides an idea of the expected deviation of a study from the overall average correlation (r_z). The forest plot of individual study correlations for Agreeableness is presented in Figure 3. As can be seen in the forest plot, there were a few studies that had r_z values in the positive direction, but with values close to 0 and with wide confidence intervals due to small sample sizes.

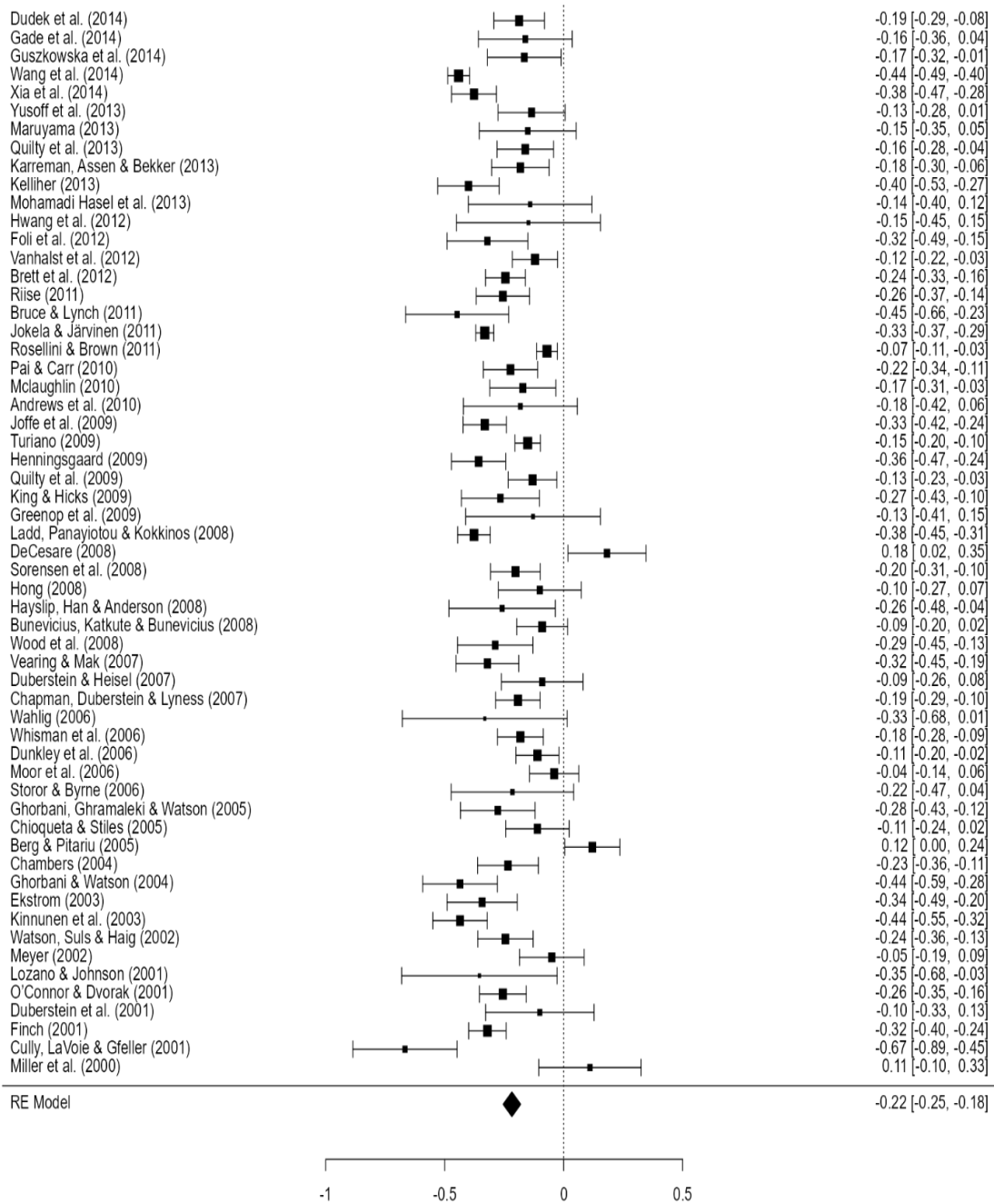
Figure 3-3 Forest Plot for Agreeableness



Note: Agreeableness part 1



Note: Agreeableness part 2

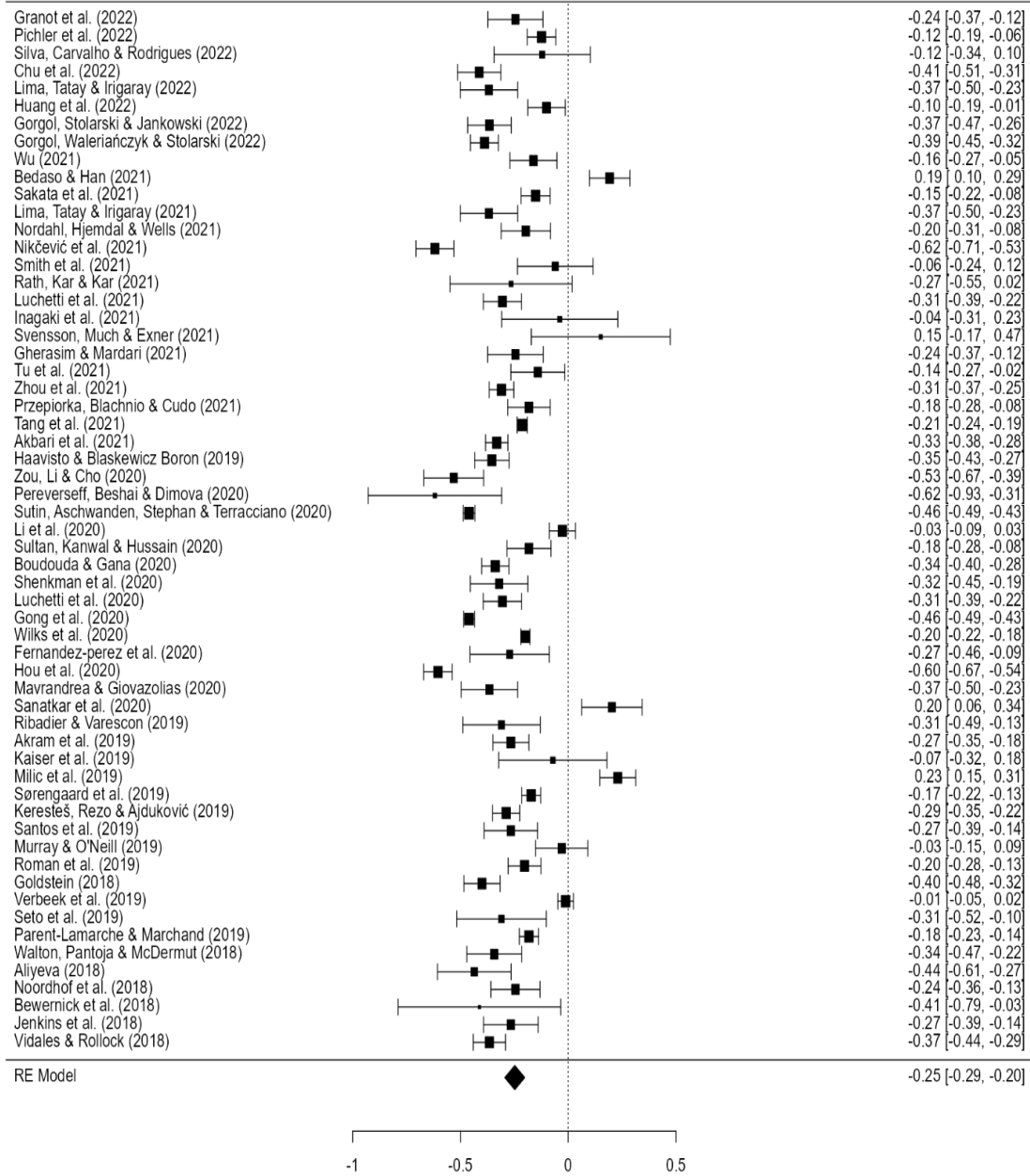


Note: Agreeableness part 3

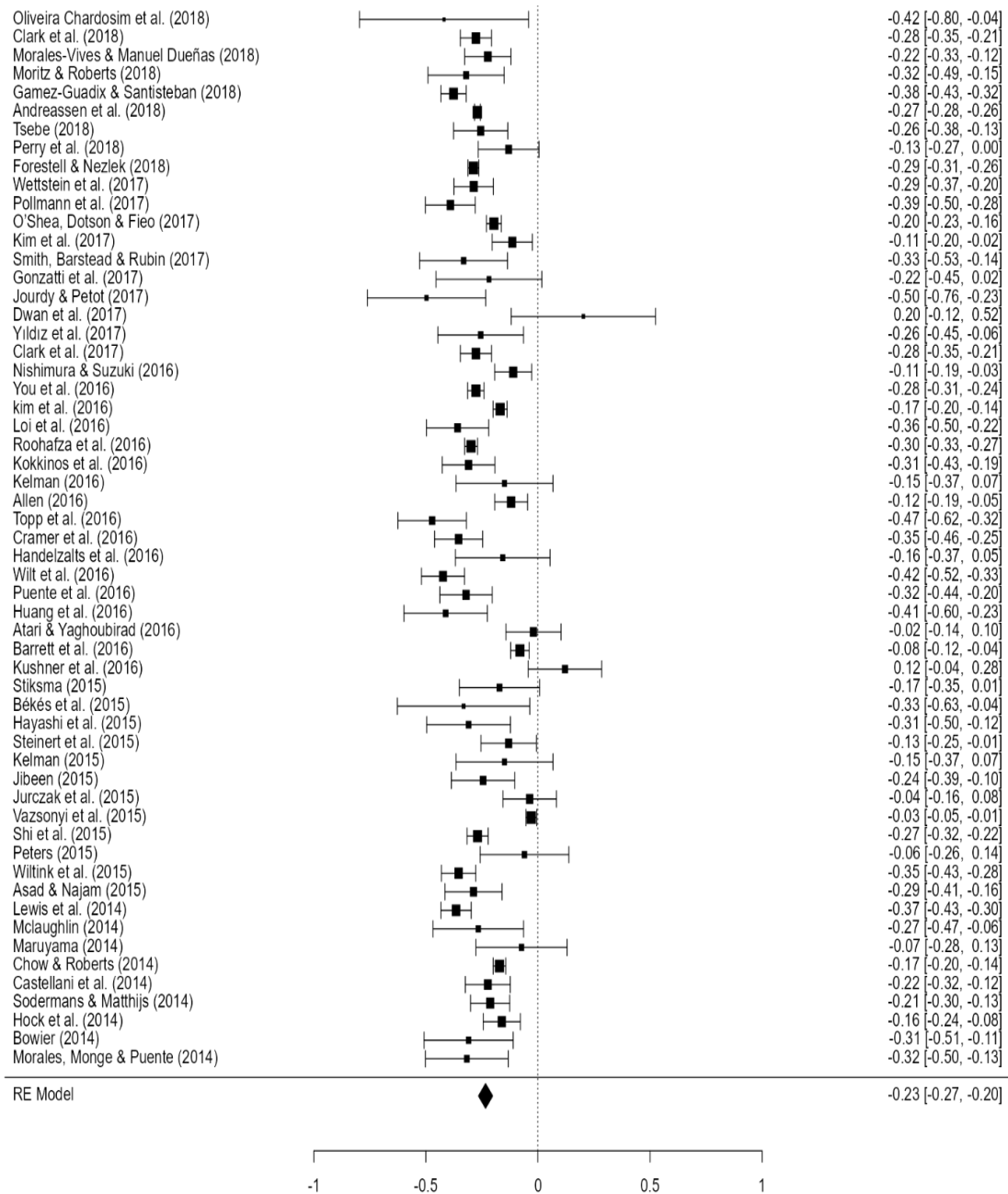
3.1.4 Conscientiousness

A total of $k = 179$ studies were included in the Conscientiousness analysis, and the overall correlation coefficient effect size between Conscientiousness and depressive symptoms was $r = -0.234$ and significantly different from 0. The $I^2 = 0.0186$ represents the variability of effect sizes across studies. The square root of $I^2 = 0.136$, which is a standard deviation, provides an idea of the expected deviation of a study from the overall average correlation (r_z). The forest plot of individual study correlations for Conscientiousness is presented in Figure 4. Also, there were a few positive but small correlations (8 out of 179 studies) in the Conscientiousness analysis ranging from $r = 0.02$ to 0.226 . The studies were inspected separately to check for anything unusual or the use of rare personality measures, but nothing strange was detected.

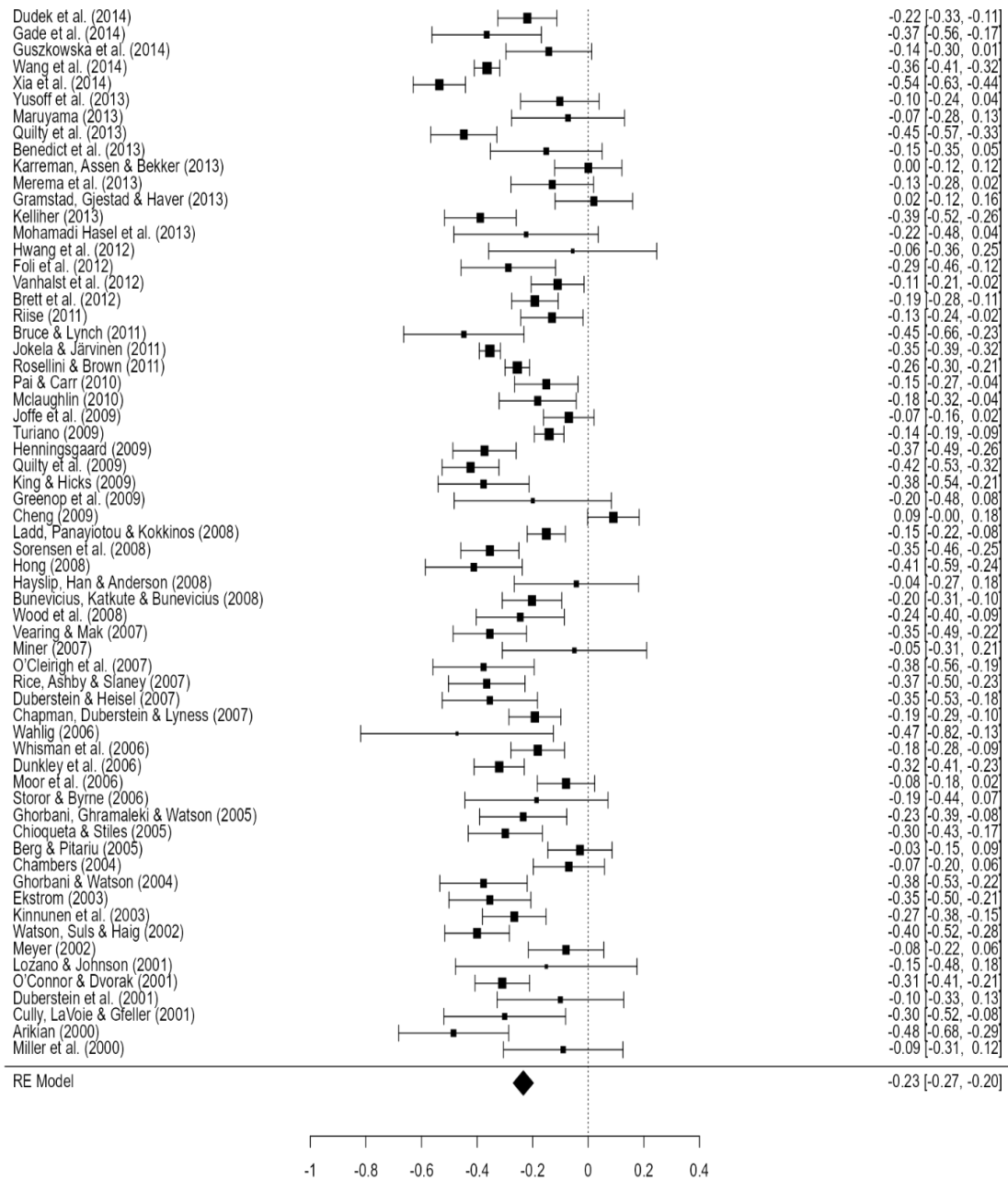
Figure 3-4 Forest Plot for Conscientiousness



Note: Conscientiousness part 1



Note: Conscientiousness part 2

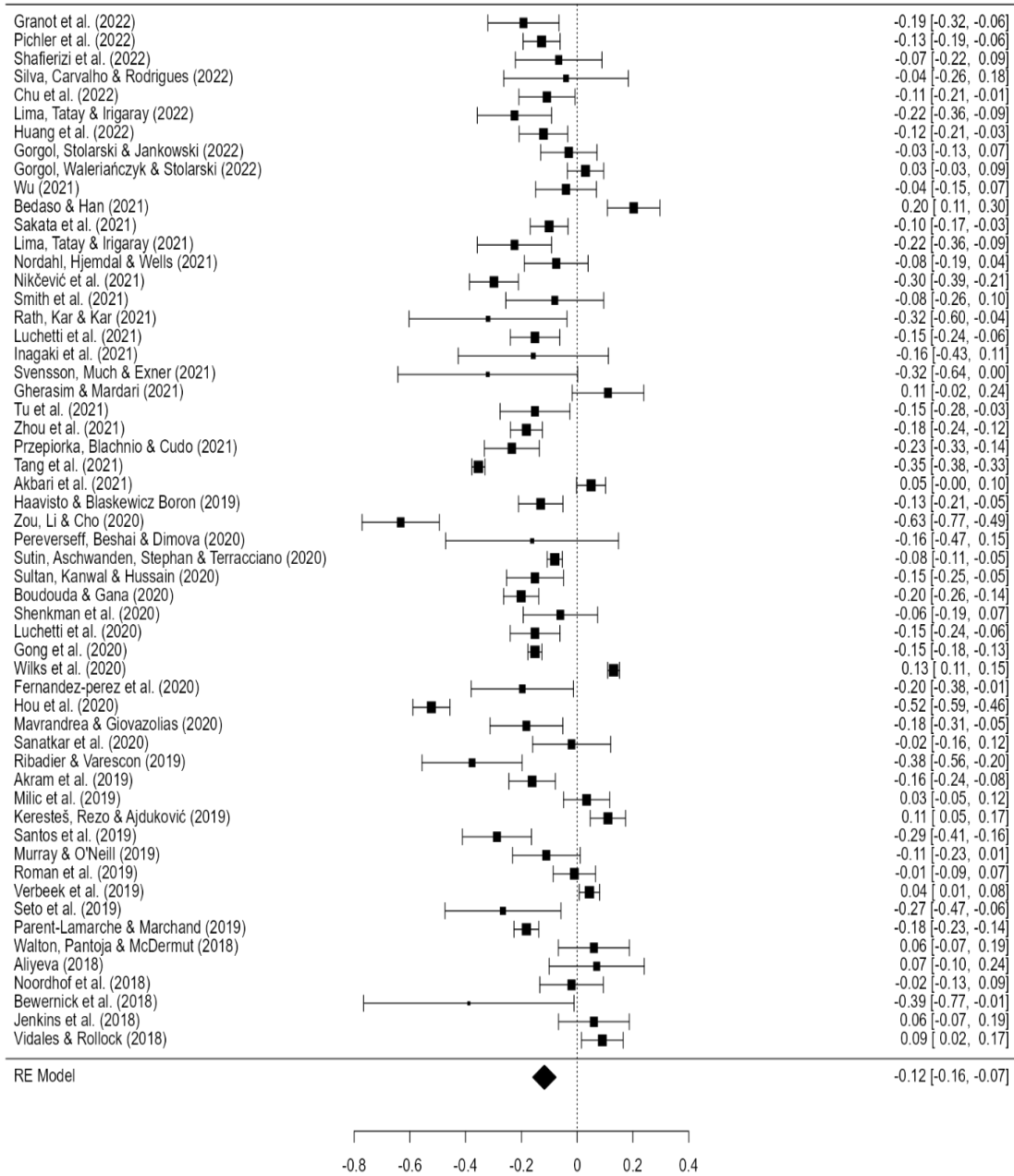


Note: Conscientiousness part 3

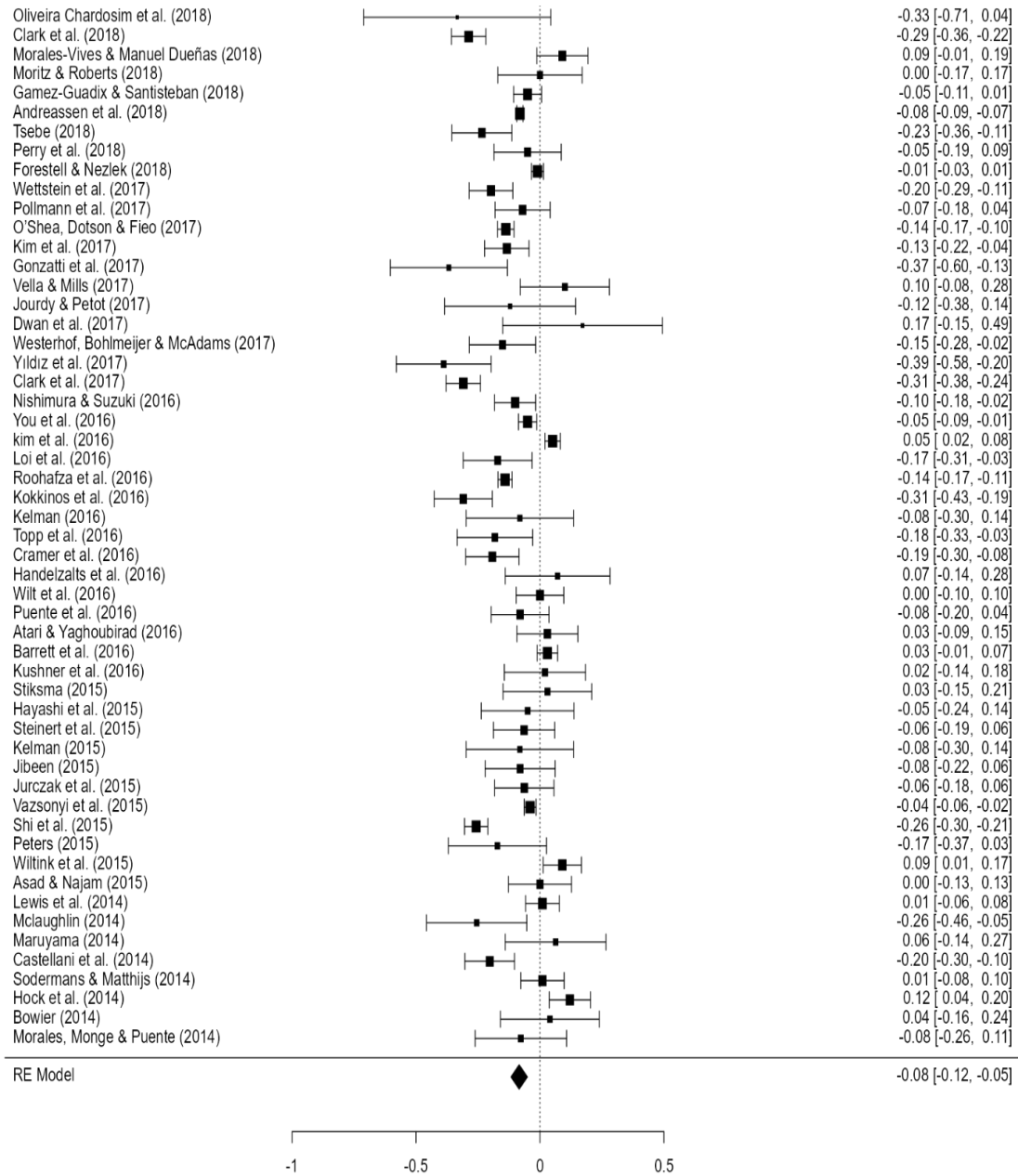
3.1.5 Openness

A total of $k = 167$ studies were included in the Openness analysis, and the overall correlation coefficient effect size between Openness and depressive symptoms was $r = -0.088$ and significantly different from 0. The $I^2 = 0.0164$ represents the variability of effect sizes across studies. The square root of $I^2 = 0.128$, which is a standard deviation, provides an idea of the expected deviation of a study from the overall average correlation (r_z). The forest plot of individual study correlations for Openness is presented in Figure 5. As represented, there are more studies with negative and positive correlations with depressive symptoms compared to other personality dimensions. Also, the overall pattern of correlations shows that many of these are close to 0.

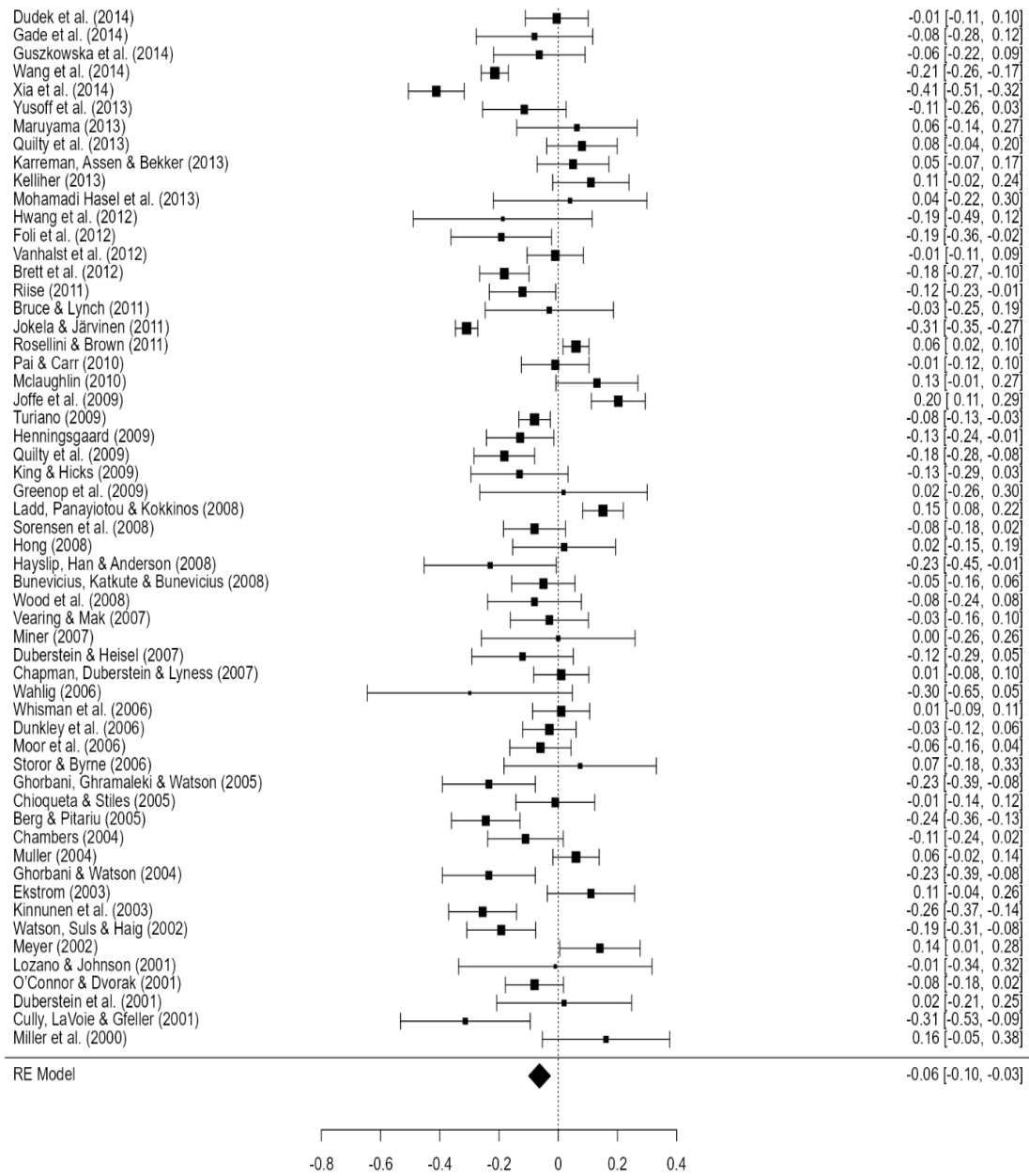
Figure 3-5 Forest Plot for Openness



Note: Openness part 1



Note: Openness part 2



Note: Openness part 3

3.2 Facets

In the following section, I present the meta-analytic results for the facets of the Big Five personality traits in separate tables for each personality dimension. Due to the large number of forest plots (i.e., one per facet), I present these in Appendix B.

3.2.1 Facets of Neuroticism

As previously reported in the personality dimensions section, the overall correlation between Neuroticism and depressive symptoms was $r = .487$. As shown in Table 3-2, the overall mean correlations (r) between the facets and depressive symptoms range from .292 for Impulsiveness to .657 for Depression. It is not surprising to see a very high correlation between the Depression facet and depressive symptoms due to the conceptual overlap. All of the facets of Neuroticism are significantly different from 0. The number of studies reporting facets was quite small (i.e., 6 to 10 for the facets of all personality dimensions), and we can observe much wider confidence intervals due to this small number of studies compared to the meta-analyses of the full personality dimensions. The sample size of the facet studies ranged from $N = 39$ to $N = 5133$. The number of studies varies a bit for the different facets since we opted not to exclude studies that do not provide the correlations for all of the facets of the Big Five.

Table 3-2 Meta-analysis statistics for facets of Neuroticism

Scales	<i>k</i>	r_z (<i>p</i> -value)	95% <i>CI</i> for <i>Lower</i> <i>Bound</i>	95% <i>CI</i> <i>for Upper</i> <i>Bound</i>	<i>r</i>	τ^2 (<i>p</i> -value)
Anxiety	9	0.5574 (0.001)	0.4899	0.6250	0.506	0.0077 (0.0001)
Angry Hostility	6	0.4270 (0.001)	0.2810	0.5729	0.403	0.0284 (0.0001)
Depression	9	0.7879 (0.001)	0.6816	0.8942	0.657	0.0229 (0.0001)
Self- Consciousness	6	0.5078 (0.001)	0.3743	0.6413	0.468	0.0231 (0.0001)
Impulsiveness	7	0.3011 (0.001)	0.1722	0.4299	0.292	0.0259 (0.0001)
Vulnerability	7	0.6056 (0.001)	0.5103	0.7009	0.541	0.0125 (0.0001)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.2.2 Facets of Extraversion

As previously reported in the personality dimensions section, the overall correlation between Extraversion and depressive symptoms was $r = -0.268$. As shown in Table 3-3, all the facets of Extraversion had a negative correlation with depressive symptoms ranging from -0.080 for Excitement-seeking to -0.338 for Positive Emotions. All of the facets of Extraversion are significantly different from 0, except for the Excitement-seeking facet.

Table 3-3 Meta-analysis statistics for facets of Extraversion

Scales	<i>k</i>	r_z (<i>p</i> -value)	95% <i>CI</i> for <i>Lower</i> <i>Bound</i>	95% <i>CI</i> <i>for Upper</i> <i>Bound</i>	<i>r</i>	τ^2 (<i>p</i> -value)
Warmth	6	-0.2745 (0.001)	-0.3754	-0.1735	-0.268	0.0116 (0.0013)
Gregariousness	9	-0.2095 (0.001)	-0.2947	-0.1242	-0.206	0.0136 (0.0001)
Assertiveness	9	-0.1830 (0.001)	-0.3560	-0.2473	-0.120	0.0067 (0.0001)
Activity	9	-0.2754 (0.001)	-0.3835	-0.1673	-0.269	0.0238 (0.0001)
Excitement- seeking	7	-0.0800 (0.045)	-0.1581	-0.0018	-0.080	0.0076 (0.0027)
Positive Emotions	7	-0.3518 (0.001)	-0.4590	-0.2446	-0.338	0.0170 (0.0001)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.2.3 Facets of Agreeableness

As previously reported in the personality dimensions section, the overall correlation between Agreeableness and depressive symptoms was $r = -0.195$. As shown in Table 3-4, the overall correlation between the facets and depressive symptoms ranges from -0.049 for Tender-Mindedness to -0.292 for Trust. All of the facets of Agreeableness are significantly different from 0, except for the Straightforwardness and Tender-Mindedness facets.

Table 3-4 Meta-analysis statistics for facets of Agreeableness

Scales	<i>k</i>	<i>r_z</i> (<i>p</i> -value)	95% CI for Lower Bound	95% CI for Upper Bound	<i>r</i>	τ^2 (<i>p</i> -value)
Trust	8	-0.3010 (0.001)	-0.3403	-0.2616	-0.292	0.0000 (0.5303)
Straightforwardness	6	-0.0651 (0.169)	-0.1581	0.0278	-0.065	0.0086 (0.0124)
Altruism	7	-0.1612 (0.001)	-0.2237	-0.0987	-0.160	0.0037 (0.0045)
Compliance	8	-0.1425 (0.001)	-0.2298	-0.0552	-0.142	0.0120 (0.0001)
Modesty	7	0.1609 (0.001)	0.0918	0.2300	0.160	0.0049 (0.0259)
Tender-Mindedness	9	-0.0486 (0.195)	-0.1220	0.0248	-0.049	0.0090 (0.0001)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.2.4 Facets of Conscientiousness

As previously reported in the personality dimensions section, the overall correlation between Conscientiousness and depressive symptoms was $r = -0.234$. As presented in Table 3-5, all of the facets of Conscientiousness had a negative correlation with depressive symptoms ranging from -0.080 for Self-Discipline to -0.331 for the facet Competence. All the facets of Conscientiousness are significantly different from 0. Further exploration of these results is presented in the discussion section.

Table 3-5 Meta-analysis statistics for facets of Conscientiousness

Scales	<i>k</i>	<i>r_z</i> (<i>p</i> -value)	95% <i>CI</i> for <i>Lower Bound</i>	95% <i>CI</i> <i>for Upper Bound</i>	<i>r</i>	τ^2 (<i>p</i> -value)
Competence	8	-0.3436 (0.001)	-0.3993	-0.2879	-0.331	0.0028 (0.0748)
Order	10	-0.1968 (0.001)	-0.2755	-0.1181	-0.194	0.0128 (0.0001)
Dutifulness	8	-0.2556 (0.001)	-0.3213	-0.1900	-0.250	0.0051 (0.0153)
Achievement Striving	8	-0.2379 (0.001)	-0.3090	-0.1668	-0.234	0.0057 (0.0031)
Self-Discipline	7	-0.3986 (0.001)	-0.4629	-0.3343	-0.080	0.0041 (0.0196)
Deliberation	7	-0.1920 (0.001)	-0.2448	-0.1392	-0.338	0.0017 (0.1632)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.2.5 Facets of Openness

As previously reported in the personality dimensions section, the overall correlation between Openness and depressive symptoms was $r = -0.088$. As illustrated in Table 3-6, the overall correlation between the facets and depressive symptoms ranges from 0.000 for Aesthetics to -0.142 for Actions. Only the facet of Ideas is significantly different from 0; the other facets are all non-significant.

Table 3-6 Meta-analysis statistics for facets of Openness to Experience

Scales	<i>k</i>	<i>r_z</i> (<i>p</i> -value)	95% <i>CI</i> for <i>Lower Bound</i>	95% <i>CI</i> <i>for Upper Bound</i>	<i>r</i>	τ^2 (<i>p</i> -value)
Imagination	8	0.0044 (0.931)	-0.0952	0.1040	0.004	0.0168 (0.0001)
Aesthetics	9	0.0001 (0.997)	-0.0692	0.0694	0.000	0.0082 (0.0001)
Feelings	6	0.0676 (0.109)	-0.0150	0.1502	0.067	0.0066 (0.0034)
Actions	6	-0.1426 (0.041)	-0.2793	-0.0059	-0.142	0.0244 (0.0001)
Ideas	9	-0.1072 (0.001)	-0.1294	-0.0851	-0.107	0.0000 (0.2233)
Values	7	-0.0587 (0.275)	-0.1641	0.0467	-0.059	0.0163 (0.0001)

Note: r_z refers to Fisher r-to-z transformed correlation coefficient; r refers to reconverted correlation coefficient; τ^2 refers to the population variability in effect sizes

3.3 Moderation Analyses

Two moderators were investigated in this study. The first was the type of depressive symptom measures. A feasible way to scale this moderator in terms of the number of available studies was to create a binary indicator variable coded as 0 for the studies using the BDI-II studies and a code of 1 for studies that used either the CES-D or HADS. (Note that this categorization leaves out studies that used other measures.) The reason for only using these three measures is that the others only had a few studies. The second Moderator was the proportion of females in the studies. This statistic was available in several studies and was left as a continuous variable.

3.3.1 Type of Depression Measure

Results of the moderation analyses for each personality dimension are presented in Table 3-7. For each analysis, the table reports the total number of studies and statistics

not unlike the previous results but with two rows for the Intercept and the Moderator. Out of 94 studies for the Neuroticism analysis, $n = 24$ used the BDI-II, and $n = 70$ used CESD or HADS. Out of 82 studies for the Extraversion analysis, $n = 21$ used the BDI-II, and $n = 61$ used CESD or HADS. Out of 71 studies for the Agreeableness analysis, $n = 16$ used the BDI-II, and $n = 55$ used CESD or HADS. Out of 75 studies for the Conscientiousness analysis, $n = 17$ used the BDI-II, and $n = 58$ used CESD or HADS. Lastly, out of 69 studies for the Openness analysis, $n = 17$ used the BDI-II, and $n = 52$ used CESD or HADS.

Not unlike in a linear regression analysis, the Intercept represents the expected value of the outcome when the predictor is 0. The outcome is the correlation coefficient, and the 0 represents the BDI-II group. In other words, the Intercept is the mean correlation of the personality measure and depressive symptoms but only for BDI-II studies. The Moderator provides the value to add (or subtract) to the Intercept to obtain the expected overall correlation for the CESD-HADS group. In addition, the row for the Moderator also provides a test of significance indicating whether it is significantly different from 0 (which also translates into whether the overall correlations for the two groups differ significantly from each other.)

Table 3-7 shows that the Moderators were not significantly different from 0 for all Big-Five personality dimensions. In all cases, the intercept was significantly different from 0, but the moderator was not significantly different from 0, indicating no significant differences between the meta-analysis results comparing BDI-II studies to CESD-HADS studies.

Table 3-7 Meta-analysis statistics for Type of Depression Measure Moderator

		Estimate r_z	se	Z	p	CI Lower Bound	CI Upper Bound
Neuroticism (k=94)	Intercept	0.4581	0.0946	4.84	< .001	0.273	0.644
	Moderator	0.0398	0.0524		0.448	-0.063	0.143
Extraversion (k=82)	Intercept	-0.2790	0.0798	-3.50	< .001	-0.435	-0.123
	Moderator	-0.0116	0.0441		0.793	-0.098	0.075
Agreeableness (k=71)	Intercept	-0.0903	0.0877	-1.03	0.303	-0.262	0.082
	Moderator	-0.0671	0.0478		0.160	-0.161	0.027
Conscientiousness (k=75)	Intercept	-0.2424	0.0801	-3.03	0.002	-0.399	-0.085
	Moderator	-0.0036	0.0436		0.935	-0.089	0.082
Openness (k=69)	Intercept	-0.1039	0.0841	-1.24	0.217	-0.269	0.061
	Moderator	-0.0011	0.0462		0.981	-0.092	0.090

3.3.2 Proportion of Females

In this moderation analysis, the Intercept represents the expected correlation value in a study where the proportion of females is 0. The moderator value represents the expected increase (or decrease) in the correlation for a 1% increase in the proportion of females in the sample. The results are presented in Table 3-8 and show that while all the intercepts were significantly different from 0, none of the moderators were significant. Using the example of Neuroticism, we see that the intercept is .503. This represents the expected r_z for a sample in which the proportion of females is 0. For the moderator (which is not significant), we see that the overall mean correlation between Neuroticism and depressive symptoms would increase from .503 by 0.000573 for a 1% increase in the

proportion of females in the sample. Therefore, none of these analyses suggest gender differences in the correlations between personality traits and depressive symptoms.

Table 3-8 Meta-analysis statistics for Proportion of Females Moderator

		Estimate	se	Z	p	CI Lower Bound	CI Upper Bound
Neuroticism (k=214)	Intercept	0.503	0.0446	11.3	<.001	0.416	0.591
	Moderator	0.0005	0.0007		0.405	-0.001	0.002
Extraversion (k=193)	Intercept	-0.259	0.0358	-7.25	<.001	-0.329	-0.189
	Moderator	-0.0003	0.0006		0.613	-0.001	0.001
Agreeableness (k=155)	Intercept	-0.2460	0.0363	-6.78	<.001	-0.317	-0.175
	Moderator	0.0008	0.0006		0.148	-0.000	0.002
Conscientiousness (k=164)	Intercept	-0.2360	0.0364	-6.49	<.001	-0.308	-0.165
	Moderator	0	0.0006		0.930	-0.001	0.001
Openness (k=154)	Intercept	-0.1350	0.0365	-3.71	<.001	-0.207	-0.064
	Moderator	0.0008	0.0006		0.186	-0.000	0.002

4 Discussion

This study examined the relationship between the Big-Five personality traits and depressive symptoms through a meta-analytic design. A total of 243 studies with correlations between personality dimensions and depressive symptoms were analyzed. The effects of the facets of the NEO-PI-R were also examined through this meta-analysis study that provides a unique contribution not provided by prior meta-analyses on this topic. The meta-analyses of the facets were based on a smaller set of available studies (i.e., 6 to 10 for the facets of all personality domains). The effects of the moderating variables, including the type of depression measure and the proportion of females, were also investigated in this study.

The five-factor model trait that had the strongest overall mean correlation with depressive symptoms was Neuroticism, which was predictable due to the conceptual overlap between these variables. Furthermore, most of the studies gathered in this meta-analysis used the NEO-PI-R to measure personality traits, and its Neuroticism trait measure includes facets of Depression as well as Anxiety (which tends to correlate substantially with depression). In fact, depressive and anxiety disorders are highly comorbid (Blanco et al., 2014; Zbozinek et al., 2012; Unick, Snowden, & Hastings, 2009). The other four personality factors had negative and somewhat smaller correlations with depressive symptoms. The correlations involving Extraversion, Conscientiousness, and Agreeableness ranged from -.27 to -.23 to -.20, respectively, and Openness had the smallest correlation of -.09.

It is easier and more meaningful to interpret the findings at the factor level when we consider their underlying facets and the relations between the facets and depressive

symptoms. The studies in the facet meta-analyses mostly used the NEO-PI-R. (There were an additional smaller number of studies, not large enough for comparison, that used facets from other measures such as the Big Five Inventory-2, but the facets were different). The positive correlations between all facets of Neuroticism and depressive symptoms should not come as a surprise since, as previously explained, these two variables are closely related. Also, conceptually the Depression, Anxiety, Vulnerability and Self-Consciousness facets are internalizing variables that have higher correlations than Impulsivity and Angry Hostility, which are more associated with externalizing variables.

All the facets of the personality trait Extraversion had negative correlations with depressive symptoms, with Positive Emotions as the strongest. There are different aspects of Extraversion in the NEO-PI-R that focus on positive emotions and activity, but there are also more social-related aspects such as gregariousness and warmth. Both the facets that deal with internal communication or affect and the facets with more social elements are probably crucial for creating positive feelings and social bonds that protect against depressive symptoms.

Considering both Neuroticism and Extraversion, it has been hypothesized that the combination of high Neuroticism (or negative affectivity) and low Extraversion (or positive affectivity) raise the possibility of vulnerability toward depressive symptoms (Clark, Watson & Mineka, 1994).

Findings from the facet analyses of Agreeableness showed that most facets had a negative correlation with depressive symptoms, as expected, except for the facet Modesty ($r = .160$). Contrary to what I expected, the facet Modesty was slightly and positively

correlated with depressive symptoms. Individuals high in Modesty are humble and do not claim they are better than others. Although modest people would be expected to form stronger social bonds as they get along more easily, they may be at a disadvantage in competitive environments where a person benefits from promoting themselves. I inspected the studies that provided effect sizes for Modesty, and the authors did not add any discussion of this positive correlation. A search of the literature revealed no additional information on the link between modesty and depressive symptoms. This is unfortunate given that the finding seems fairly robust. All seven studies revealed a positive correlation and four of these were statistically significant. The facet Trust had the strongest negative correlation ($r = -.292$). People who do not trust others tend to assume people are dishonest or dangerous, making it difficult for them to create social bonds and cooperation, which is a protective factor against depression.

Findings from the analyses of the Conscientiousness facets showed that Competence and Deliberation had the strongest negative correlations with depressive symptoms. The facet Competence refers to the belief that individuals are capable, competent, and in control of their lives, while the facet Deliberation reflects a tendency to think carefully before acting. People with high scores on these facets feel well-prepared to deal with life in terms of success and probably in social situations, which in turn would act as a protective factor against depressive symptoms. Those with low scores on Deliberation make more hasty decisions without considering the consequences and are more spontaneous in general, making them get in trouble more quickly.

Contrary to my hypothesis of a positive correlation between the Conscientiousness facet of Achievement Striving and depressive symptoms, based on the

view that achievement strivings can reflect perfectionism, which in turn is often related positively to depression, the results revealed a negative correlation ($r = -.23$). A more in-depth review of the literature suggests that some measures of perfectionism are multidimensional and include facets of Positive Strivings that represent an adaptive side, whereas a second facet, Perfectionism Concerns is the more maladaptive aspect that may correlate positively with depression (Stoeber & Rambow, 2007; Slade & Owens, 1998; Hamachek, 1978). Therefore, although Achievement Striving is sometimes seen as an aspect of perfectionism, it was found not to be necessarily maladaptive such as other aspects of perfectionism (i.e., perfectionism concerns such as constantly avoiding failure or excessive self-evaluative and self-critical).

Another finding that differs somewhat from expectations was that the Conscientiousness facet of Self-Discipline only had a small negative correlation with depressive symptoms ($-.08$). Self-Discipline overlaps with self-control or self-regulation, a very adaptive trait in several situations, and people with low scores on this facet tend to procrastinate, which is usually associated with higher stress and symptoms of depression (Beutel et al., 2016).

Findings from the Openness to Experience facets analyses revealed small (Actions, Ideas) or correlations close to 0. Ideas was the only facet that had a correlation different from 0 ($r = -.107$). The Ideas facet reflects an intellectual interest, and individuals high on this facet are considered open-minded and tend to think about new ideas. Although not the same as intelligence, intellectual curiosity plays an essential role in developing intellectual potential, which can result in being more successful and

creative when facing difficulties or everyday life and provide protection from depressive symptoms.

In considering all the above results, it seems that the facet analyses, although less precise due to a small number of studies, provide more nuanced and more important information than just the overall dimensions. Also, we expected to find more studies using facets and studies using other inventories such as the HEXACO. Our intention was to compare facet results of different instruments (i.e., NEO-PI-R and HEXACO), but we found no usable studies using the HEXACO. More research is clearly needed at the facet level to see if the study results would replicate.

Another purpose of this meta-analysis was to determine whether the type of depressive symptom measures would moderate the association between personality dimensions and depressive symptoms. As indicated in the introduction, a problem has been identified mainly in the clinical assessment literature related to the heterogeneity among different depressive symptom measures. Essentially this problem refers to the fact that different measures do not converge on the symptoms assessed. For example, the BDI-II includes an item on suicidal ideation, while the CESD and HADS do not. Also, the CESD has additional symptoms (e.g., anxiety or the item "I felt fearful") that are not part of the diagnostic criteria for depression. The instrument HADS is used to measure the presence of depression and anxiety and has seven items that measure anxiety.

We did not have any expectations about why one specific measure might correlate more strongly than another with personality traits, but given the heterogeneity problem, we considered it valuable to do an exploratory moderation analysis for each of the five factors. Accordingly, we compared BDI-II to the combination of the CESD-HADS

studies mainly because we had a large enough number of studies in each of those categories. We did not find any significant moderation for any of the five dimensions. It is important to acknowledge that we did not control for the type of personality measure (i.e., NEO-PI-R vs. other measures). If we had found statistically significant moderation, it would have been important to do a more in-depth analysis to see if the moderation was due to heterogeneity in the depressive symptom measures or perhaps also heterogeneity in the personality measures.

The other moderator that was investigated was the proportion of females in the samples of the studies. Although studies did not provide separate coefficients by gender that would have allowed for gender as a moderator, they did provide the proportions of genders, and I could use this as a proxy (i.e., approximation) of gender differences. This was also an exploratory analysis because we had no expectations for gender differences in the correlations, regardless of the fact that gender differences have been found in the personality and depressive symptom measures. The results showed no evidence of moderation of gender proportion across the five analyses for each personality dimension. It is important to recognize that the effectiveness of the proxy measure that we used might be limited by a large number of studies that have an approximately equal proportion of men and women.

The results of the present meta-analysis (at the factor-level) are highly consistent with prior meta-analysis (Kotov et al., 2010), especially in the direction of the correlations. The minor differences are that the present meta-analysis had a slightly higher negative correlation for Agreeableness and a lower correlation for Conscientiousness. The present meta-analysis differed from the others mainly in terms of

the inclusion criterion of correlational studies. The Kotov et al. (2010) study focused on comparing groups (disorder and control), while in the present study, we decided to gather effect sizes correlation coefficients (r) since it is the appropriate statistic for gathering associations between two continuous variables and is the right choice for meta-analyses on the magnitude of mental illnesses in relation to personality (Ruiz et al., 2008). Also, the present meta-analyses include more recent studies, and although we did not look at the year of the study as a moderator, visual inspection of the forest plots does not seem to suggest any higher or lower correlations across time. Regardless of these different approaches, this meta-analysis's findings are relatively similar to the results of Kotov et al. (2010).

4.1 Strengths and Limitations of the Meta-Analysis

In contrast to prior meta-analyses, this study included analyses of the relations between facets of personality dimensions and depressive symptoms, but the number of studies with facet information was small (6-10). Therefore, in future studies, researchers should also report the effect sizes for the facets as it can be very informative, and researchers and practitioners can better understand the association between personality and depressive symptoms. Although this usually requires that researchers use the longer inventories necessary for facet information, there is much to be gained over shorter measures that provide only summary factor-level scores in terms of useful information, as we saw in this study.

Moreover, the studies included in this meta-analysis were from substantially homogeneous samples. Regarding the population of interest, this study focused on adolescents, young adults, middle-aged and older adults and did not exclude any specific

type of samples. The majority of studies had samples of college or university students. There were also a few studies with samples of elderly, caregivers, pregnant women, general population samples, ethnicity (i.e., African Americans), and patient samples. More intensive analyses of sample type as a moderator could be undertaken.

Prior to submission for publication in a peer-reviewed journal, this study will ideally undergo another iteration of coding the full set of studies by a second coder with any discrepancies addressed and an update of studies available in 2022. Although the set of studies included unpublished theses and dissertations, a more intensive search of studies that did not provide correlations at the facet level could be undertaken by contacting authors. Finally other potential moderators such as demographics of the sample could be investigated.

4.2 Conclusion

The purpose of this meta-analysis was to provide a synthesis of the current literature on the relationship between the Big-Five personality traits and depressive symptoms. Overall, this meta-analysis found both the higher-order dimensions and some lower-order facets to be impactful variables. None of the examined moderators significantly impacted this association. The findings of this study contribute to the knowledge of the precise estimates of the relations between personality traits and their facets with depressive symptoms and call for attention to the fact that analyses at the factor level only leave out important information for researchers and practitioners

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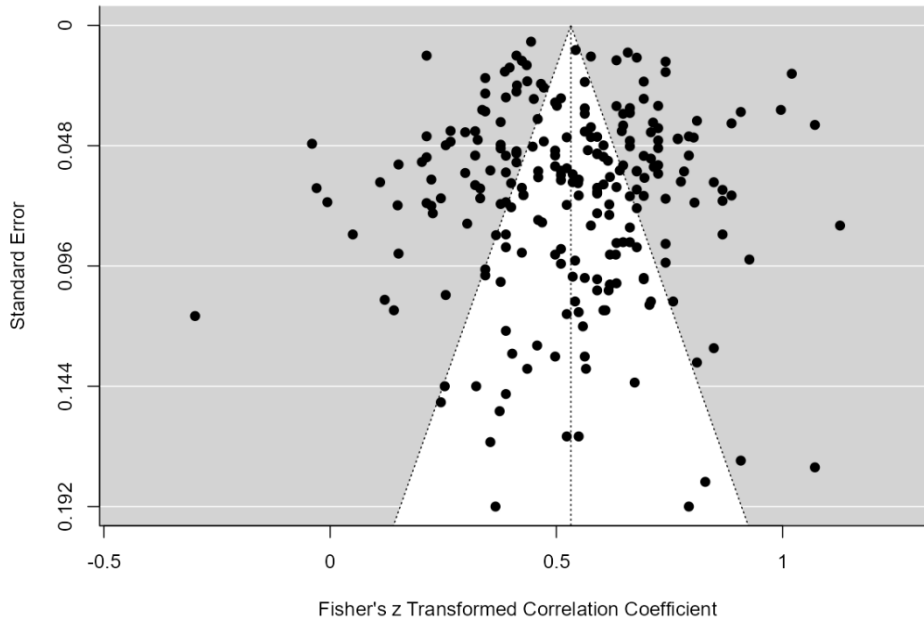
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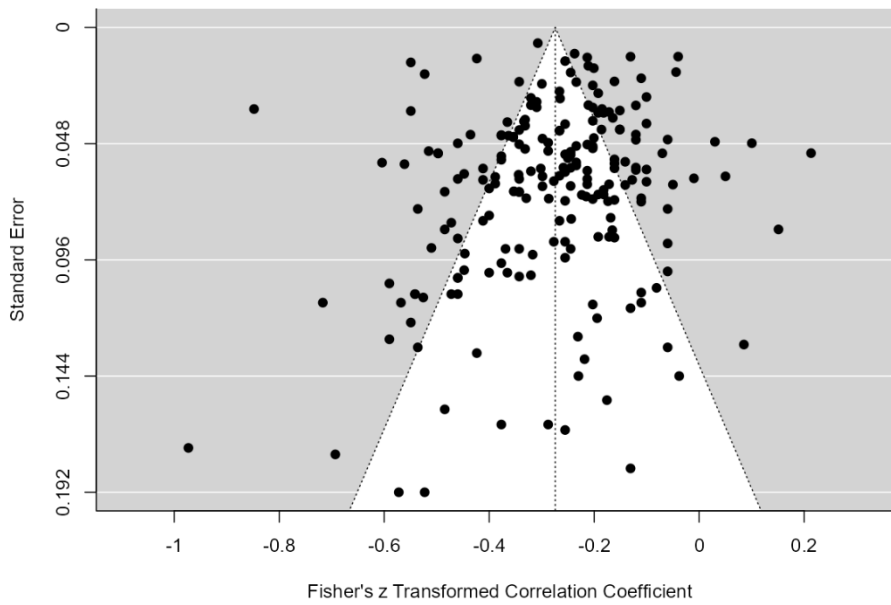
Appendices

Appendix A: Funnel Plots for Five Dimensions of Personality

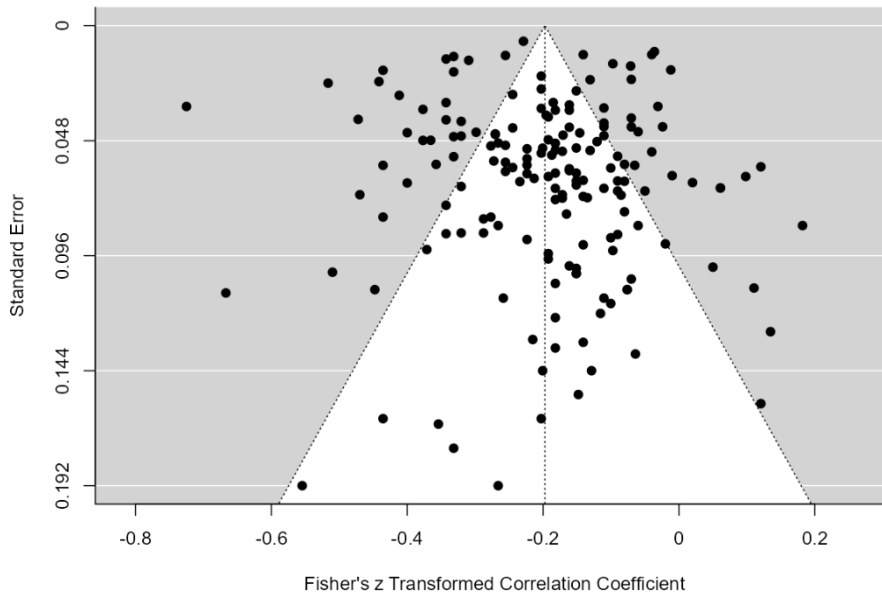
Funnel Plot for Neuroticism



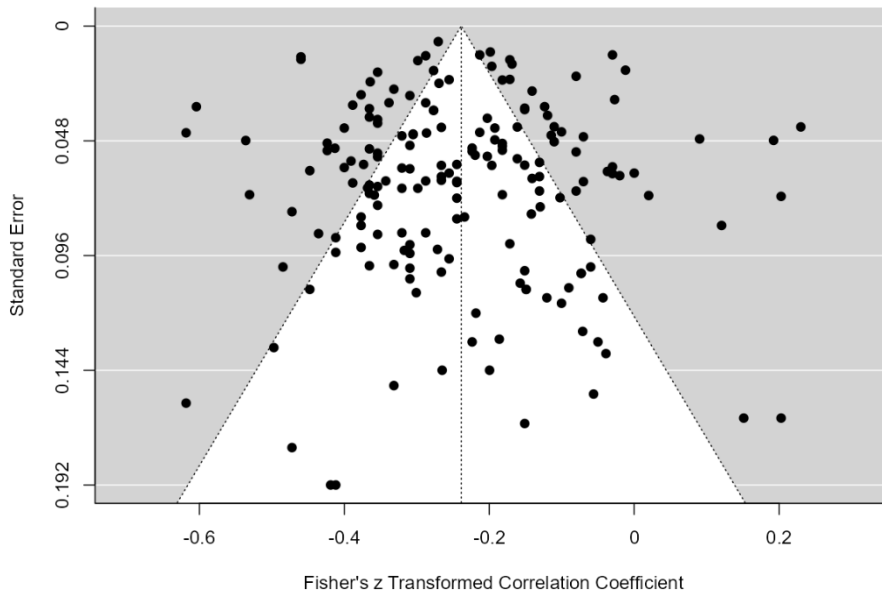
Funnel Plot for Extraversion



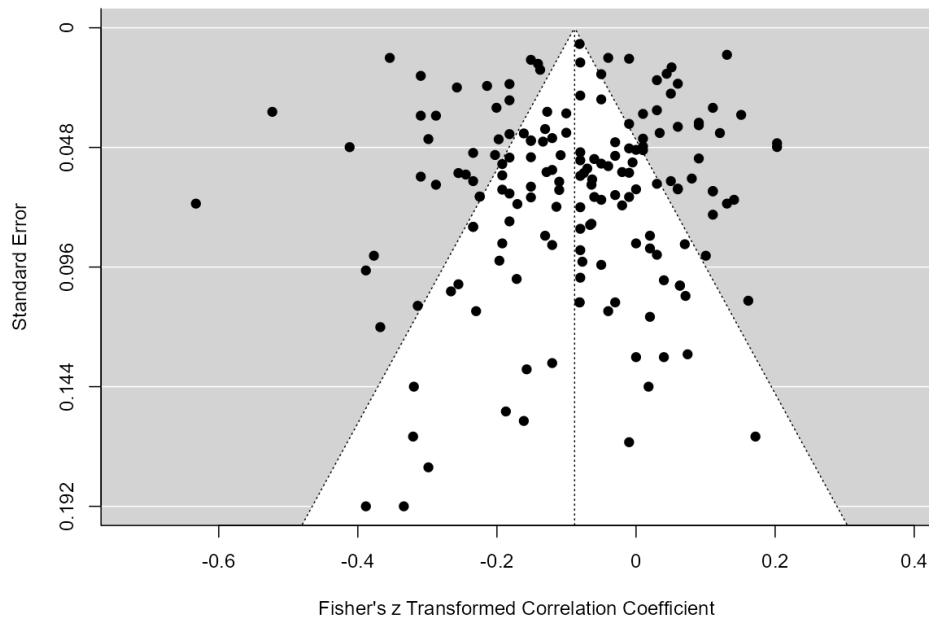
Funnel Plot for Agreeableness



Funnel Plot for Conscientiousness

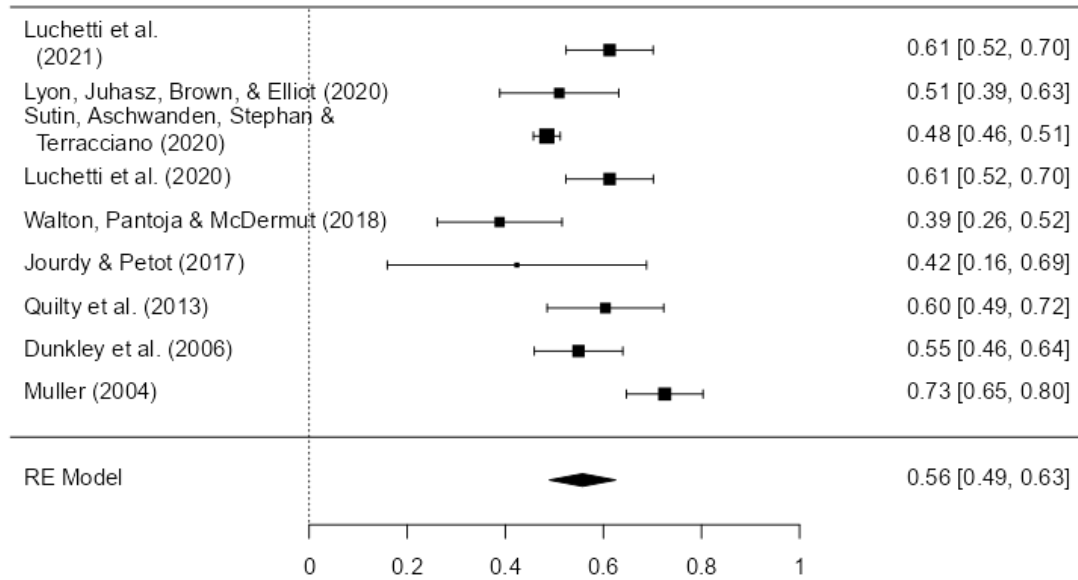


Funnel Plot for Openness

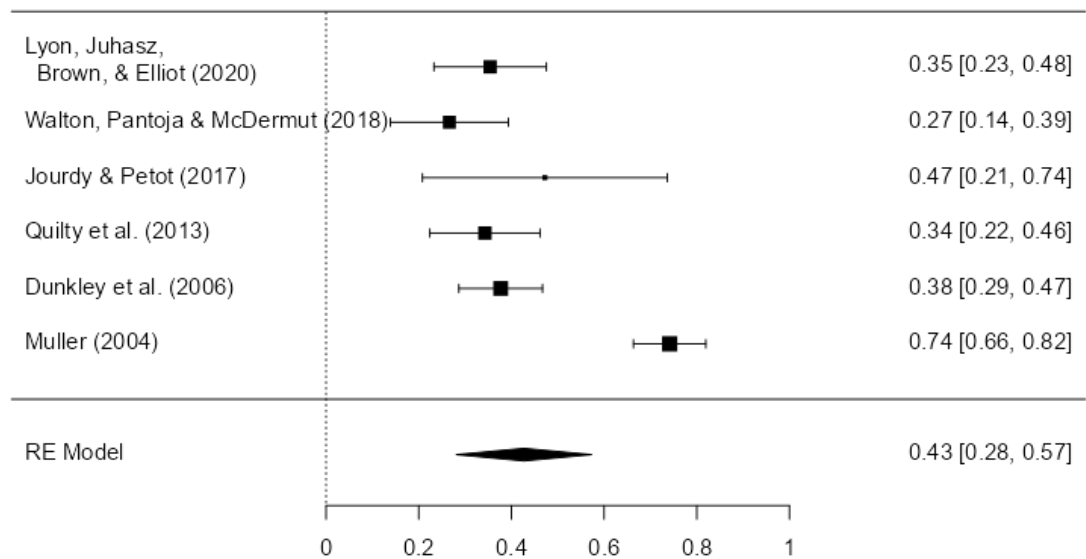


Appendix B: Forest Plots for the facets

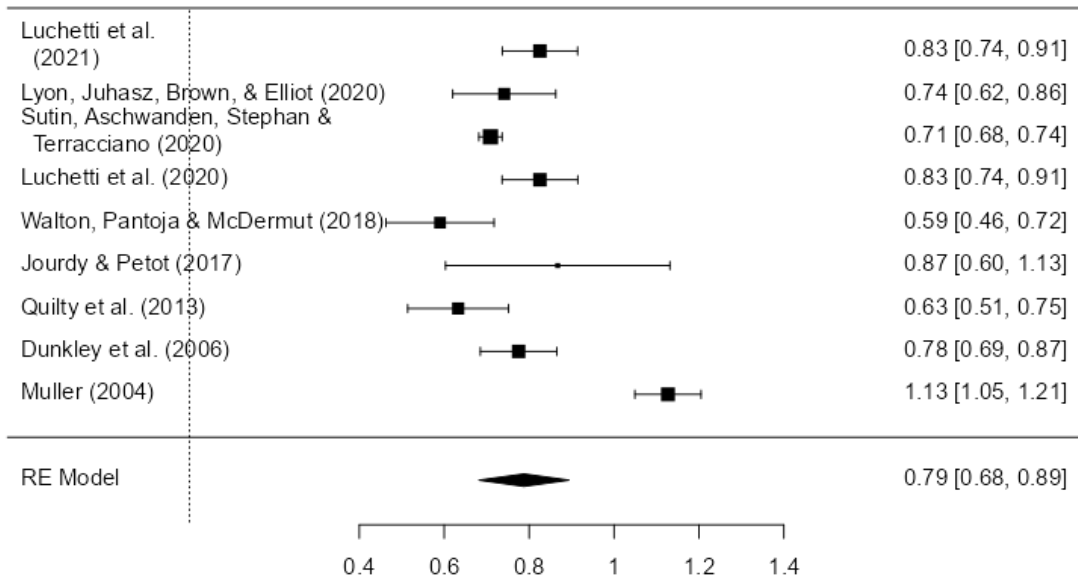
Forest Plot for Anxiety



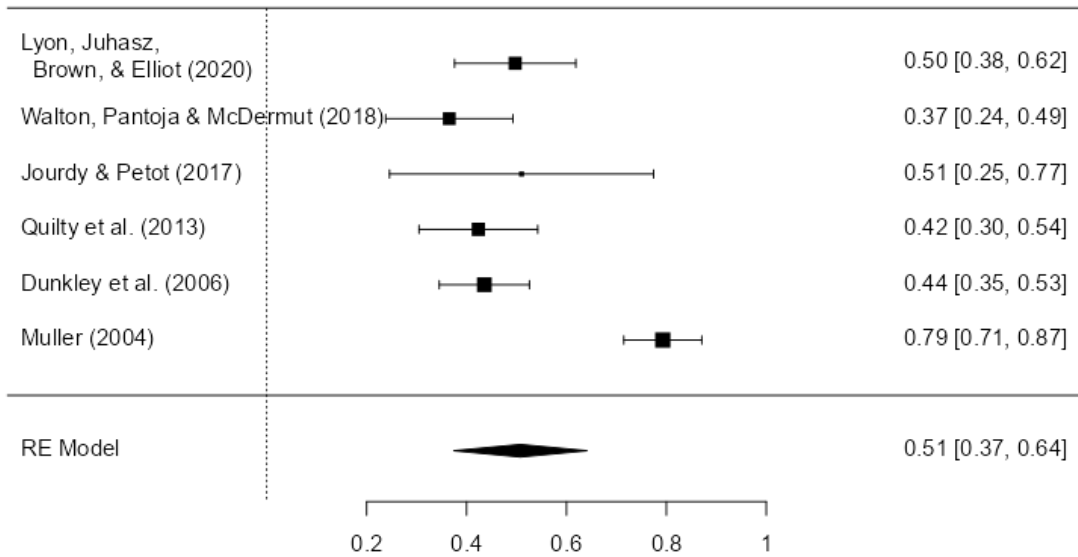
Forest Plot for Angry Hostility



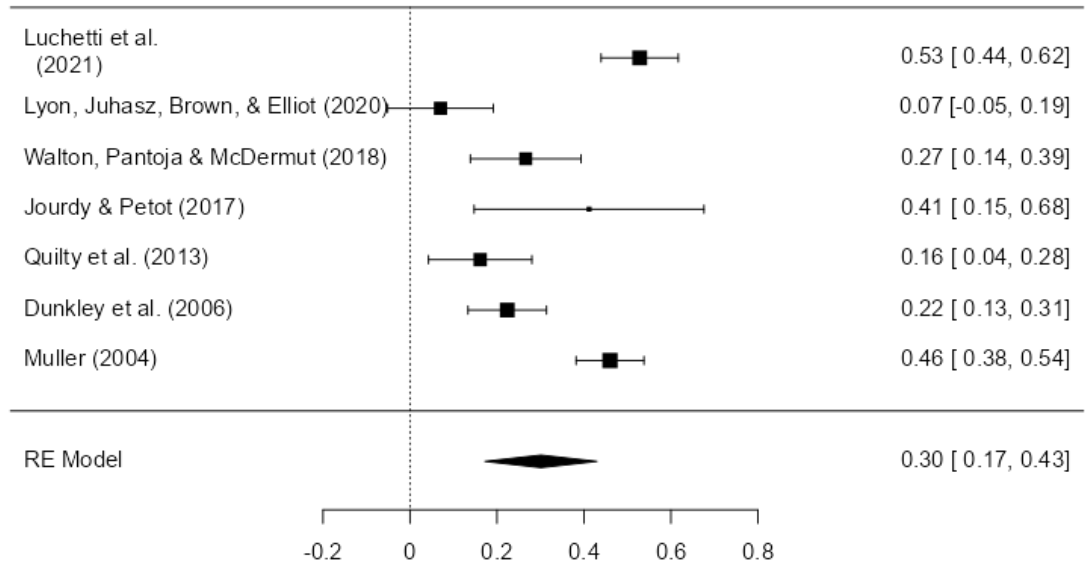
Forest Plot for Depression



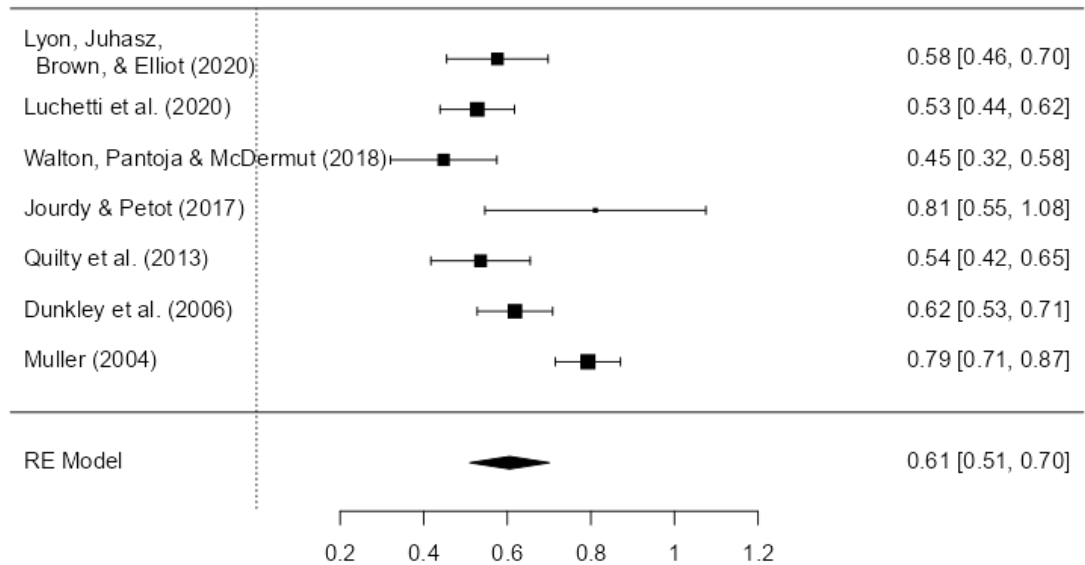
Forest Plot for Self-Consciousness



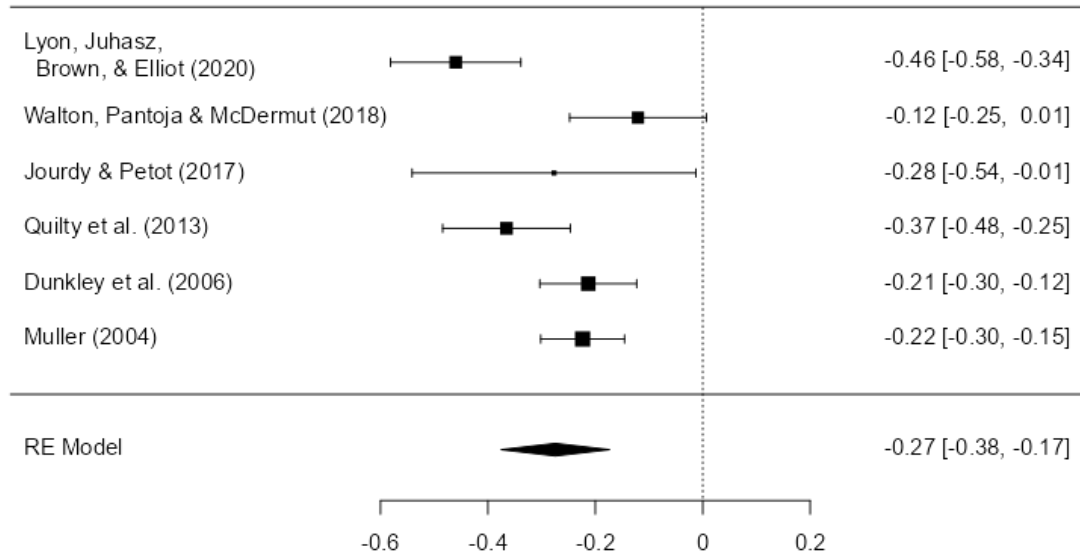
Forest Plot for Impulsiveness



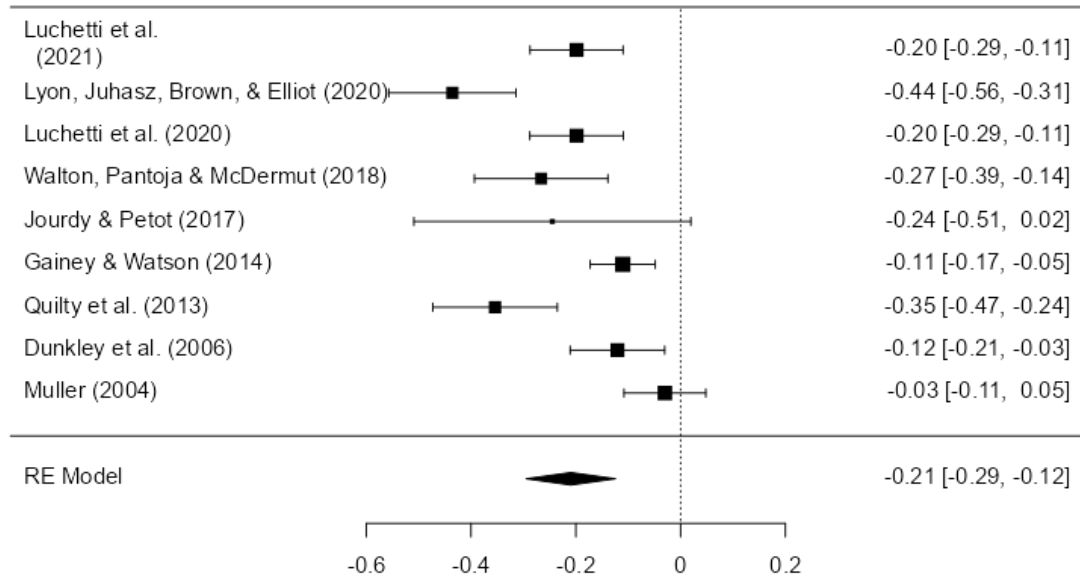
Forest Plot for Vulnerability



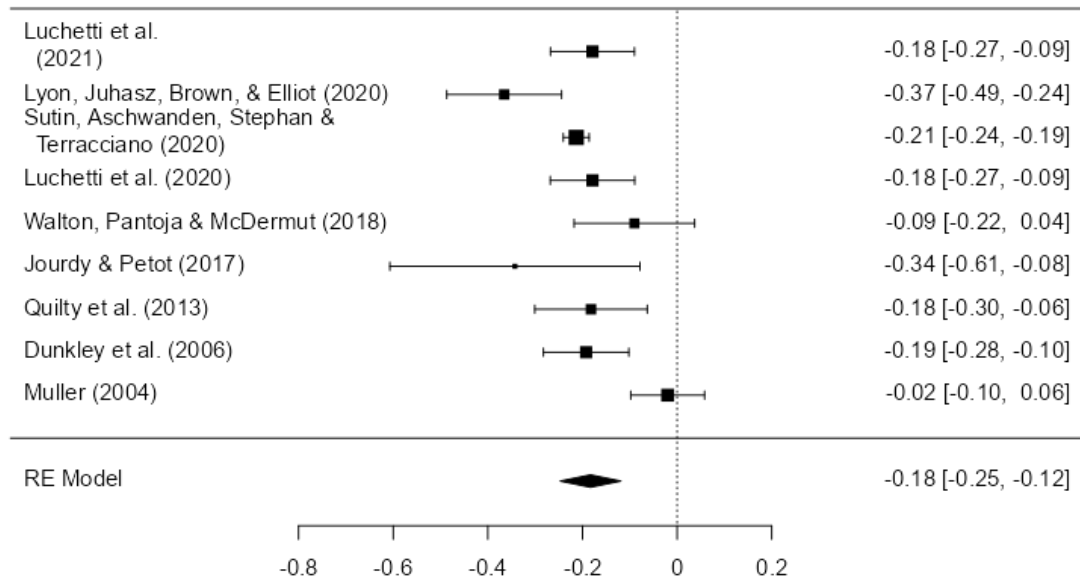
Forest Plot for Warmth



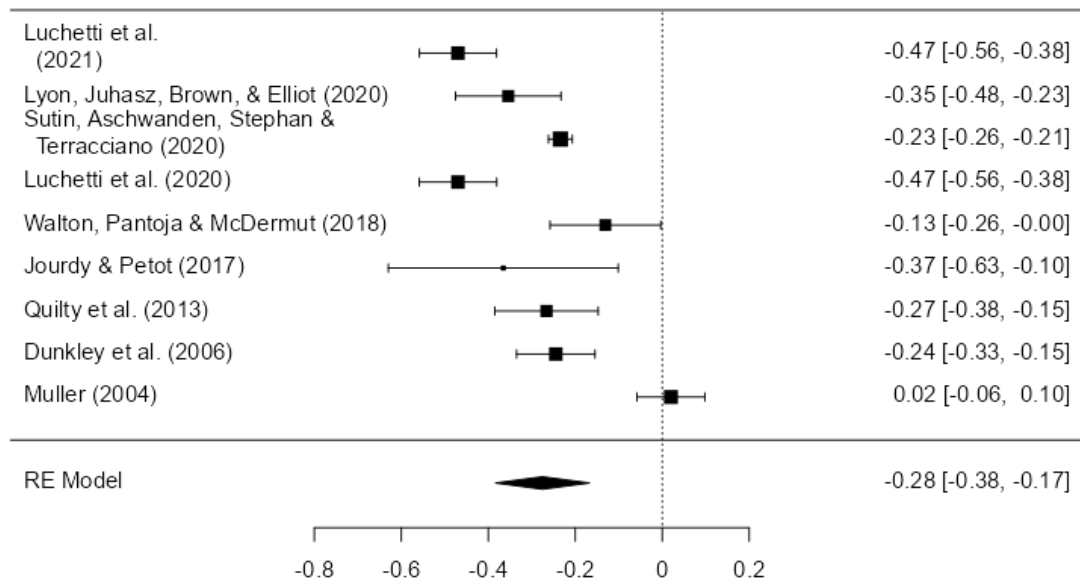
Forest Plot for Gregariousness



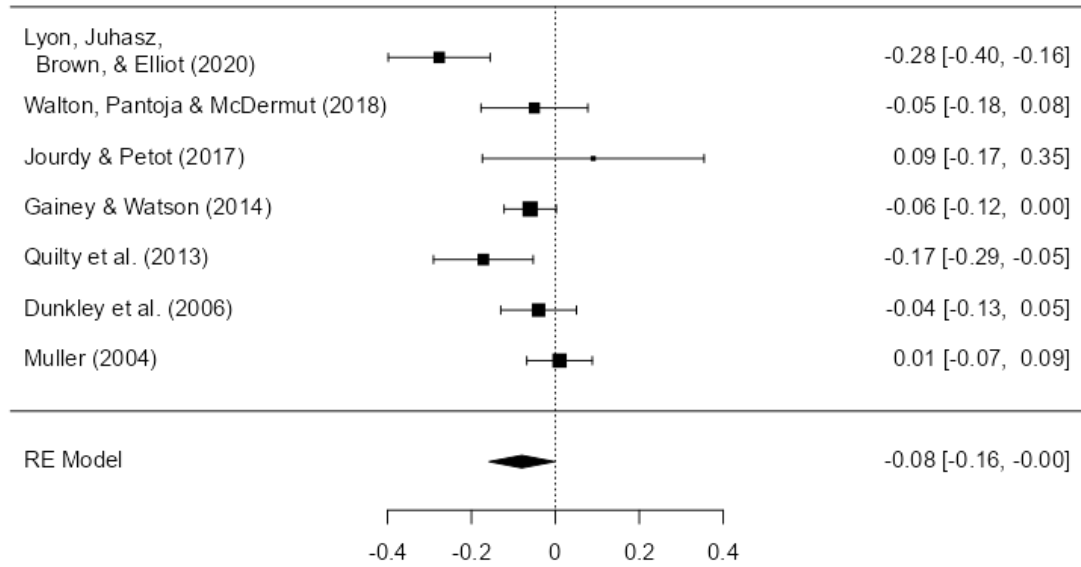
Forest Plot for Assertiveness



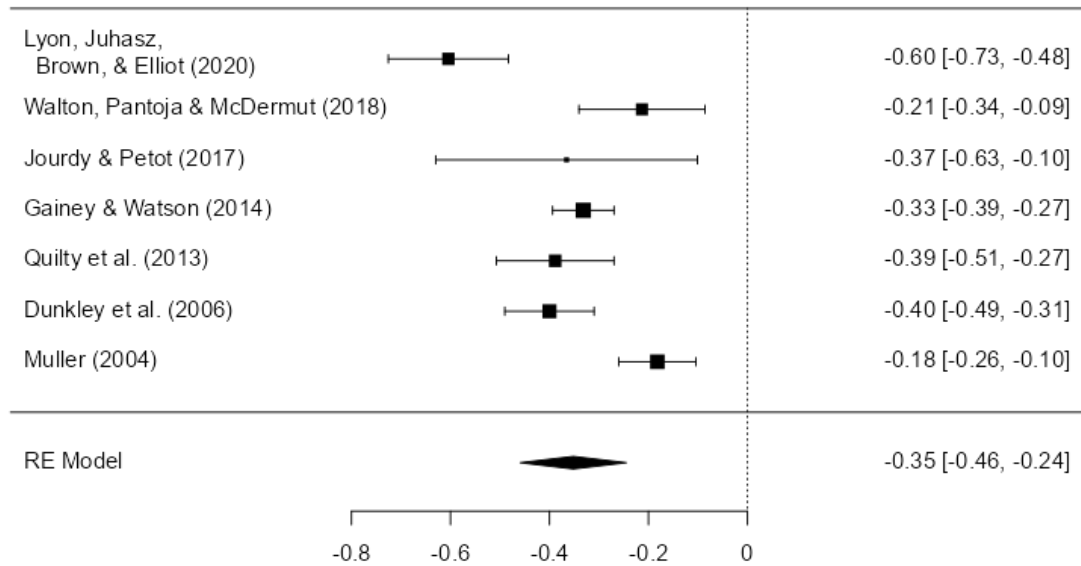
Forest Plot for Activity



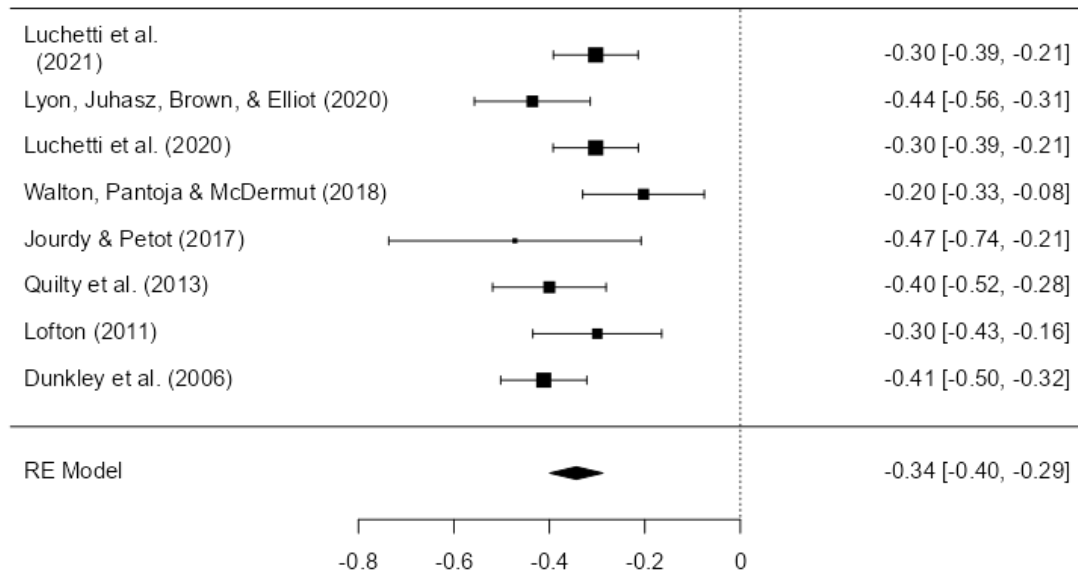
Forest Plot for Excitement-seeking



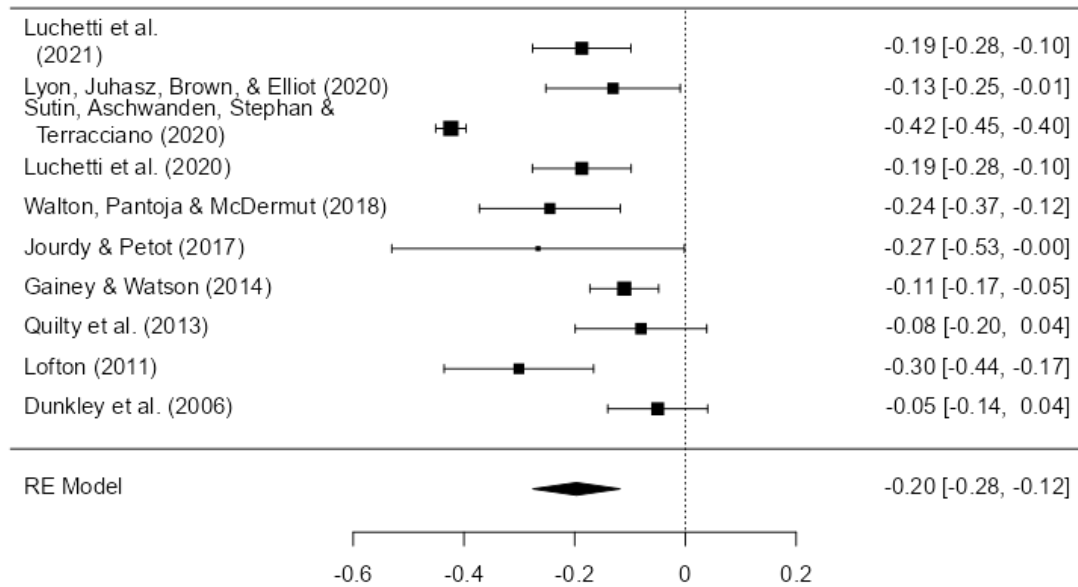
Forest Plot for Positive Emotions



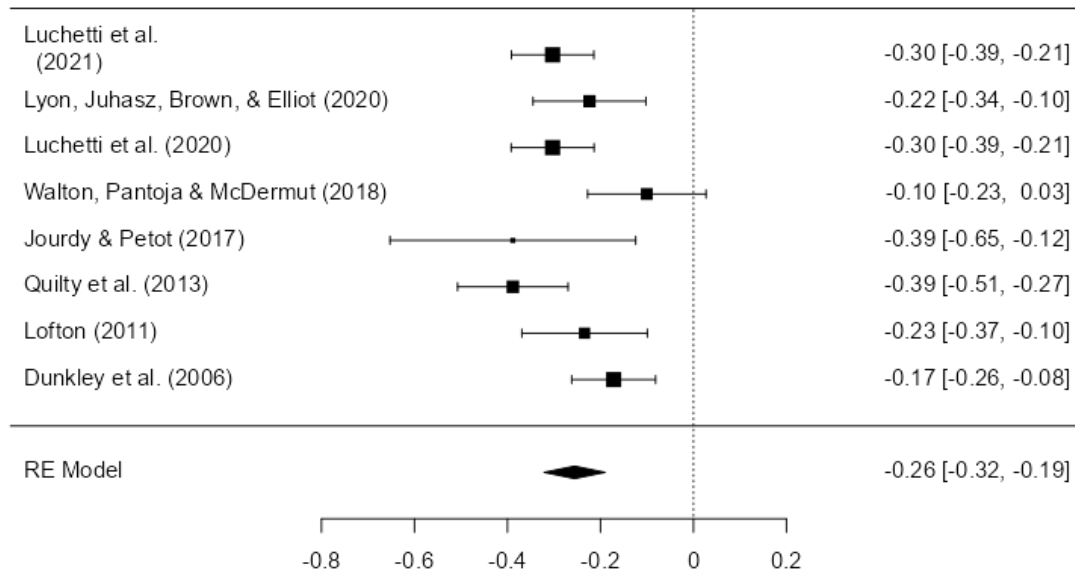
Forest Plot for Competence



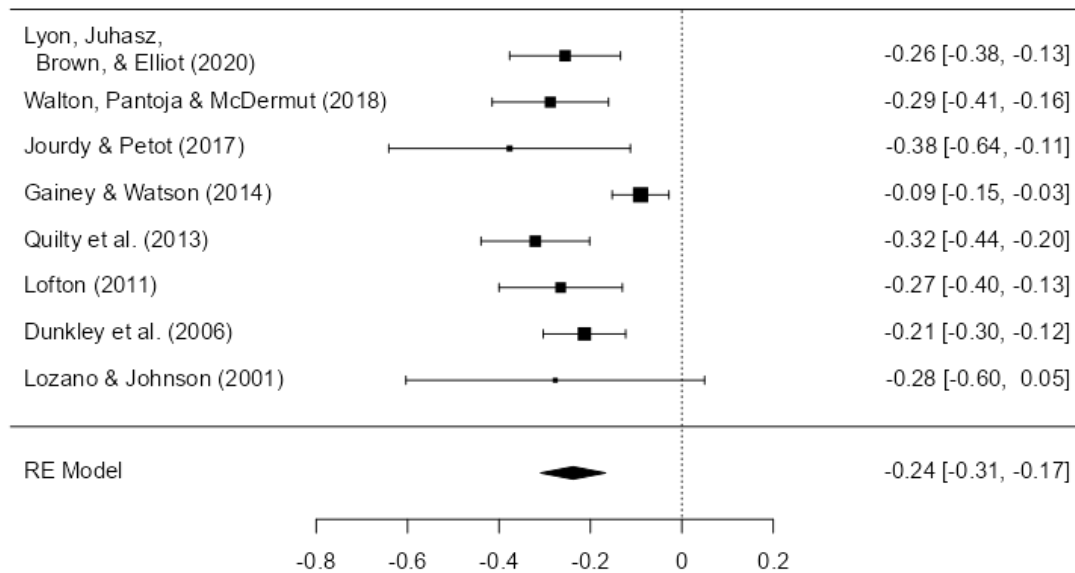
Forest Plot for Order



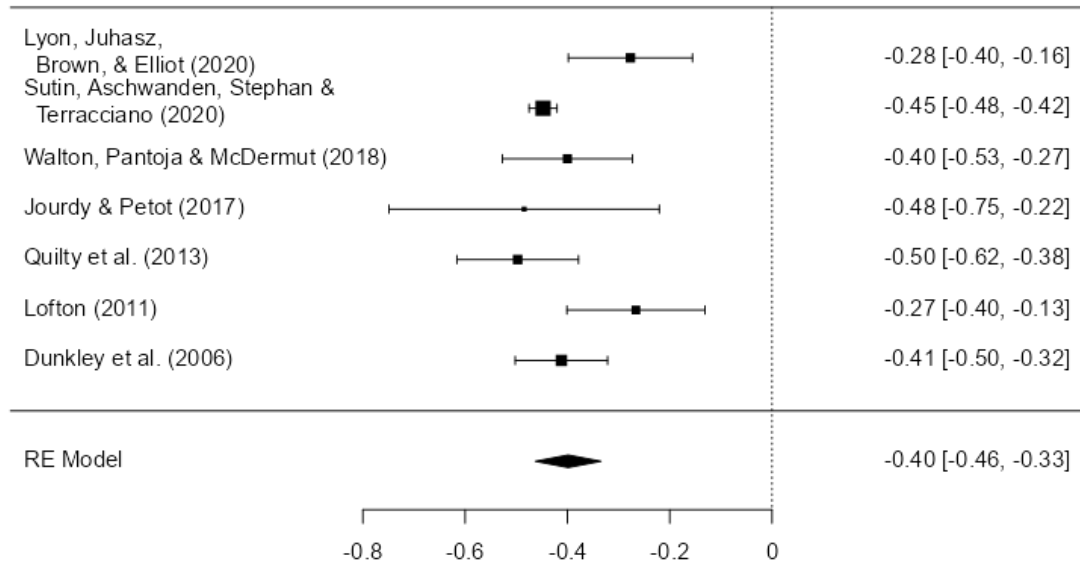
Forest Plot for Dutifulness



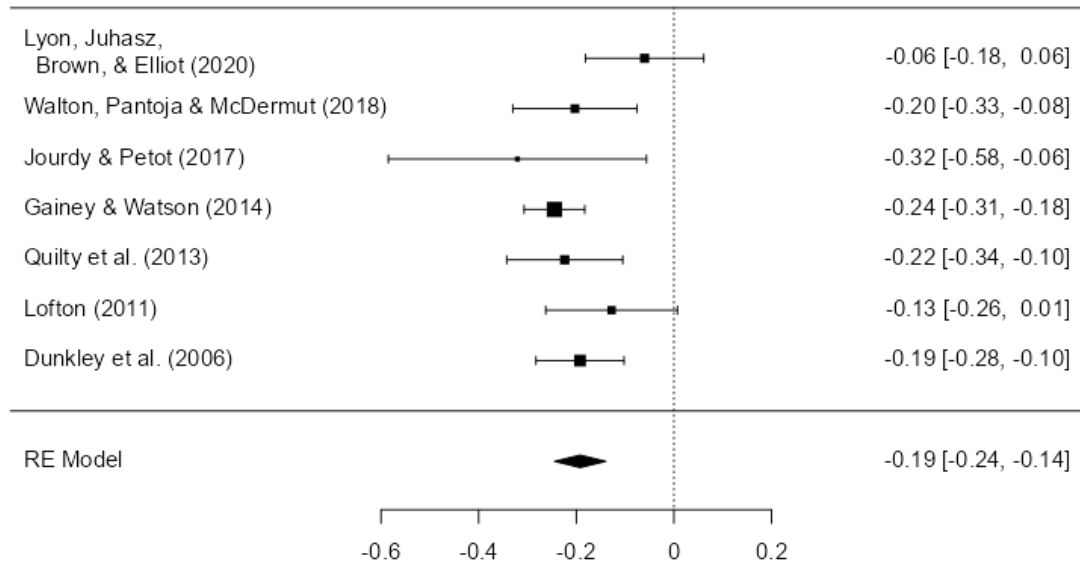
Forest Plot for Achievement Striving



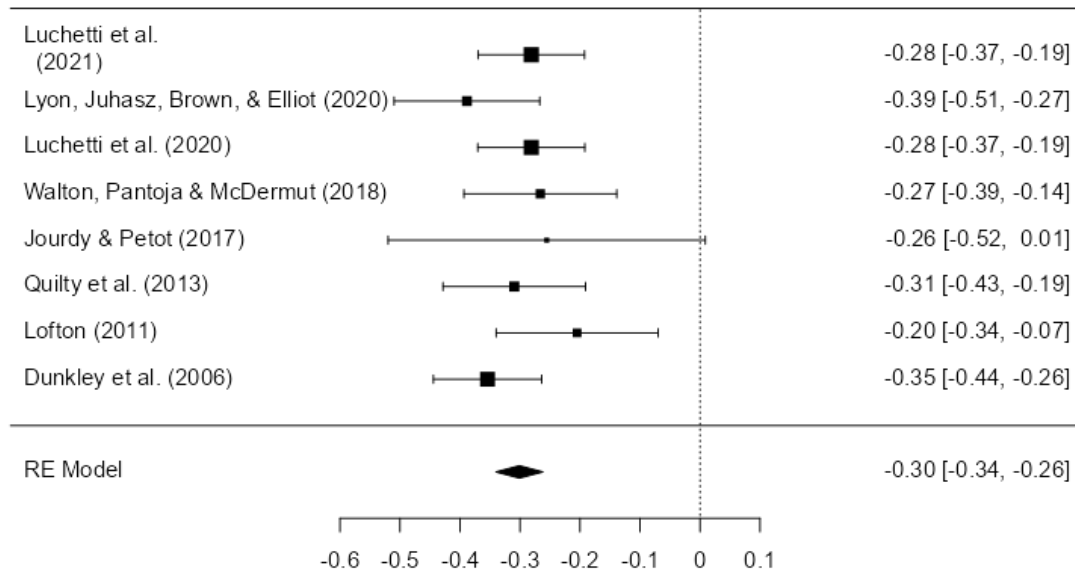
Forest Plot for Self-Discipline



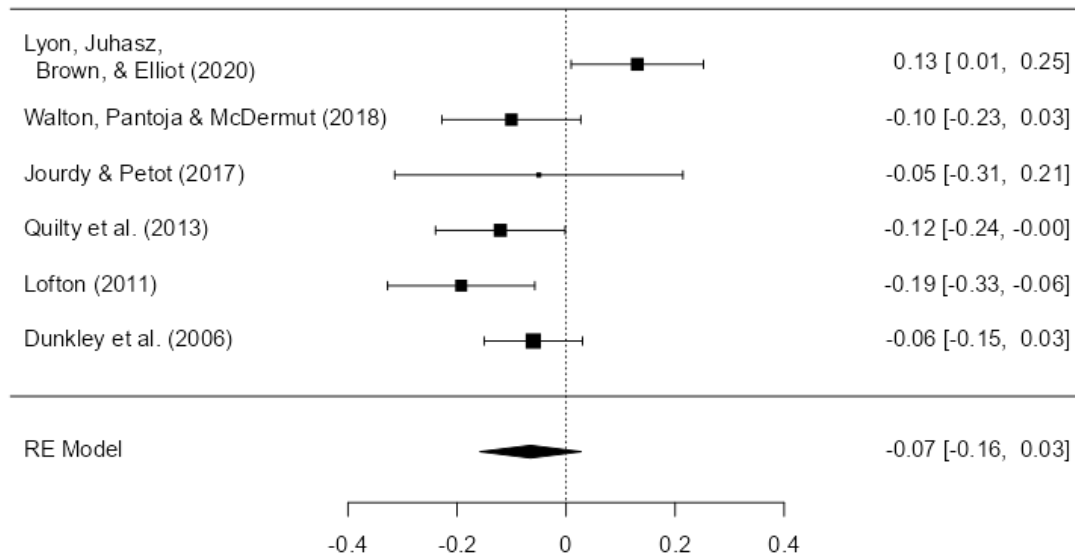
Forest Plot for Deliberation



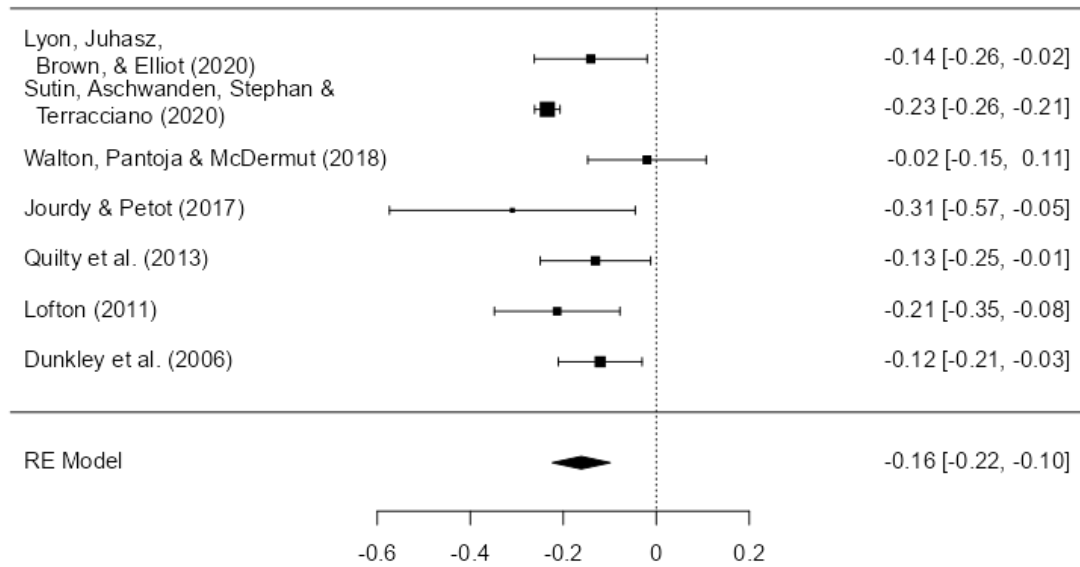
Forest Plot for Trust



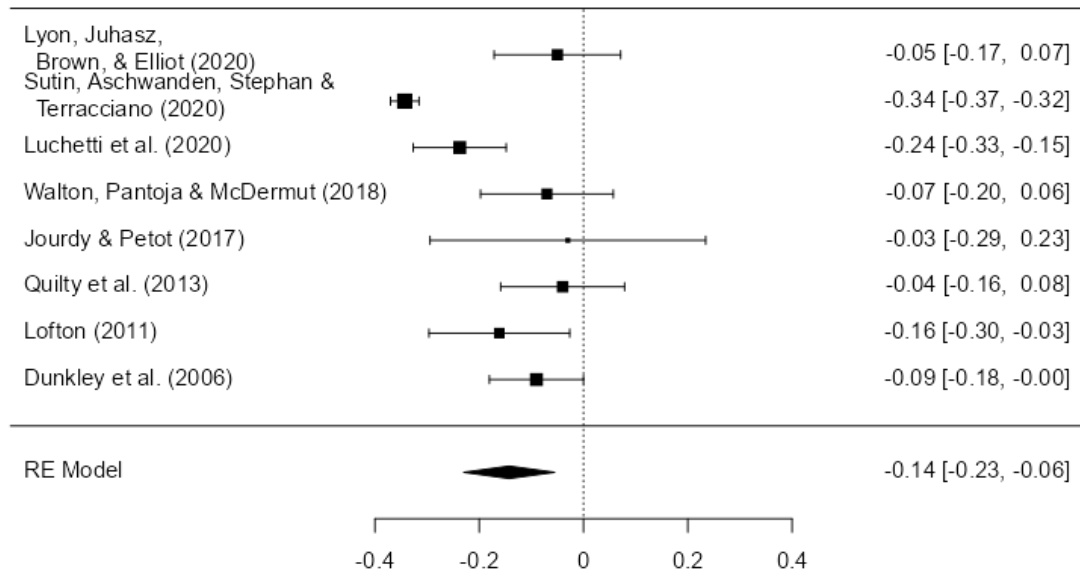
Forest Plot for Straightforwardness



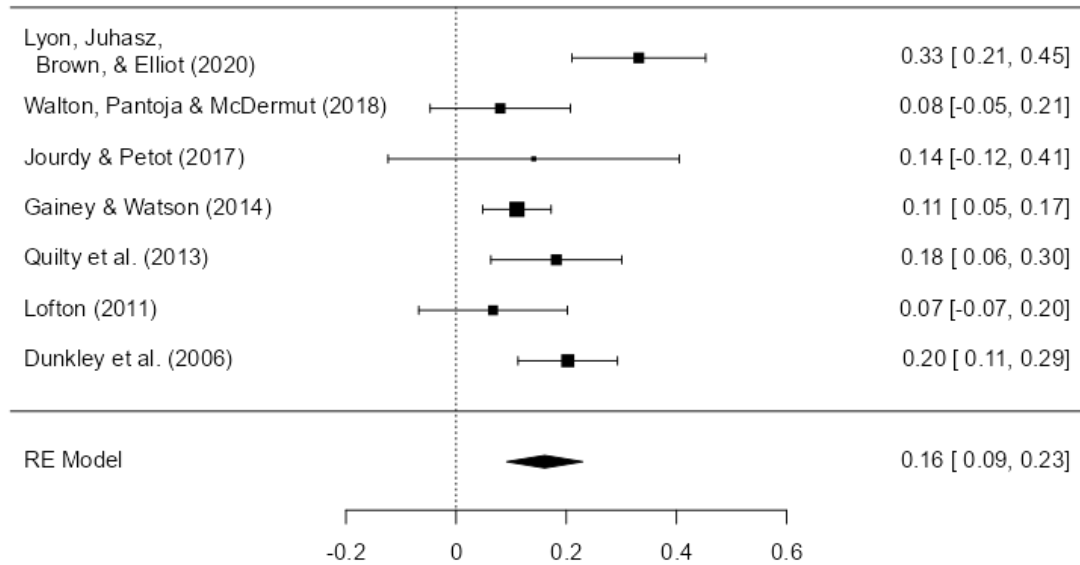
Forest Plot for Altruism



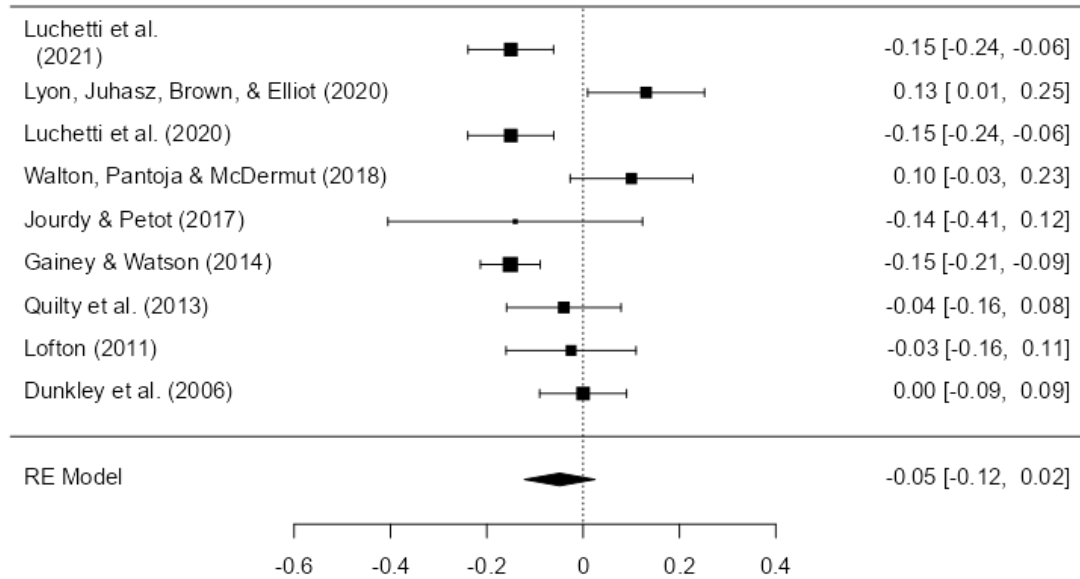
Forest Plot for Compliance



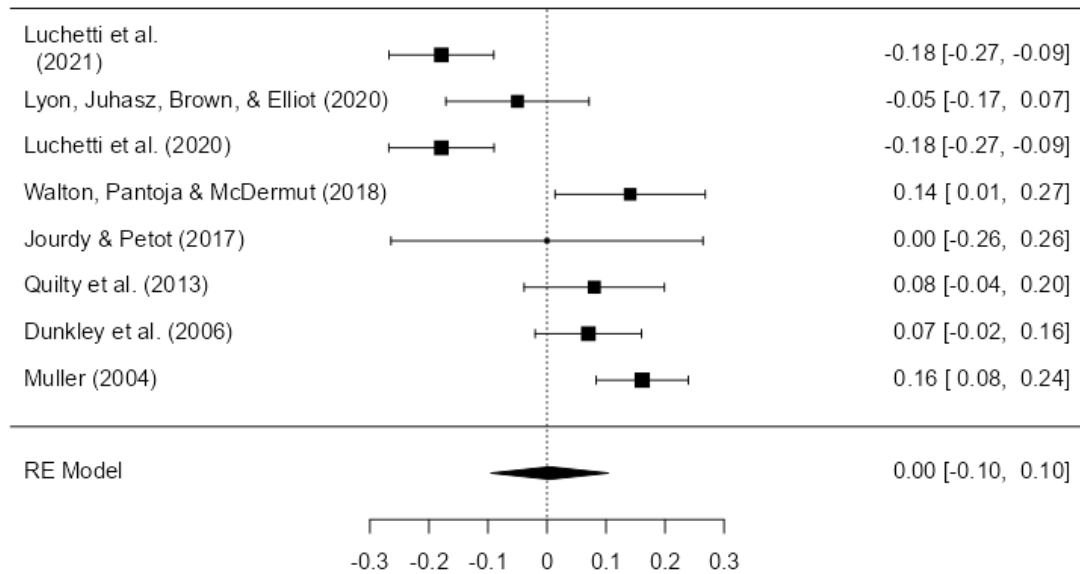
Forest Plot for Modesty



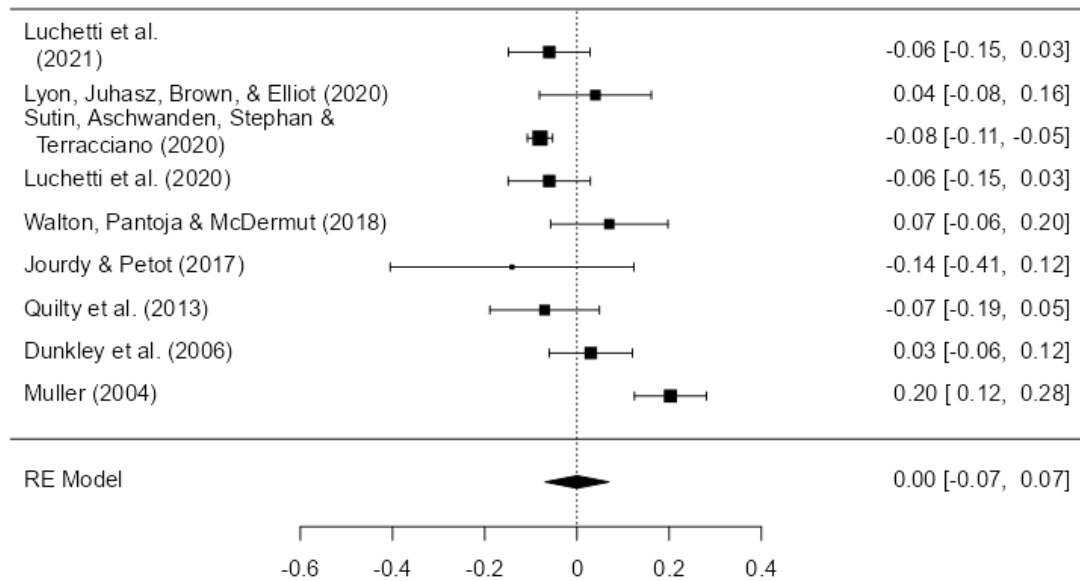
Forest Plot for Tender-Mindedness



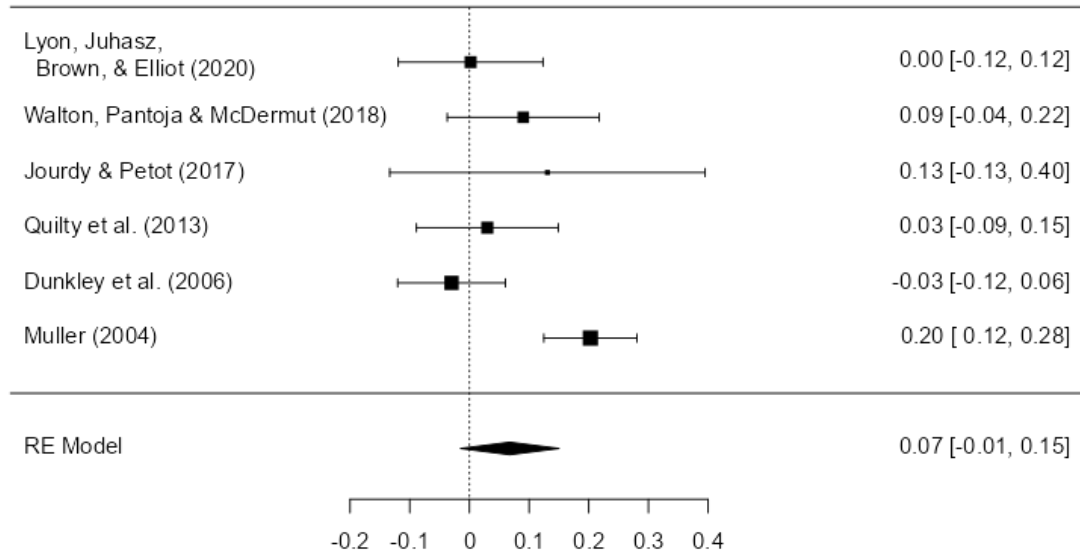
Forest Plot for Imagination



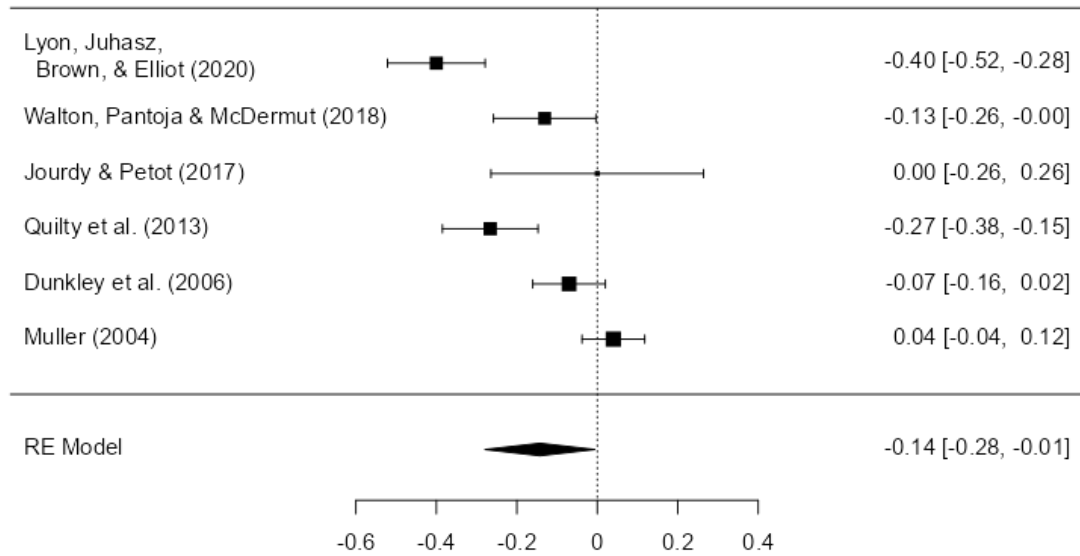
Forest Plot for Aesthetics



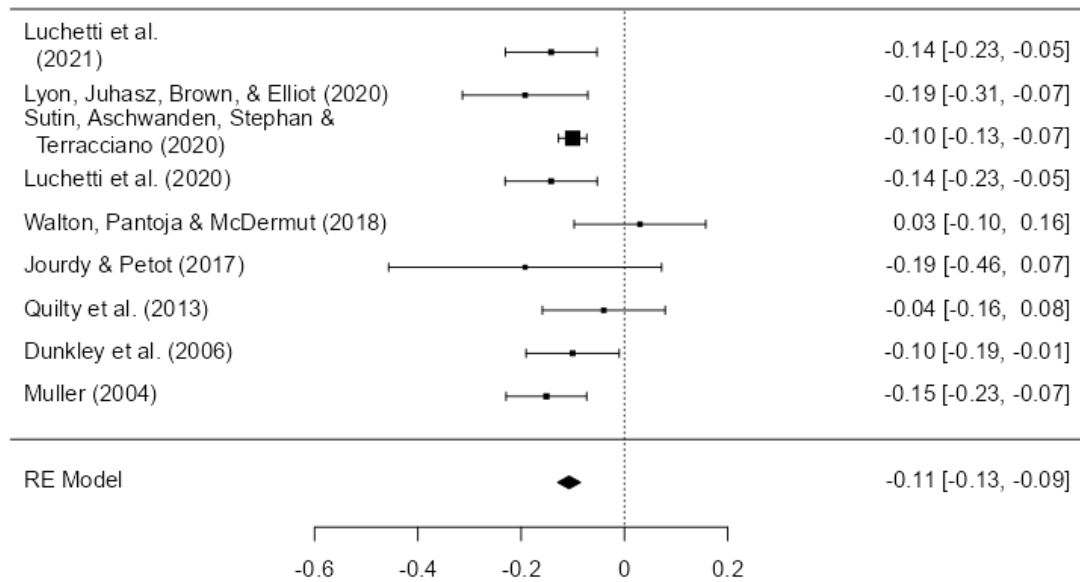
Forest Plot for Feelings



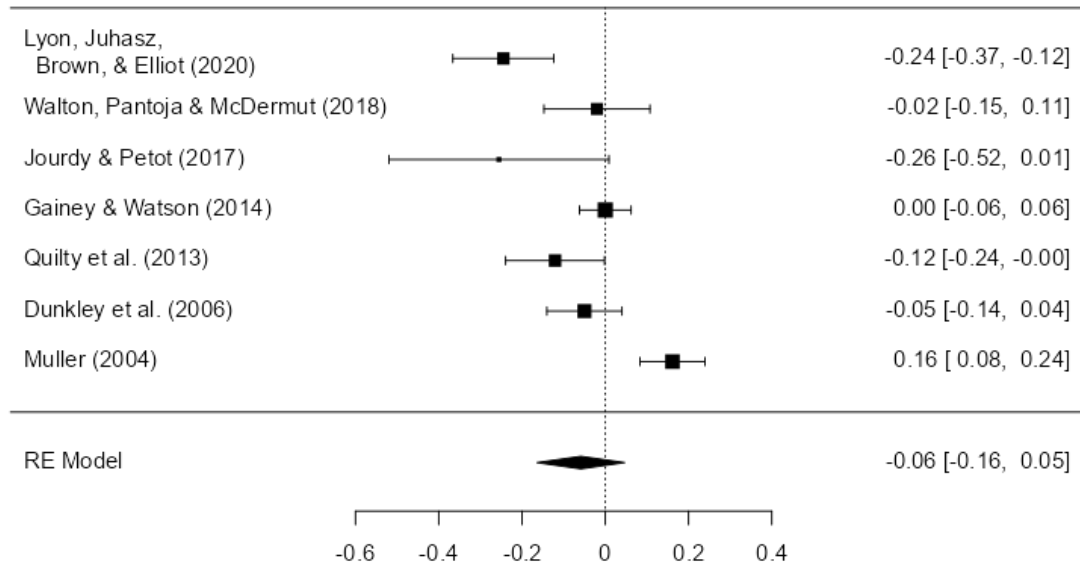
Forest Plot for Actions



Forest Plot for Ideas

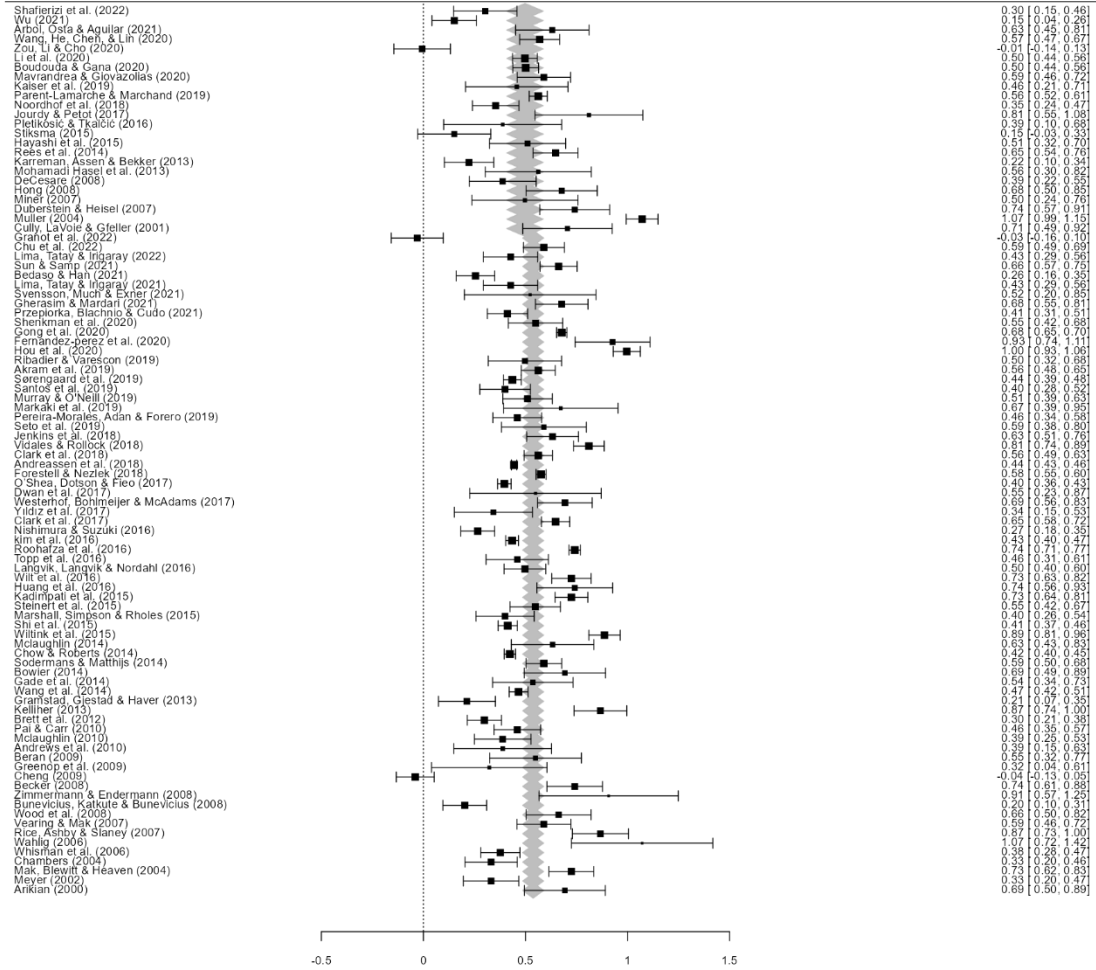


Forest Plot for Values

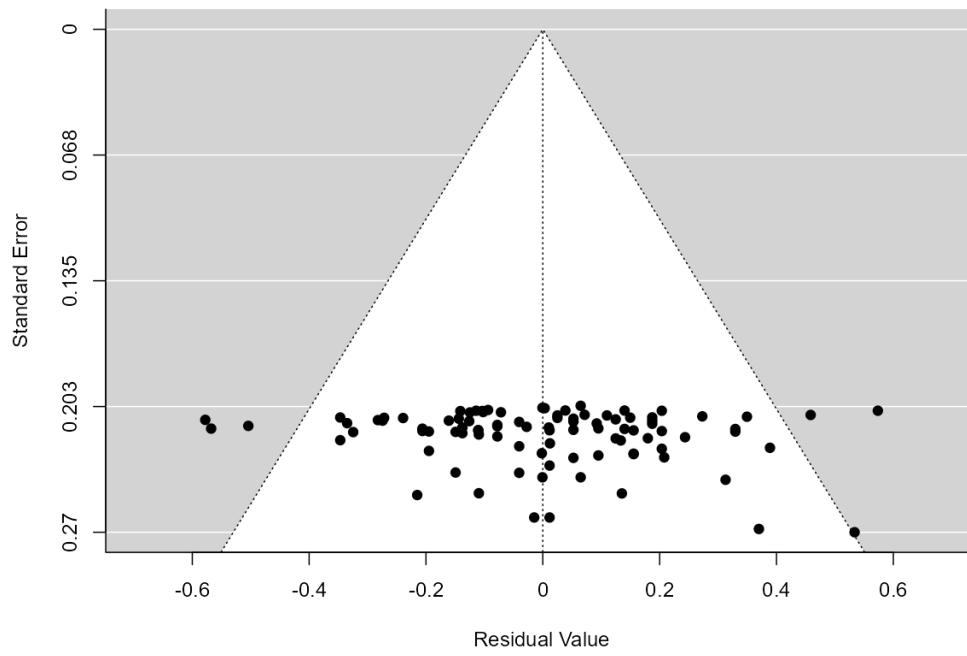


Appendix C: Funnel Plots and Forest Plots for the moderation analyses – Type of Depression Measure

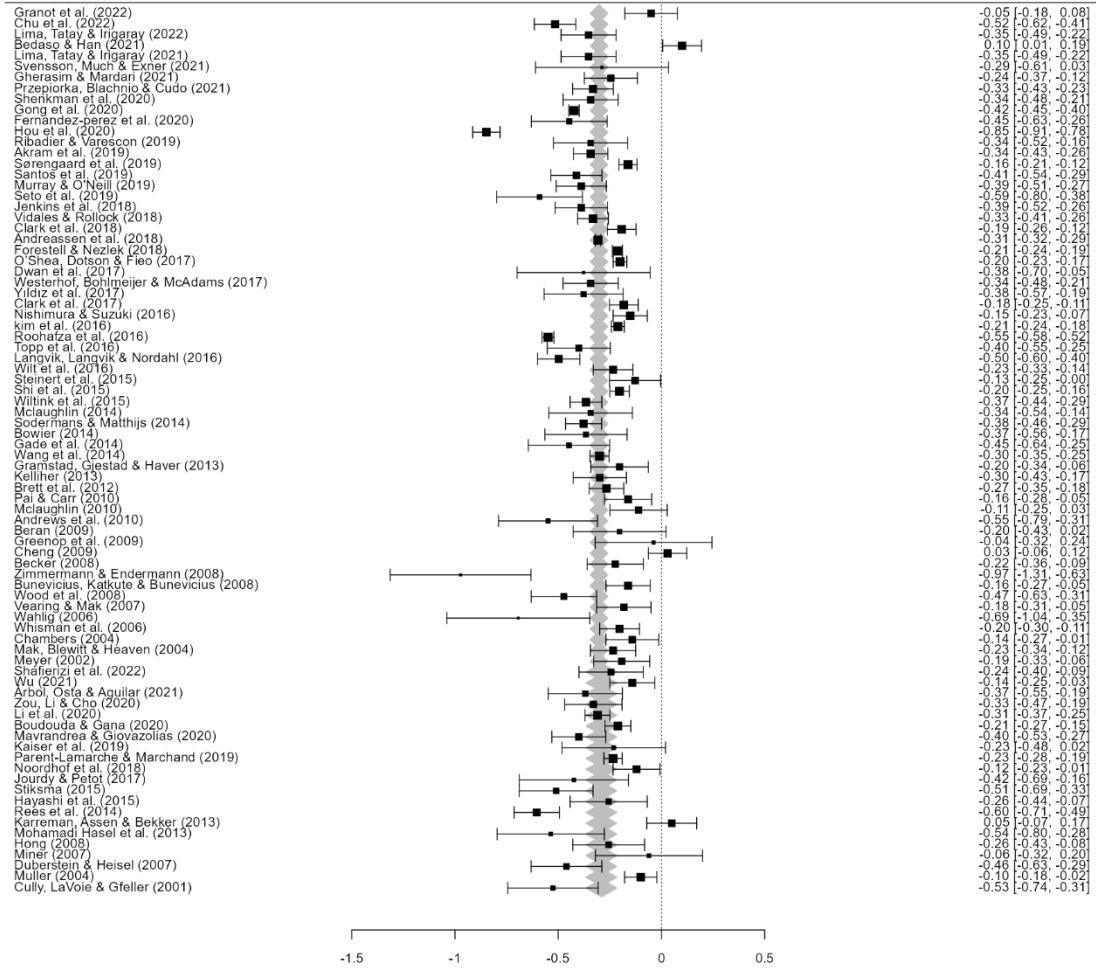
Forest Plot for Neuroticism



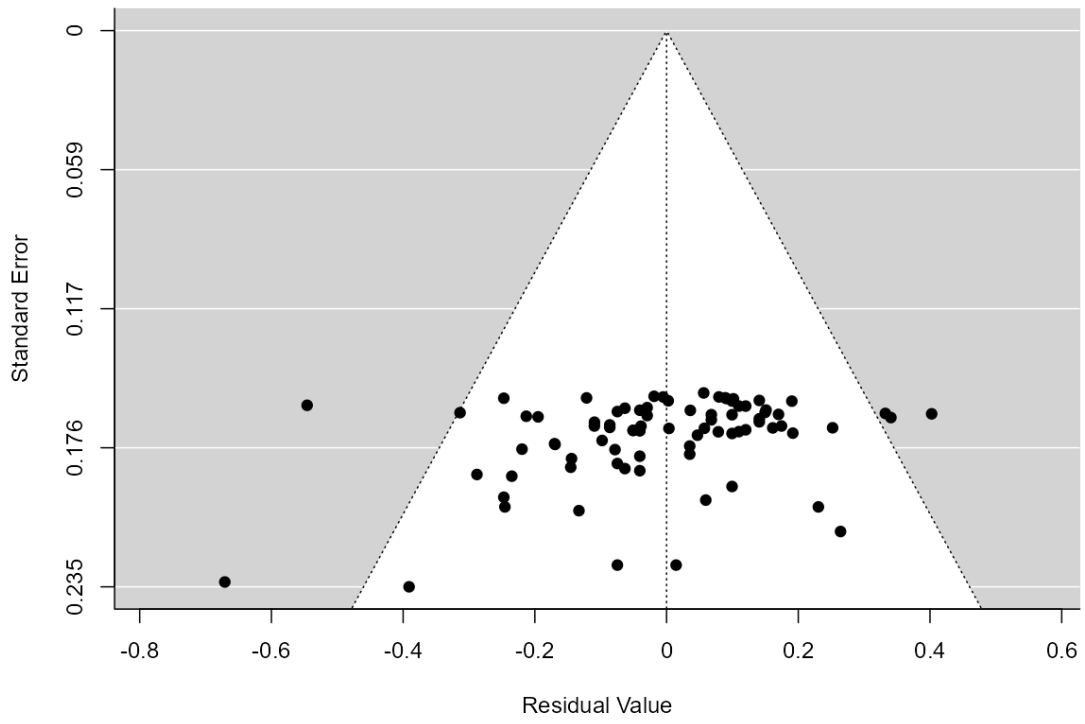
Funnel Plot for Neuroticism



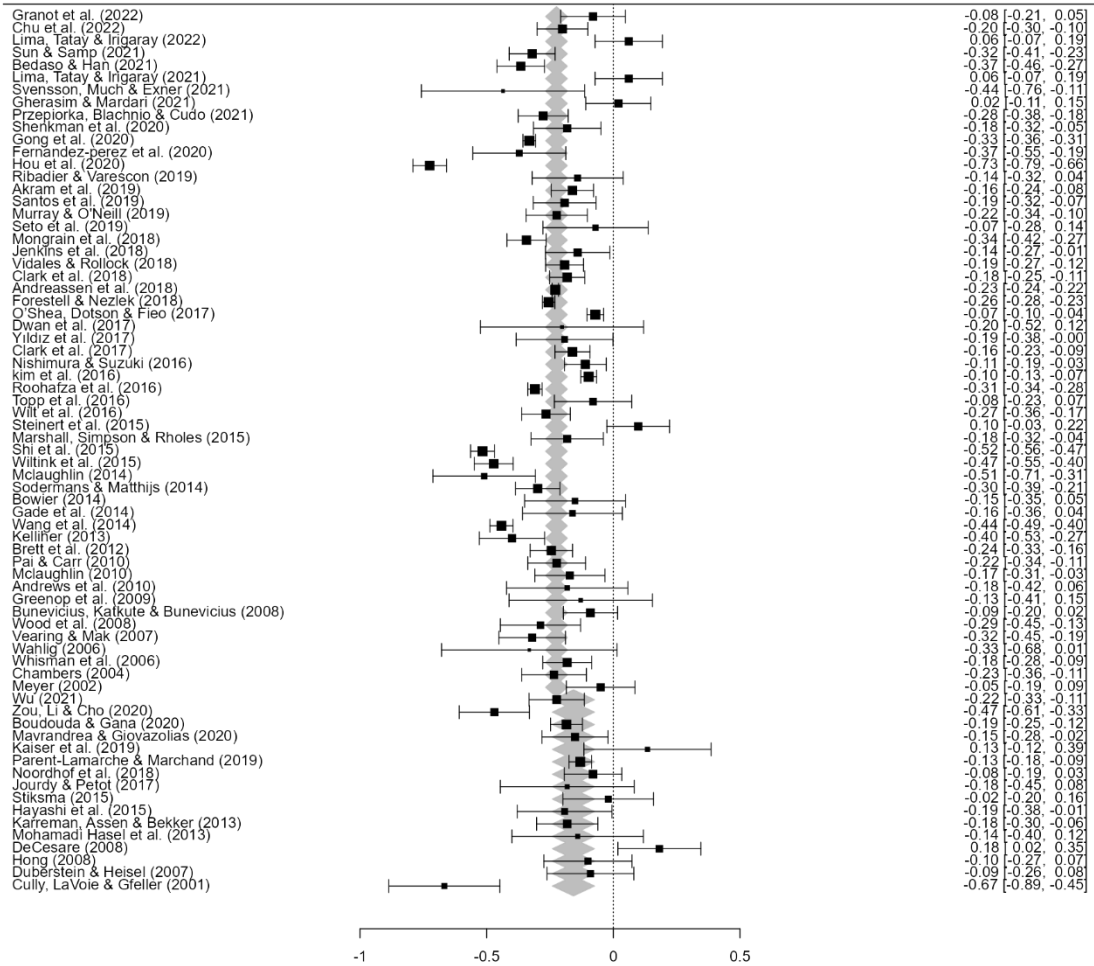
Forest Plot for Extraversion



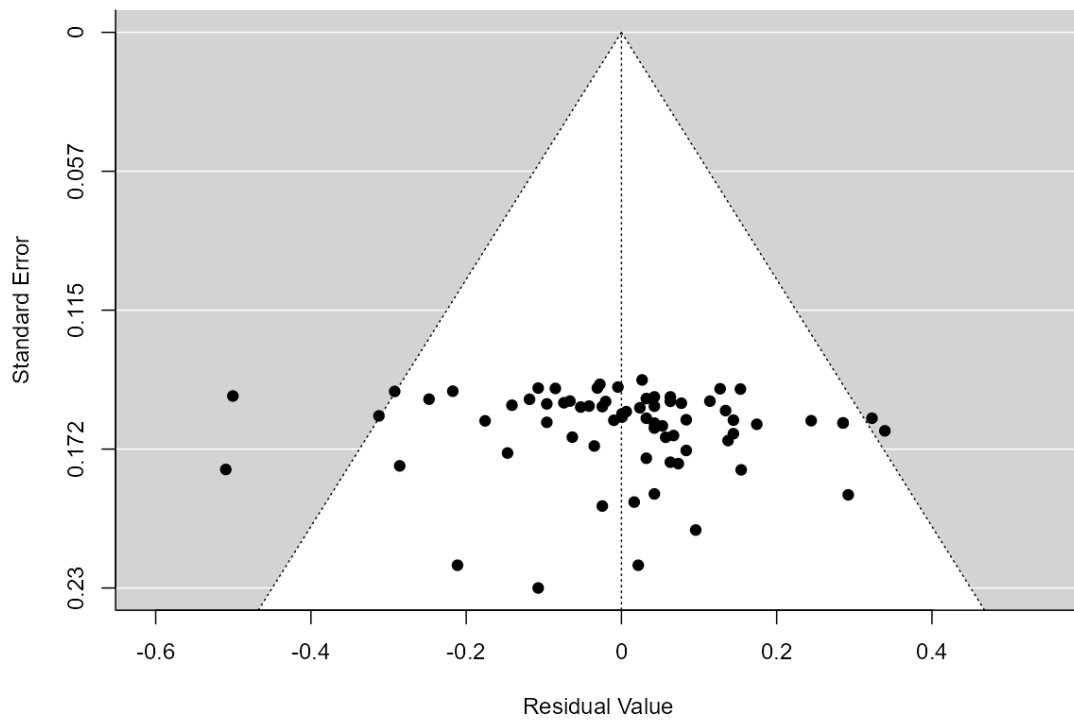
Funnel Plot for Extraversion



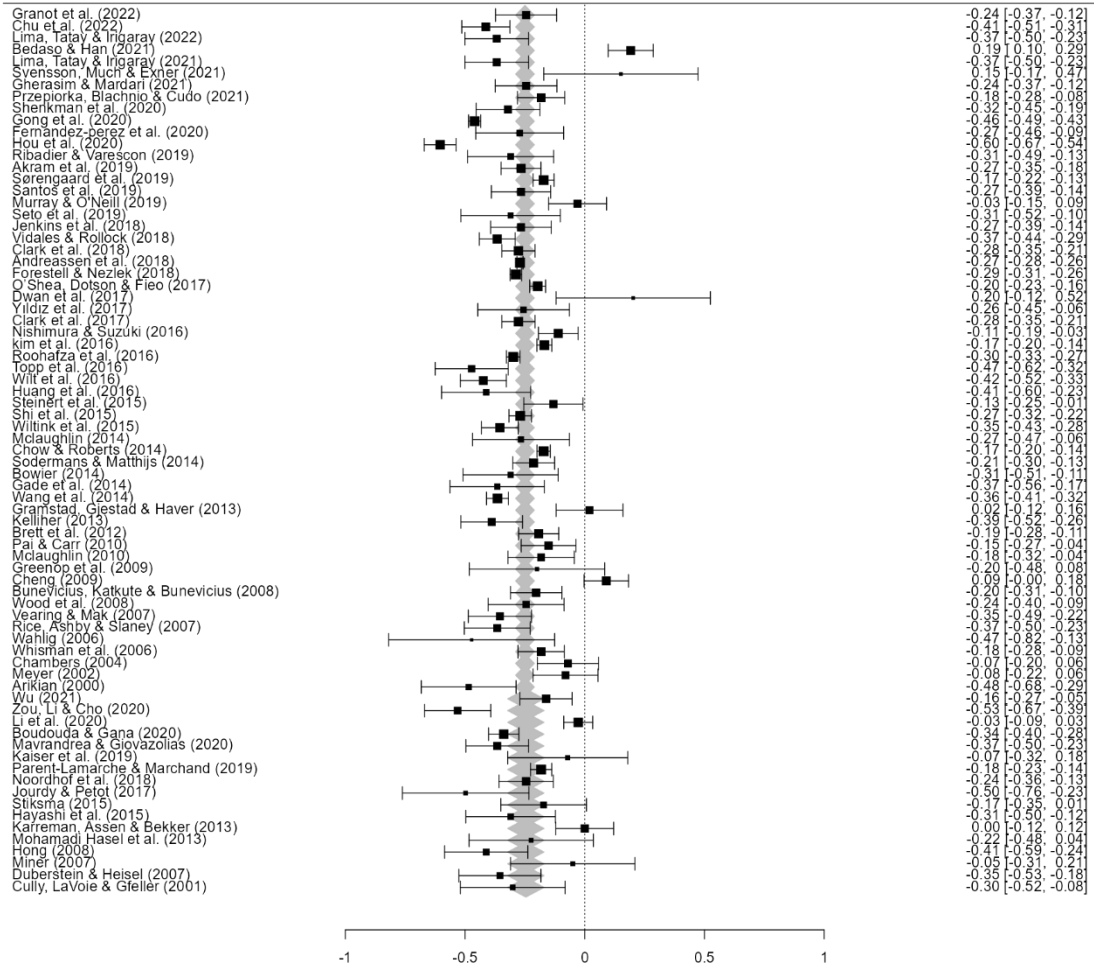
Forest Plot for Agreeableness



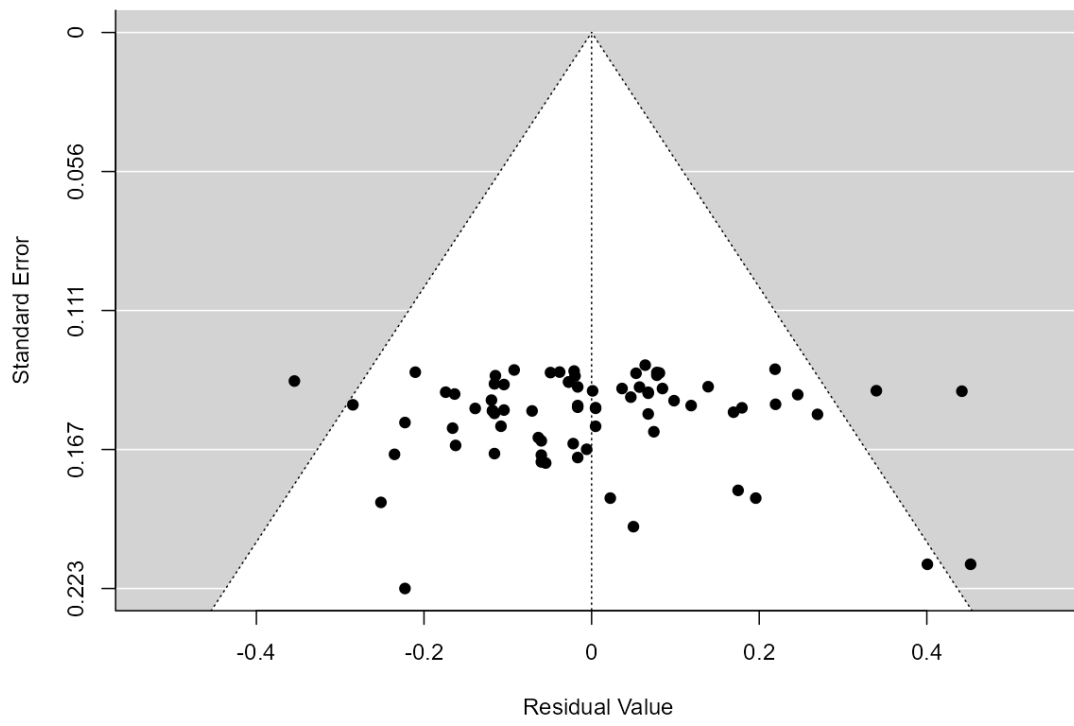
Funnel Plot for Agreeableness



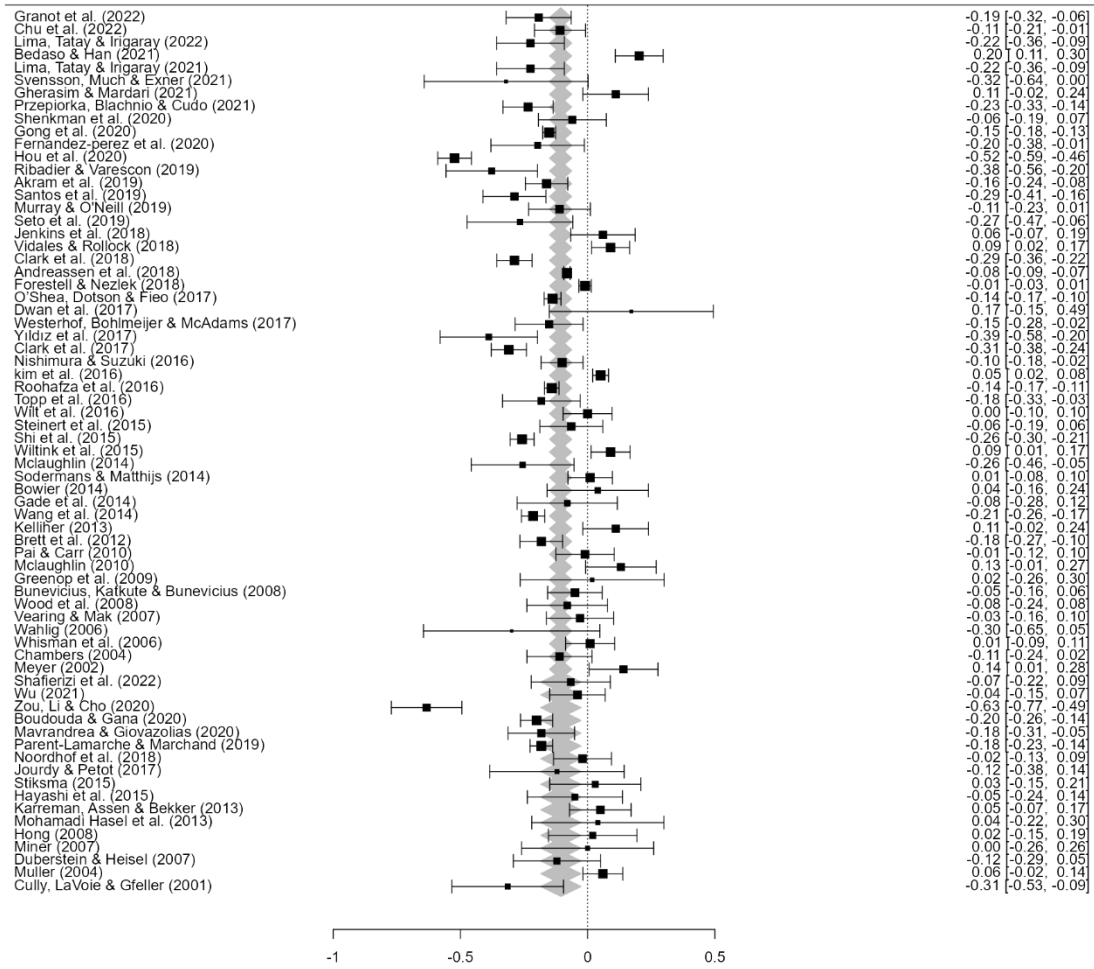
Forest Plot for Conscientiousness



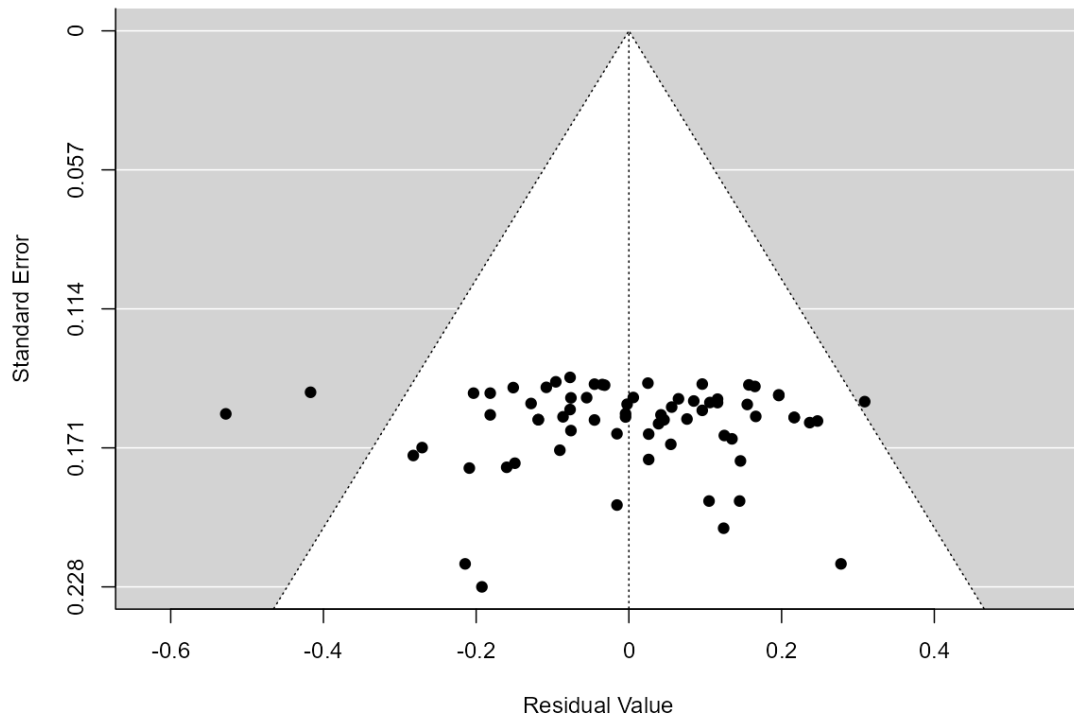
Funnel Plot for Conscientiousness



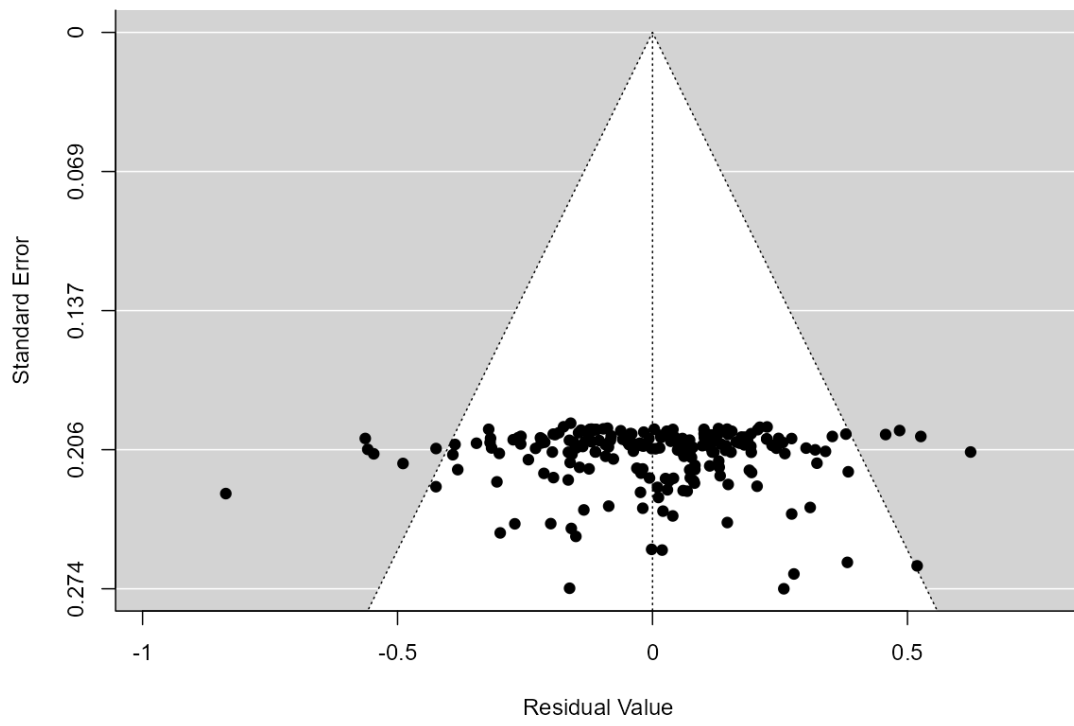
Forest Plot for Openness



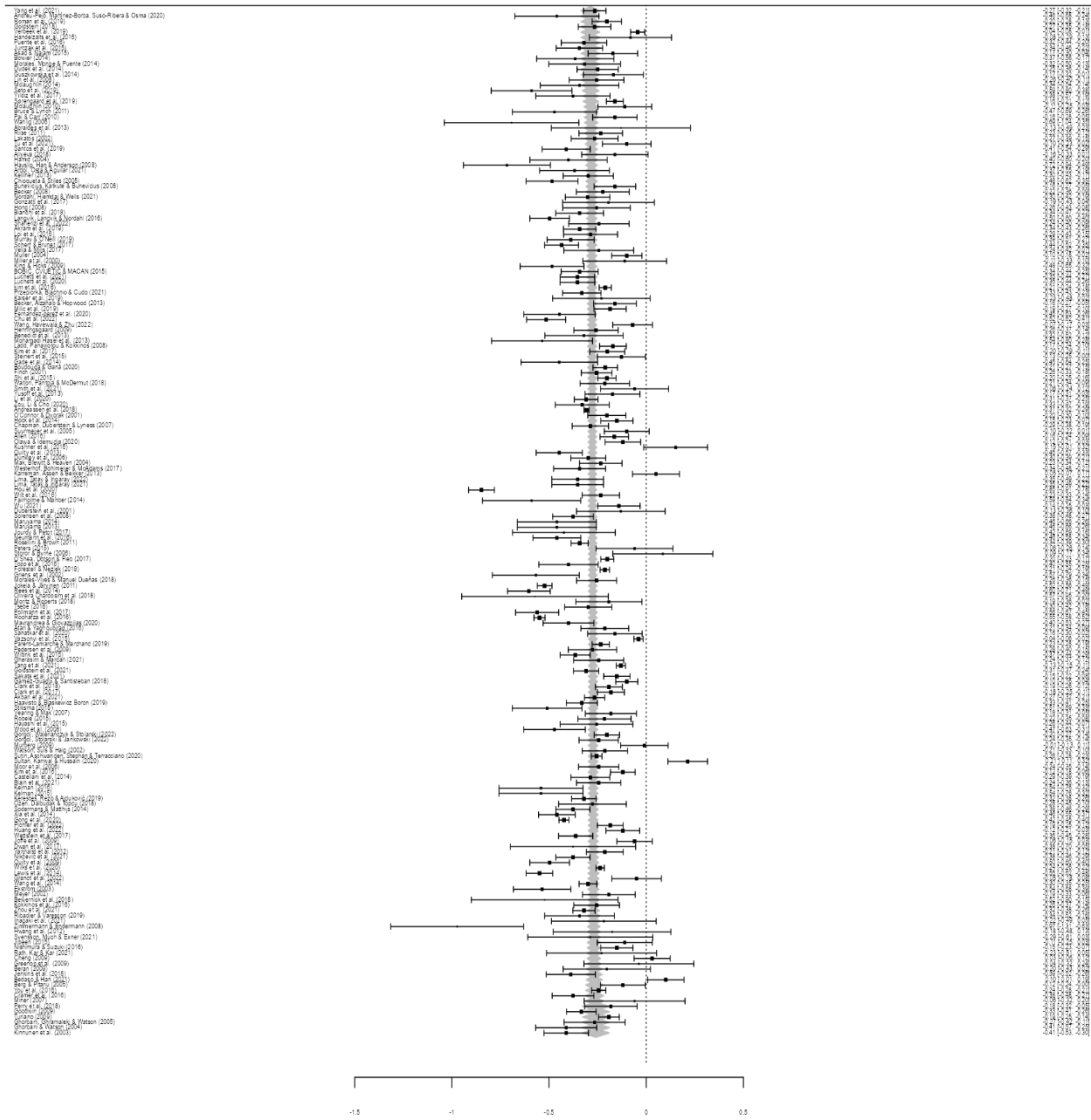
Funnel Plot for Openness



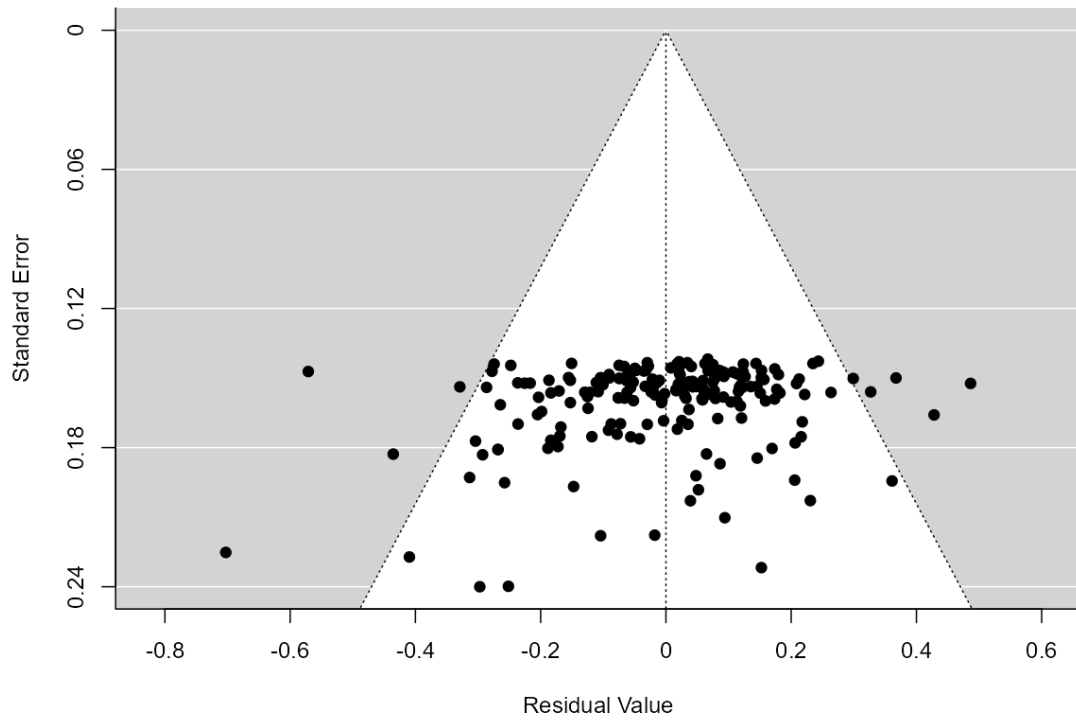
Funnel Plot for Neuroticism



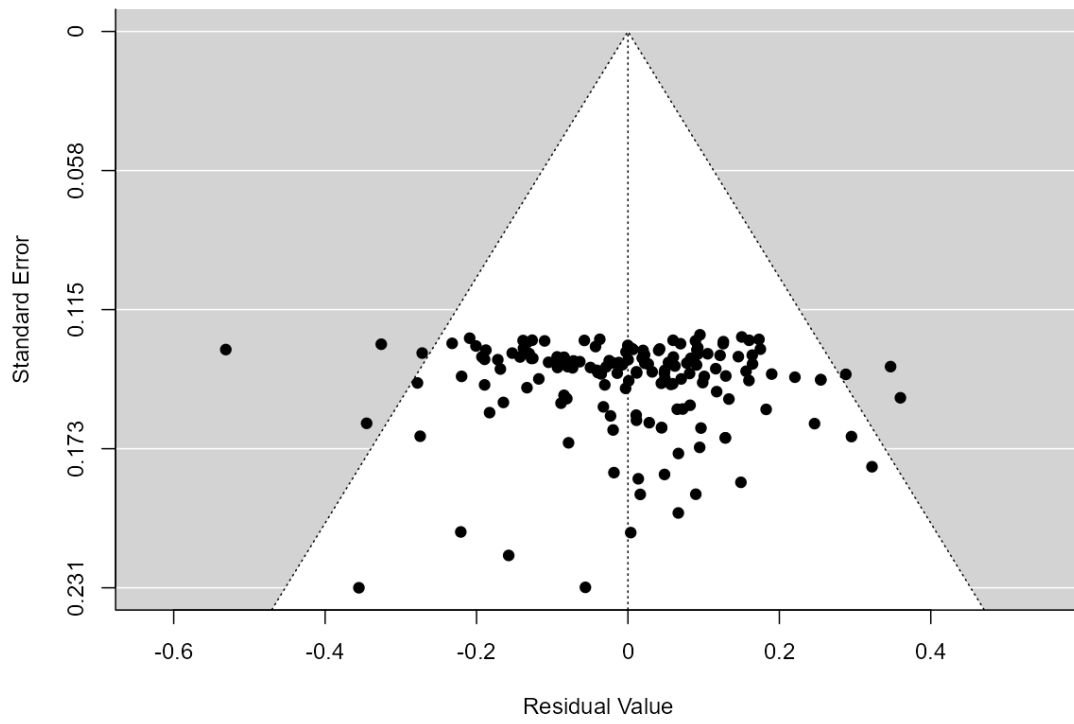
Forest Plot for Extraversion



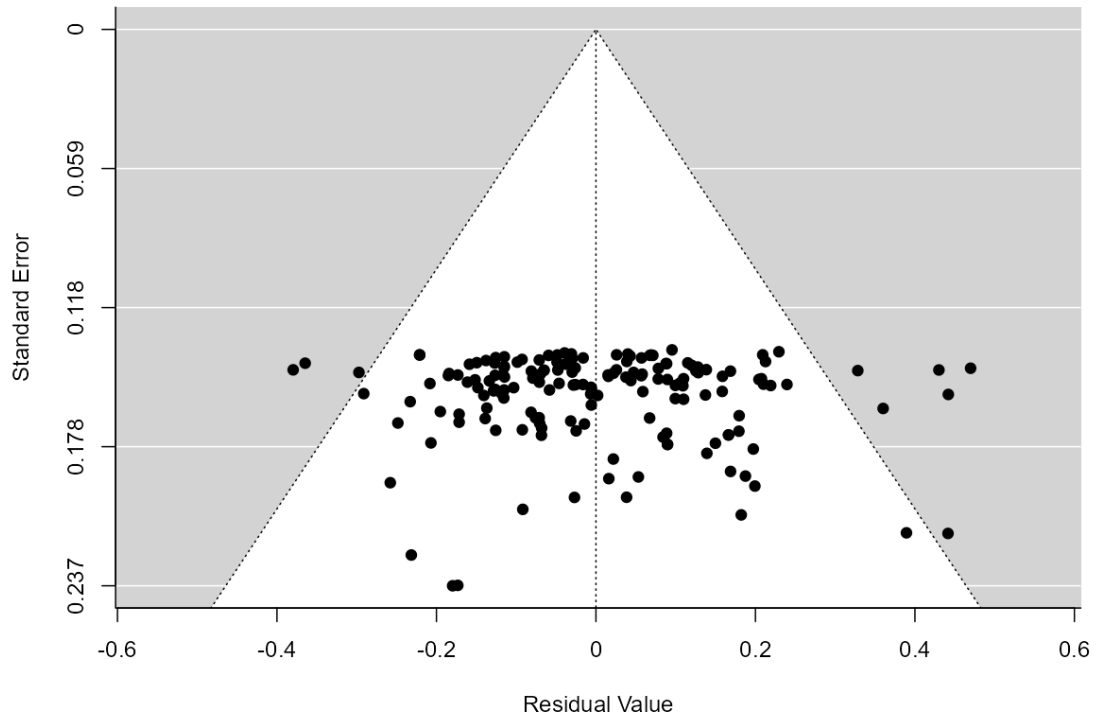
Funnel Plot for Extraversion



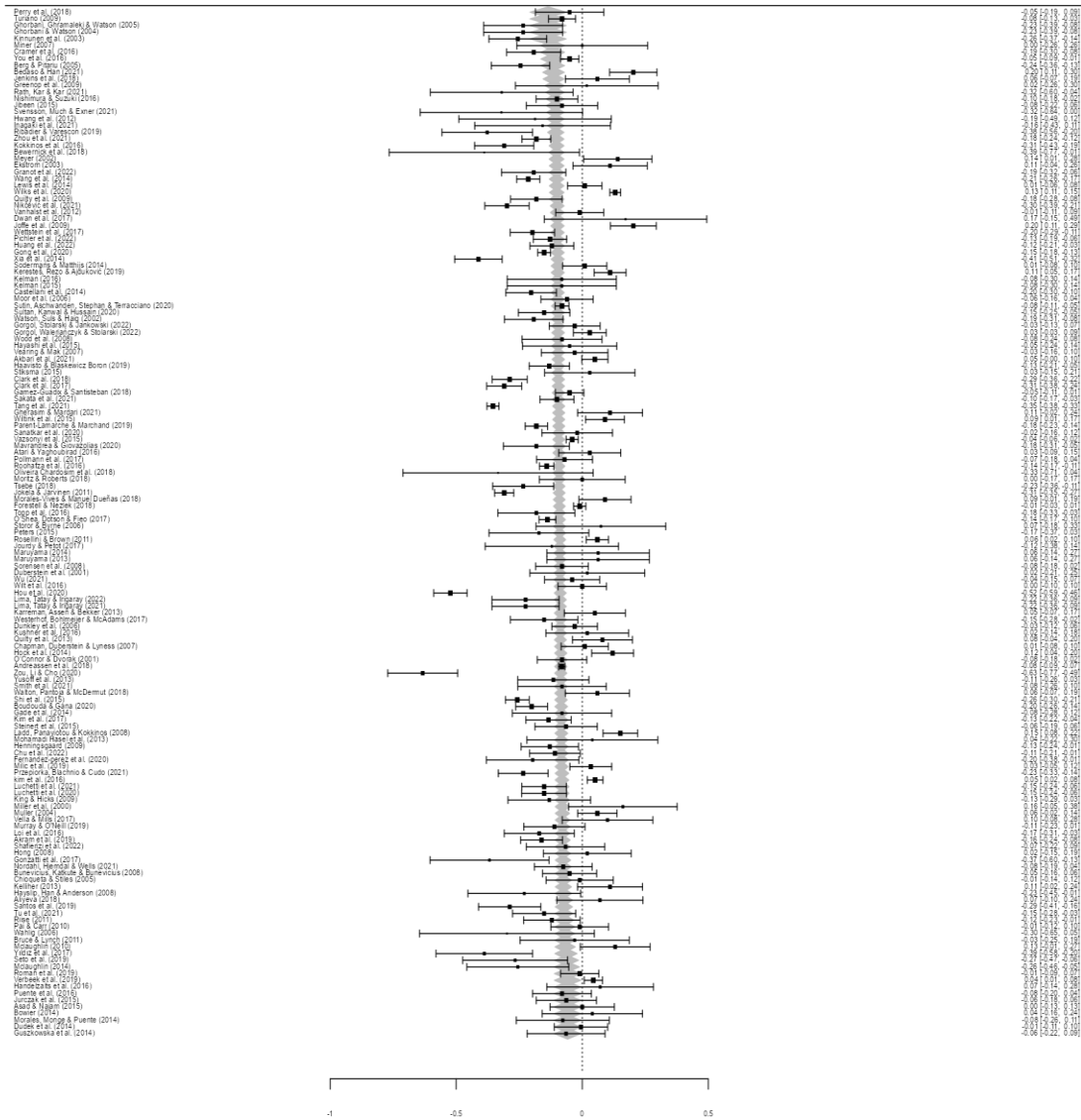
Funnel Plot for Agreeableness



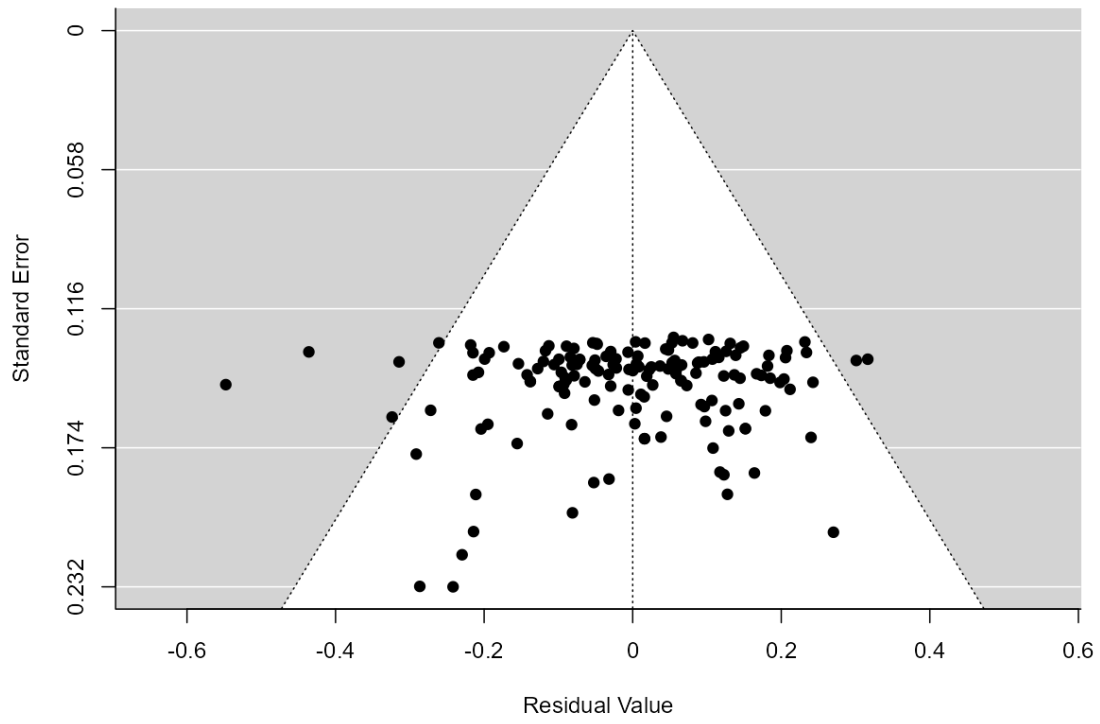
Funnel Plot for Conscientiousness



Forest Plot for Openness



Funnel Plot for Openness



Appendix E: Screenshots of the preregistration at OSF

Study Information



Hypotheses

I hypothesize that Neuroticism would have a strong positive correlation and Extraversion would have a significant negative correlation with depression. I also hypothesize that it would be hard to state that the correlation between Conscientiousness, Agreeableness, Openness and depression would be positive or negative.

In this study, I will consider the type of depression measure as a moderator to see whether type of depression measure (e.g., BDI-II vs. CESD) influences the strength or direction of the relationship between personality and depression.

Design Plan

Study type

Meta-Analysis - A systematic review of published studies.

Blinding

No blinding is involved in this study.

Is there any additional blinding in this study?

No response

Study design

The current study used a meta-analysis to investigate the effect size of personality traits on depressive symptoms and to investigate the influence of moderators such as the type of depressive symptom measure. In this study, the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement was used to help conduct the meta-analysis

No files selected

Randomization

No response

Sampling Plan

Existing Data

Registration prior to analysis of the data

Explanation of existing data

No response

Data collection procedures

For the meta-analysis, the following databases were searched concurrently within ProQuest: APA PsycInfo, ERIC, MEDLINE, and ProQuest Dissertations and Thesis Global to also include findings of unpublished studies relevant to this meta-analysis study. The following keywords were used to perform a comprehensive literature search for the meta-analysis:

(ti(personality) OR ti,ab,if("big five" OR "five factor" OR "personality traits" OR "personality facets" OR "personality dimensions" OR "personality scales" OR "personality measures" OR HEXACO OR NEO-PI-R))AND ti,ab,if(depress* OR BDI*).

Types of studies to be included. Correlational

Main outcome. Depressive symptom measures.

Explanatory variables. Self-report of personality traits including major dimensions (e.g., Five-Factor Model (i.e., Big Five) or six-factor models (i.e., HEXACO) and facets. In terms of the exclusion criteria, personality disorder measures such as borderline personality disorder and scales that assess personality disorders and other DSM-based measures such as Millon Clinical Multiaxial Inventory or MMPI were not included.

Samples. In terms of the targeted population, this study focused on adolescents, young adults, middle-aged and older adults.

No files selected

Sample size

we aim to include at least 100 eligible studies in this meta-analysis study.

Sample size rationale

No response

Stopping rule

No response

Variables

Manipulated variables

No response

No files selected

Measured variables

The outcome variable will be the depressive symptom measures used in the selected studies.

Explanatory variables will be the self-report of personality traits including major dimensions (e.g., Five-Factor Model (i.e., Big Five) or six-factor models (i.e., HEXACO) and their facets.

No files selected

Indices

No response

No files selected

Analysis Plan

Statistical models

Following the PRISMA method protocol for the meta-analysis, the aim is to first go through all the titles and abstracts identified by the key search terms to identify relevant studies. Second, the duplicates will be removed. Third, we identify studies that do not meet the inclusion criteria and exclude those that do not meet our criteria. In the fourth stage, we will look at the full-text articles to check if they are eligible and code the information. At this stage, we will again exclude many studies, mainly studies that do not provide the necessary information. In the fifth stage, by looking at the coded studies, we will decide which ones should be added or excluded in the meta-analysis to reach the point where I could determine the included studies. After searching the literature and screening the cases, the final step is to code the selected studies. JAMOVI and the MAJOR Module were used to conduct the meta-analysis. The selected studies were coded for different information such as authors, year of the study, sample size, correlations, type of personality and depression measures, and ethnicity.

We will most likely use a random-effects model. While fixed-effects models assume the exact same population value for all studies in the meta-analysis, random-effect models allow differences among studies and participants to vary across studies (Schmidt, Oh, and Hayes, 2009). Therefore, we will use a random-effects model as a recommended meta-analytic approach to consider the differences between studies.

No files selected

Transformations

No response

Inference criteria

No response

Transformations

No response

Inference criteria

No response

Data exclusion

No response

Missing data

No response

Exploratory analysis

No response

Curriculum Vitae

Name: Parisa Chavoshi

Post-secondary Education and Degrees: The University of Western Ontario
London, Ontario, Canada
2020-2022 M.Sc.

University of Tehran
Tehran, Iran
2012-2017 B.Sc.

Honours and Awards: Western Graduate Research Scholarship
2020-2021, 2021-2022

Fellowship from University of Tehran
2012-2017

Related Work Experience Teaching Assistant
The University of Western Ontario
2020-2022