



# The five factor model of personality and emotion regulation: A meta-analysis<sup>☆</sup>

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## ABSTRACT

**Objective:** The aim of the present meta-analysis was to examine the relationship between the Big Five personality traits and emotion regulation strategies.

**Method:** Studies were identified in PsycArticles, Medline, and Eric databases. Only empirical studies were included.

**Results:** Out of 32,656 identified articles, 132 studies (156 independent samples, 46,345 participants, and 753 effect sizes) met the inclusion criteria. The effect sizes of the *r*-type were obtained from all studies. The data were analyzed with random effects model. Lower level of neuroticism and higher levels of extraversion, openness to experience, agreeableness, and conscientiousness were associated with greater typically adaptive emotion regulation strategies (reappraisal, problem solving and mindfulness) and lower typically maladaptive emotion regulation strategies (avoidance and suppression). Additionally, in a few cases, the associations were stronger in clinical samples than in nonclinical samples, in females than males, and in samples reporting dispositional emotion regulation compared to samples reporting situational emotion regulation.

**Conclusion:** These results were discussed in terms of their importance for possible intervention strategies.

## 1. Introduction

In this article, I seek to address the relationships between the Big Five personality traits and emotion regulation strategies. Until now, no study has meta-analytically evaluated the associations between the Five Factor Model of Personality and emotion regulation strategies. However, previous studies on the relations between personality traits and coping suggest that the Big Five and emotion regulation may be interrelated. Perhaps the most prominent evidence comes from Connor-Smith and Flachsbart (2007) who meta-analytically tested the relations between the Five Factor Model of Personality and coping using 2653 effect sizes drawn from 165 samples and 33,094 participants. In their study, all the Big Five personality traits were linked with coping. Neuroticism, extraversion, and conscientiousness showed the strongest association with coping. Generally, neuroticism was linked with problematic strategies like wishful thinking, withdrawal, and emotion-focused coping, extraversion was related to support seeking and together with conscientiousness also with problem-solving and cognitive restructuring. Extending the knowledge of the relationship between personality traits and emotion regulation strategies is important because it allows us to better understand which personality traits are associated

with adaptive and maladaptive emotion regulation strategies and how other factors modify these relations. Whereas, some studies even suggest that all the Big Five personality traits are linked with emotion regulation strategies (Balzarotti, John, & Gross, 2010), others do not confirm these results (comp. Egloff, Schmukle, Burns, & Schwerdtfeger, 2006). These discrepancies suggest that a few questions still need to be addressed. First, the strength and direction of the association between personality traits and emotion regulation strategies is still unclear. Second, it needs to be verified which personality traits are predominantly linked with typically adaptive emotion regulation strategies and which are particularly associated with typically maladaptive emotion regulation strategies. Third, the potential moderating effects of other factors should be evaluated.

### 1.1. Defining the five factor model of personality

Personality traits should be defined as individual differences dimensions in thoughts, feelings, and actions patterns (McCrae & Costa Jr., 2003). Although, many theories of personality have been proposed over the years (Drapela, 1995), the Five Factor Model of Personality seems to be the most prominent and influential model in contemporary

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psychology (Costa & McCrae, 1989, 1992; comp. Allport & Odbert, 1936; Cattell, 1943; Eysenck & Eysenck, 1985; Norman, 1963). According to the Big Five, people differ in five personality trait dimensions which are neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness (Costa & McCrae, 1989, 1992). Individuals who score high on neuroticism are characterized by more vulnerability to stress, tendency to experience negative emotions (i.e., anxiety, anger, sadness), self-consciousness, and impulsivity compared to people who are more emotionally stable. Individuals who are extravert report greater activity, need for stimulation, seeking social interactions, gregariousness, warmth, and tendency to experience positive emotions than introvert individuals. People who score high on openness to experience are characterized by greater openness to feelings and emotions, imagination, appreciation of art and beauty, adventurousness, and liberalism. People who score high on agreeableness report greater tender-mindedness, straightforwardness, modesty, trust, compliance, and altruism than individuals with low agreeableness. People who score high on conscientiousness are characterized by competence, orderliness, achievement-striving, dutifulness, self-discipline, and deliberation compared to low conscientiousness individuals (Costa & McCrae, 1989, 1992).

### 1.2. Defining the emotion regulation strategies

*Emotion regulation* is the processes by which people modify which emotions they have, when they have them, but also how they experience and express them (Gross, 1998; comp. Bar-On, 1997; Goleman, 1995; Gratz & Roemer, 2004; Salovey & Mayer, 1990). It is important to mention that people modulate their emotions (comp. Gross & Jazaieri, 2014) consciously and unconsciously (Bargh & Williams, 2007; Gross, 1998; Rottenberg & Gross, 2003; Williams, Bargh, Nocera, & Gray, 2009) with cognitive and behavioral strategies (Garnefski & Kraaij, 2006, 2007; Gratz & Roemer, 2004; Gross & John, 2003; Kamholz, Hayes, Carver, Gulliver, & Perlman, 2006; Naragon-Gainey, McMahon, & Chacko, 2017; Parkinson & Totterdell, 1999).

There are many emotion regulation strategies (see Peña-Sarrionandia, Mikolajczak, & Gross, 2015). However, it has been found that some emotion regulation strategies are more strongly associated with psychopathologies and human functioning than others. The most important strategies which are generally assumed to be adaptive (i.e., linked to beneficial outcomes in long-term) are acceptance, reappraisal, problem-solving, and mindfulness (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Hu, Zhang, Wang, Mistry, Ran, & Wang, 2014; Karyadi, VanderVeen, & Cyders, 2014; O'Driscoll, Laing, & Mason, 2014; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017; Seligowski, Lee, Bardeen, & Orcutt, 2015). Acceptance involves accepting the situation and/or associated emotions in a nonevaluative way (Carver, Scheier, & Weintraub, 1989; Garnefski & Kraaij, 2007; Kamholz et al., 2006). Reappraisal reflects tendencies to think about the situation in a different way to alter its emotional effect (Carver et al., 1989; Garnefski & Kraaij, 2007; Gross & John, 2003; Kamholz et al., 2006). Problem-solving involves taking active, cognitive, and behavioral actions aimed at changing the situation (Carver et al., 1989; Garnefski & Kraaij, 2007; Kamholz et al., 2006). Mindfulness, that originated from Buddhist spiritual practices such as meditation and yoga, reflects a process that leads to a mental state of nonjudgmental awareness of the present moment experience (Kabat-Zinn, 2011). The most relevant strategies which are generally assumed to be maladaptive (i.e., associated with negative outcomes in long-term perspective) are avoidance, rumination, suppression, and worry (Aldao et al., 2010; O'Driscoll et al., 2014; Schäfer et al., 2017; Seligowski et al., 2015). Avoidance reflects the attempts to avoid not only external stimuli and situations (Carver et al., 1989) but also the experience of the internal psychological events (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Rumination involves perseverative focusing on situation, emotional experiences and their consequences (Garnefski & Kraaij, 2007;

Nolen-Hoeksema & Morrow, 1991). Suppression is a strategy that reflects not only the attempts to suppress thoughts and emotions associated with the situation (Wegner & Zanakos, 1994) but also the expression of emotions (Gross & John, 2003). Worry involves the tendencies to think about the negative consequences of the situation in the future (Meyer, Miller, Metzger, & Borkovec, 1990).

### 1.3. Expected theoretical relationships between personality traits and emotion regulation

People experience and express many positive and negative emotions in their lifespan. It has been found that people are prone to reveal their thoughts, beliefs, needs, and emotions if they declare greater relationship quality (Greer, Campione-Barr, & Lindell, 2015; Reidler & Swenson, 2012). The process through which emotional reactions are shaped by others is called emotion socialization (Eisenberg, Cumberland, & Spinrad, 1998). People learn to identify, label, and regulate their emotions through emotion socialization (Morris, Silk, Steinberg, Myers, & Robinson, 2007). It is assumed that parents are the primary emotion socializing agents (Eisenberg et al., 1998). The role of parents in children's emotional development changes when children start to interact with people outside of the family. Close friends are thought to be especially important socializing agents (Miller-Slough & Dunsmore, 2016; Reindl, Gniewosz, & Reinders, 2016). People may socialize individuals' emotions through: (1) reactions to people's emotions, (2) emotion-related conversations, and (3) emotional expressiveness in relationships (Eisenberg et al., 1998). Others emotion socialization reactions have generally been considered as either supportive (e.g., acceptance, comfort, and validation of person's emotions, problem-solving, or encouraging of emotional expression) or nonsupportive (e.g., avoidance of emotional discussion with the person, minimizing the relevance, and even punitive reactions to the individual's emotions; Eisenberg et al., 1998; Miller-Slough & Dunsmore, 2016). Greater supportive and lower nonsupportive emotion socialization practices are linked with better individuals' emotion knowledge, emotional competence, and emotion regulation strategies (Cole, Dennis, Smith-Simon, & Cohen, 2009; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Garner, 1999). It has been suggested that temperament and personality traits are one of the most important characteristics of the person which may modify not only the others' choice of emotion socialization practices but also the influence of emotion socialization behaviors on individual's emotional development (Eisenberg et al., 1998).

#### 1.3.1. Main expectations

Connor-Smith and Flachsbart (2007) meta-analytically tested the relations between the Five Factor Model of Personality and coping. Neuroticism, extraversion, and conscientiousness showed the strongest association with coping. There has been a growing number of evidence for the relationship of emotion socialization with the Big Five personality traits and emotion regulation strategies. For example, it has been found that parents may be more emotionally unavailable and use more avoidant, punitive, and minimize emotion socialization reactions and employ less problem-solving emotion socialization behaviors in reaction to their children's negative emotions if they view their children as high in negative emotionality (Eisenberg et al., 1999; Eisenberg & Fabes, 1994; Eisenberg, Fabes, & Murphy, 1996; Kim, Chow, Bray, & Teti, 2017; Kochanska, Friesenborg, Lange, & Martel, 2004; Laible, Panfile, & Makariev, 2008; Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990). In turn, it has been noticed that parents may be more emotionally available, caring, responsive, and supportive if they view their children as high in surgency, extraversion, and positive emotionality (Kim et al., 2017; Kochanska et al., 2004; Mangelsdorf et al., 1990). These findings suggest that people who report greater neuroticism, lower extraversion, and agreeableness may declare greater nonsupportive emotion socialization and lower supportive emotion

socialization. Less supportive and more nonsupportive emotion socialization may be associated with lower individuals' emotion knowledge, emotional competence, and emotion regulation strategies (Cole et al., 2009; Denham et al., 1997; Garner, 1999). Thus, it might be supposed that people who declare greater neuroticism, lower extraversion, and agreeableness may tend to use more maladaptive emotion regulation strategies and less adaptive emotion regulation strategies.

### 1.3.2. Potential moderators

Until now, there is no study which has directly examined whether other factors moderate the magnitude of the association between personality traits and emotion regulation strategies. In the study of Connor-Smith and Flachsbart (2007), who meta-analytically tested the relations between the Five Factor Model of Personality and coping, personality traits were strongly linked with coping in young samples, and samples reporting dispositional rather than situation-specific coping. In their study gender was not a consistent moderator. However, considering the results of the additional previous studies, it seems especially important to examine the effects of group type, age, gender, and emotion regulation focus on these relations. First, it is well-documented that individuals suffering from mental disorders declare less supportive and more nonsupportive emotion socialization practices from close family members and friends (Borowski, Zeman, & Braunstein, 2018; Johnson, Hawes, Eisenberg, Kohlhoff, & Dudeney, 2017; Silk et al., 2011). Second, the role of emotion socialization in the development of emotional self-regulation may become weaker as people get older (Eisenberg et al., 1998; Miller-Slough & Dunsmore, 2016; Reindl et al., 2016). Third, the degree to which females' and males' emotional experiences and expressions are met by others' differential responses is not well established. There is a large number of studies which have presented that parents often do not report reacting differently to the negative emotions of female or male children (Eisenberg et al., 1996; Eisenberg & Fabes, 1994; Kliewer, Fearnow, & Miller, 1996). However, in some studies it has been found that parents report being more accepting of females' sadness and anxiety and of males' anger (Birnbaum & Croll, 1984; Casey & Fuller, 1994; Condrey & Ross, 1985). Despite these differences, the most important evidence suggests that females feel more hurt and less loved than males when their parents engage in punitive and minimizing emotion socialization behaviors (Perry, Leerkes, Dunbar, & Cavanaugh, 2017). Fourth, it is possible that the magnitude of the relationship between personality traits and emotion regulation strategies may differ in samples reporting dispositional emotion regulation in comparison to samples reporting situational emotion regulation (see Connor-Smith & Flachsbart, 2007). However, the lack of a strong theoretical and empirical evidence makes it impossible to make prediction at a higher level of precision.

### 1.4. The current study

In this article, I evaluated the association between the Big Five personality traits and the most common emotion regulation strategies. More specifically, my aims were to examine: (1) the relations of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness with typically adaptive emotion regulation strategies (acceptance, cognitive reappraisal, problem-solving, and mindfulness) and typically maladaptive emotion regulation strategies (avoidance, rumination, suppression, and worry) and (2) the moderating effects of group type (clinical vs non-clinical), age (according to mean age of the group), gender (according to percentage of females in the sample), and emotion regulation focus (dispositional vs situational) on these relations.

## 2. Method

### 2.1. Inclusion and exclusion criteria

To ensure the high quality of the publications, I included only studies which met the following criteria: (1) the article was written in English, (2) permitted peer-reviewed research that used well-validated and commonly administered self-report measures of personality traits and emotion regulation strategies were included in this meta-analysis, and (3) the correlation coefficients between personality traits and emotion regulation were reported in the study. Additionally, I excluded studies if: (1) temperament traits were measured in the study (i.e., Cloninger's Psychobiological Model of Temperament and Character, Strelau's Regulative Theory of Temperament, and Zuckerman's sensation seeking temperament), (2) only general ability to regulate emotions was measured in the research, and (3) participants suffered from any kind of brain damage.

### 2.2. Information sources

In March 2018 I searched the PsycArticles, Medline, and Eric databases using personality keywords: *personality traits* or *Big Five* or *Five Factor Model* or *neuroticism* or *extraversion* or *openness to experience* OR *agreeableness* OR *conscientiousness* in all text plus one of the following emotion regulation keywords: *emotion regulation* or *regulation of emotion* (2090 results), *cope* or *coping* (8755 results), *acceptance* (4490 results), *reappraisal* (931 results), *problem solving* (3893 results), *mindfulness* or *meditation* or *yoga* (1163 results), *avoidance* (5538 results), *rumination* (1238 results), *suppression* (1905 results) and *worry* (2653 results) in all text. I included only the full versions of articles in the study.

### 2.3. Study selection and data collection

The whole process of study selection and data collection was performed only by the author of the manuscript. In the first step, I conducted the study selection process by title, followed by abstract, and full text based on inclusion and exclusion criteria. In the second step, I coded the correlation coefficients for main analyses and the information about group type, age, gender, and emotion regulation focus for moderation analyses.

### 2.4. Risk to internal validity

In this meta-analysis, I included only permitted peer-review high quality publications based only on correlational effect sizes which used reliable, well-validated, and commonly administered self-report measures of personality traits and emotion regulation strategies. Thus overall there was small risk for low internal validity. However, there are few potential factors which may be a threat to internal validity. One potential problem is that there was only one coder. Second problem is associated with the fact that all measures were self-reported. Third potential problem is that no measurement error correction was performed in this study. I discussed these aspects in the context of the study limitations.

### 2.5. Summary measures and methods of synthesis

I obtained the effect sizes of the *r*-type from all studies. Pearson's correlation was used in 155 samples (99,35%) and Spearman's correlation was used in 1 sample (0,65%). Other studies did not provide sufficient data which could be transformed to *r*-type effect sizes. When necessary, I reversed the correlation coefficients, so that positive scores would indicate greater level of personality trait or greater level of emotion regulation strategy. If the individual study included multiple effect sizes for the same outcome, I combined these effect sizes into one

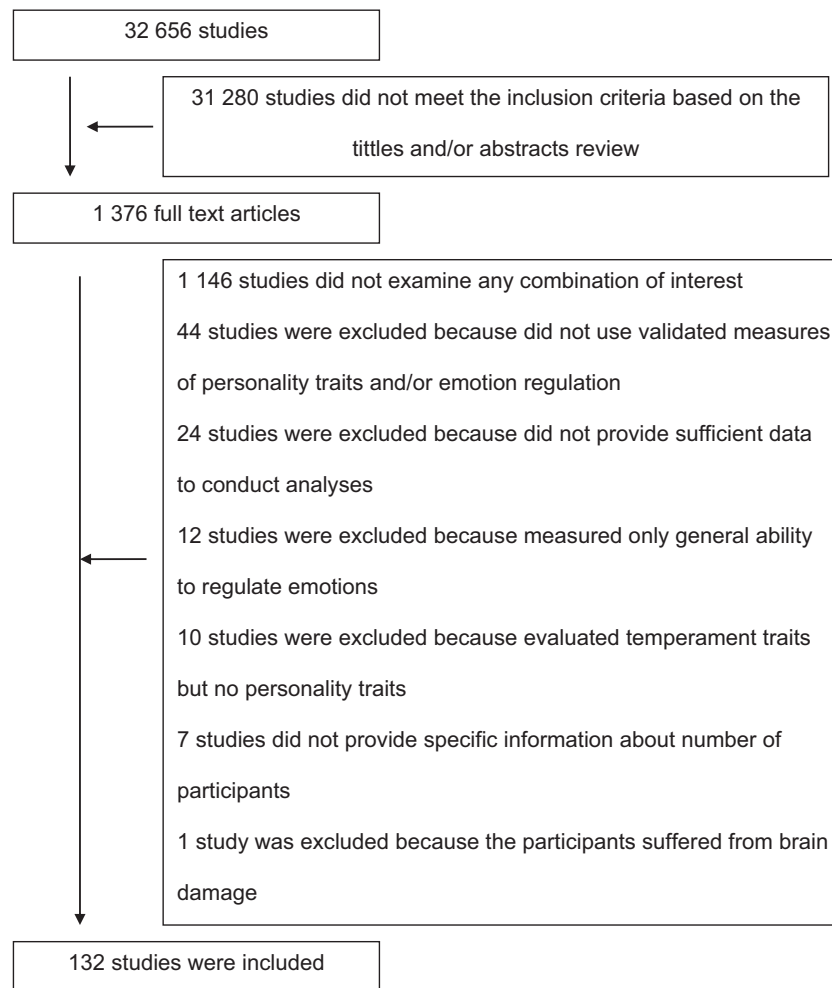


Fig. 1. Derivation of the analysis samples.

mean effect size per study. Correlation coefficients were then transformed to the Fisher's  $z$ -values to avoid the problematic standard error formulation of the  $r$ -values (Lipsey & Wilson, 2001). Next, the Fisher's  $z$ -values were transformed back to the  $r$ -values to make their interpretation easier (Lipsey & Wilson, 2001). I used study as unit of analyses if there were independent subgroups within a study. Finally, to examine the potential effects of dependency among effect sizes, I calculated a synthetic variable for each study if research included multiple outcomes. According to Cohen's (1992) guidelines effect sizes of the  $r$ -metric should be interpreted as follows: small effect for  $r \geq 0.10$ , medium for  $r \geq 0.30$ , and large for  $r \geq 0.50$ .

Additionally, to assess moderators, I examined the degree of heterogeneity between effect sizes with  $Q$  statistic (Cochran, 1954; Hedges & Olkin, 1985),  $I^2$  (Higgins, Thompson, Deeks, & Altman, 2003) and  $\tau^2$  (Thompson & Sharp, 1999).  $Q$  statistic (Cochran, 1954; Hedges & Olkin, 1985) denotes the ratio of observed variation to within-study error.  $I^2$  (Higgins et al., 2003) and  $\tau^2$  (Thompson & Sharp, 1999) represents the between - study variance. Greater heterogeneity reflects the differences between the results which cannot simply be attributed to chance variation. The aim of the moderator analyses was to evaluate the proportion of the variance that was accounted for group type, age, gender, and emotion regulation focus. The study was assigned to a clinical group if participants suffered from mental disorders or were exposed to trauma and the study was assigned to a nonclinical group if individuals suffered from somatic disorders (i.e., people exposed to cardiac catheterization, patients suffering from rheumatoid arthritis, fibromyalgia, asthma, and diabetes), were students, or other community samples. I evaluated the

moderating effect of age according to the mean age of a group. I examined the moderating effect of gender according to percentage of females in a group. Finally, the study was assigned to a dispositional emotion regulation group if participants reported dispositional emotion regulation and the study was assigned to a situational emotion regulation group if individuals reported context-specific emotion regulation.

I performed main effect sizes analyses as well as moderation analyses (method of moments) with random effect model analyses (which assumes that the data are drawn from different populations) using the Comprehensive Meta Analysis Software version 3.0 for Windows.

## 2.6. Publication bias and selective reporting

I included only published studies in this meta-analysis. The meta-analysis results depend heavily on the studies available for assessment. One potential problem is the fact that studies with statistically significant results are more likely to be published than studies which have not noticed any significant effects. This is so called a file-drawer problem (Rosenthal, 1979). Accordingly, Rosenthal's (1979) fail-safe  $N$  was used to evaluate the number of null studies which have to be added to remove the observed effects. Greater numbers of additional effect sizes needed to reduce an estimate from the original effect size to null suggest that publication bias is unlikely. Meta-analytic results are considered to be robust if number of null findings needed for refutation is  $> 5$  times the total number of findings, plus 10 (Rosenthal, 1995). Second potential problem is the tendency of smaller studies to produce

different effects (usually larger ones) than those of larger studies (Sterne, Gavaghan, & Egger, 2000). Therefore, Egger's test for bias (Egger, Davey Smith, Schneider, & Minder, 1997) and Begg and Mazumdar rank correlations (Begg & Mazumdar, 1994) were used to evaluate whether the meta-analysis results relied on small-study effects. Both tests are based on funnel plot analyses (Begg & Mazumdar, 1994; Egger et al., 1997). Finally, the relationships which were at risk for publication bias were adjusted for publication bias with trim and fill (Duval & Tweedie, 2000) random effect model analyses. Again, trim and fill (Duval & Tweedie, 2000) is based on funnel plot analysis. This analysis consists of few steps. The effect sizes on both sides of the funnel plot are compared and the image which does not have a mirror one on the opposite side is removed. Next, the effect sizes which were removed and their simulated mirror images on the opposite side of the funnel plot are returned to the analyses. Finally, original results are compared with trimmed effect sizes. I performed Rosenthal's (1979) fail-safe  $N$  analyses only if at least 3 effect sizes were available. Additionally, I conducted Egger's test (Egger et al., 1997), Begg and Mazumdar (1994) rank correlations, and trim and fill (Duval & Tweedie, 2000) analyses if at least 10 effect sizes were observed as it is recommended for funnel plots analyses. I performed all analyses only for significant relationships. I conducted all analyses with Comprehensive Meta Analysis Software version 3.0 for Windows.

### 3. Results

#### 3.1. Study selection and characteristics

Fig. 1 contains detailed information about the literature selection process. Of the 32,656 records, 1376 articles were retained for the full text review after removing duplicates. Of 1376 studies, 132 articles met above criteria and were included in the current meta-analysis (see Appendix A in Supplemental material and data coding of each individual studies at Open Science Framework, <https://osf.io/8h2zg>).

132 articles included 156 independent samples (46,345 participants) and 753 effect sizes. Out of total 156 samples: (1) 44 samples (28%) were coded as clinical, 109 samples (69%) were coded as non-clinical, and 3 samples (3%) were not coded to either clinical or non-clinical group, (2) mean age of the group ranging from 11,10 years old to 65,50 years old, (3) the percentage of females included in the study ranging from 0% to 100%, and (4) 125 samples (80%) reporting dispositional emotion regulation and 31 samples (20%) reporting situational emotion regulation.

#### 3.2. Main results

Correlation coefficients and tests of heterogeneity are presented in Table 1.

##### 3.2.1. Neuroticism and emotion regulation strategies

Neuroticism was positively largely linked with worry, moderately associated with avoidance and rumination (ranging from  $r = 0.31$  to  $r = 0.59$ ). Additionally, neuroticism was inversely moderately linked with mindfulness and modestly associated with reappraisal and problem solving (ranging from  $r = -0.17$  to  $r = -0.34$ ). Furthermore, the analyses indicated significant variability for the relationships of neuroticism with avoidance, suppression, worry, rumination, reappraisal, problem solving, and mindfulness (ranging from  $Q = 147.52$ ,  $p \leq .001$ ;  $I^2 = 88\%$ ;  $\tau^2 = 0.03$  to  $Q = 1393.62$ ,  $p \leq .001$ ;  $I^2 = 95\%$ ;  $\tau^2 = 0.06$ ).

##### 3.2.2. Extraversion and emotion regulation strategies

Extraversion was positively modestly related to reappraisal, problem solving, mindfulness, and acceptance (ranging from  $r = 0.12$  to  $r = 0.22$ ). Additionally, extraversion was inversely modestly associated with avoidance, suppression, worry, and rumination (ranging from  $r = -0.10$  to  $r = -0.29$ ). Moreover, the analyses indicated significant

variability for the relationships of extraversion with reappraisal, problem solving, mindfulness, avoidance, suppression, and worry (ranging from  $Q = 3.09$ ,  $p \leq .001$ ;  $I^2 = 35\%$ ;  $\tau^2 = 0.00$  to  $Q = 372.87$ ,  $p \leq .001$ ;  $I^2 = 88\%$ ;  $\tau^2 = 0.02$ ).

##### 3.2.3. Openness to experience and emotion regulation strategies

Openness to experience was positively modestly related to reappraisal, problem solving, mindfulness, and worry (ranging from  $r = 0.10$  to  $r = 0.20$ ). Additionally, openness to experience was inversely modestly associated with suppression ( $r = -0.13$ ). Furthermore, the analyses indicated significant variability for the relationships of openness to experience with reappraisal, problem solving, avoidance, and suppression (ranging from  $Q = 30.24$ ,  $p \leq .001$ ;  $I^2 = 66\%$ ;  $\tau^2 = 0.00$  to  $Q = 168.02$ ,  $p \leq .001$ ;  $I^2 = 80\%$ ;  $\tau^2 = 0.01$ ).

##### 3.2.4. Agreeableness and emotion regulation strategies

Agreeableness was positively modestly related to reappraisal, problem solving, and mindfulness (ranging from  $r = 0.12$  to  $r = 0.18$ ). Additionally, agreeableness was inversely modestly linked with avoidance ( $r = -0.12$ ) and suppression ( $r = -0.15$ ). Moreover, the analyses indicated significant variability for the relationships of agreeableness with reappraisal, problem solving, mindfulness, avoidance, and suppression (from  $Q = 20.64$ ,  $p \leq .001$ ;  $I^2 = 75\%$ ;  $\tau^2 = 0.01$  to  $Q = 332.22$ ,  $p \leq .001$ ;  $I^2 = 91\%$ ;  $\tau^2 = 0.02$ ).

##### 3.2.5. Conscientiousness and emotion regulation strategies

Conscientiousness was positively modestly related to reappraisal, problem solving, mindfulness, and acceptance (ranging from  $r = 0.11$  to  $r = 0.29$ ). Additionally, conscientiousness was inversely modestly associated with avoidance ( $r = -0.13$ ). Furthermore, the analyses indicated significant variability for the relationships of conscientiousness with reappraisal, problem solving, mindfulness, avoidance, and suppression (ranging from  $Q = 32.67$ ,  $p \leq .001$ ;  $I^2 = 81\%$ ;  $\tau^2 = 0.02$  to  $Q = 403.55$ ,  $p \leq .001$ ;  $I^2 = 92\%$ ;  $\tau^2 = 0.03$ ).

### 3.3. Moderation analyses

The details of the moderation analyses are presented in the Supplementary materials (see Appendix B).

#### 3.3.1. Group status

The type of group moderated the relationships between (1) neuroticism and avoidance ( $Q = 5.28$ ,  $p \leq .05$ ;  $R^2 = 19\%$ ), (2) extraversion and problem solving ( $Q = 4.83$ ,  $p \leq .05$ ;  $R^2 = 0\%$ ), and (3) conscientiousness and reappraisal ( $Q = 6.95$ ,  $p \leq .01$ ;  $R^2 = 10\%$ ), in that the relationships were stronger in clinical samples in comparison to non-clinical samples. In turn, the type of group was a significant moderator of extraversion and suppression ( $Q(1) = 28.11$ ,  $p \leq .001$ ;  $R^2 = 74\%$ ) with non-clinical samples showing larger relationship than clinical samples.

#### 3.3.2. Age

Age moderated the relationships between conscientiousness and mindfulness ( $Q = 4.10$ ,  $p \leq .05$ ;  $R^2 = 55\%$ ), in that the associations became stronger as more younger individuals were included in the study. In turn, age was a significant moderator between extraversion and reappraisal ( $Q = 5.79$ ,  $p \leq .05$ ;  $R^2 = 40\%$ ), in that the relation became stronger as more older individuals were included in the study.

#### 3.3.3. Gender

Gender moderated the relationships of (1) extraversion and suppression ( $Q = 20.47$ ,  $p \leq .001$ ;  $R^2 = 50\%$ ), (2) agreeableness with mindfulness ( $Q = 13.69$ ,  $p \leq .001$ ;  $R^2 = 97\%$ ), acceptance ( $Q = 4.92$ ,  $p \leq .05$ ;  $R^2 = 96\%$ ), and suppression ( $Q = 4.19$ ,  $p \leq .05$ ;  $R^2 = 46\%$ ), and (3) conscientiousness and acceptance ( $Q = 3.85$ ,  $p \leq .05$ ;  $R^2 = 100\%$ ). In all cases the relations became stronger as more females

**Table 1**  
The Big Five personality traits and emotion regulation strategies.

Personality traits & emotion regulation strategies	Mean <i>r</i>	95% CI	<i>k</i>	<i>Q</i>	<i>I</i> <sup>2</sup>	$\tau^2$
Reappraisal						
Neuroticism	−0.19***	−0.24, −0.14	27	174.20***	85%	0.01
Extraversion	0.22***	0.16, 0.28	19	154.85***	88%	0.01
Openness	0.20***	0.15, 0.24	17	76.49***	79%	0.01
Agreeableness	0.18***	0.14, 0.22	16	49.20***	69%	0.00
Conscientiousness	0.19***	0.13, 0.24	17	120.33***	86%	0.01
Problem solving						
Neuroticism	−0.17***	−0.21, −0.13	54	398.61***	86%	0.02
Extraversion	0.21***	0.16, 0.25	44	372.87***	88%	0.02
Openness	0.18***	0.14, 0.22	29	168.02***	80%	0.01
Agreeableness	0.12***	0.06, 0.19	29	332.22***	91%	0.02
Conscientiousness	0.29***	0.23, 0.35	32	403.55***	92%	0.03
Mindfulness						
Neuroticism	−0.34***	−0.42, −0.26	18	147.52***	88%	0.03
Extraversion	0.15***	0.08, 0.22	9	21.60**	62%	0.01
Openness	0.13***	0.09, 0.17	9	9.15	12%	0.00
Agreeableness	0.15**	0.05, 0.25	6	20.64***	75%	0.01
Conscientiousness	0.19***	0.09, 0.29	7	32.67***	81%	0.02
Acceptance						
Neuroticism	0.03	−0.17, 0.23	7	80.16***	92%	0.06
Extraversion	0.12*	0.00, 0.23	4	5.97	49%	0.01
Openness	0.02	−0.04, 0.07	4	3.33	9%	0.00
Agreeableness	0.06	−0.07, 0.19	4	7.42	59%	0.01
Conscientiousness	0.11*	0.02, 0.21	4	4.65	35%	0.00
Avoidance						
Neuroticism	0.31***	0.25, 0.36	59	1393.62***	95%	0.06
Extraversion	−0.10**	−0.14, −0.05	45	367.06***	88%	0.02
Openness	−0.05**	−0.09, −0.01	32	135.93***	77%	0.01
Agreeableness	−0.12***	−0.15, −0.08	32	146.47***	78%	0.01
Conscientiousness	−0.13***	−0.17, −0.08	34	232.12***	85%	0.01
Suppression (total score)						
Suppression of thoughts and emotions						
Suppression of the expression of emotions						
Neuroticism	0.09*	0.01, 0.17	21	289.03***	93%	0.03
	0.21*	0.04, 0.37	7	97.00***	93%	0.05
	0.04	−0.03, 0.11	15	110.45**	87%	0.01
Extraversion	−0.29***	−0.37, −0.21	14	120.29**	89%	0.02
	0.02	−0.13, 0.17	3	6.92*	71%	0.01
	−0.37***	−0.40, −0.34	11	12.40	19%	0.00
Openness	−0.13***	−0.18, −0.07	11	30.24***	66%	0.00
	−	−	−	−	−	−
	−0.12**	−0.18, −0.07	10	30.24***	70%	0.01
Agreeableness	−0.15***	−0.29, −0.10	11	29.87**	71%	0.00
	−	−	−	−	−	−
	−0.15***	−0.20, −0.10	10	25.90**	65%	0.00
Conscientiousness	−0.08**	−0.14, −0.02	11	38.90***	74%	0.01
	−	−	−	−	−	−
	−0.08*	−0.14, −0.01	10	38.75***	76%	0.01
Worry						
Neuroticism	0.59***	0.47, 0.69	14	409.82***	96%	0.10
Extraversion	−0.16**	−0.26, −0.06	3	3.09***	35%	0.00
Openness	0.10*	0.01, 0.19	2	1.11	10%	0.00
Agreeableness	−0.04	−0.31, 0.24	2	9.40**	89%	0.04
Conscientiousness	0.07	−0.08, 0.21	2	2.49	59%	0.01
Rumination						
Neuroticism	0.47***	0.40, 0.53	25	241.13***	90%	0.04
Extraversion	−0.20***	−0.27, −0.12	8	13.55	48%	0.01
Openness	0.22	−0.27, 0.62	3	52.84***	96%	0.18
Agreeableness	−	−	−	−	−	−
Conscientiousness	−0.04	−0.34, 0.27	2	8.48**	88%	0.05

Note: *k* - number of effect sizes, *r* - correlation effect sizes, *Q* - ratio of variation to within-study error, *I*<sup>2</sup> &  $\tau^2$  - between study variance.

\* *p* ≤ .05.

\*\* *p* ≤ .01.

\*\*\* *p* ≤ .001.

were included in the study.

### 3.3.4. Emotion regulation focus

Emotion regulation focus moderated the relationships of (1)

neuroticism with reappraisal (*Q* (1) = 12.92, *p* ≤ .001; *R*<sup>2</sup> = 37%), problem solving (*Q* (1) = 8.12, *p* ≤ .01; *R*<sup>2</sup> = 9%), mindfulness (*Q* (1) = 31.56, *p* ≤ .001; *R*<sup>2</sup> = 64%), and worry (*Q* (1) = 21.25, *p* ≤ .001; *R*<sup>2</sup> = 72%), (2) extraversion with reappraisal (*Q* (1) = 5.63, *p* ≤ .05;



analyses. It was found that (1) 18 studies were “missing” for the relationship between neuroticism and reappraisal on the left side of the funnel plot and after including these effect sizes in the sample, the analysis indicated an estimate increased from  $r = -0.19$  to  $r = -0.25$  and (2) 1 study was “missing” for the relationship between neuroticism and worry on the right side of the funnel plot and after including these effect sizes in the sample, the analysis indicated an estimate increased from  $r = 0.59$  to  $r = 0.60$ . Trim and fill (Duval & Tweedie, 2000) did not change the relationships between openness to experience and reappraisal and between neuroticism and rumination.

#### 4. Discussion

The present meta-analysis examined the relationship between the Big Five personality traits and emotion regulation strategies. All personality traits were linked with emotion regulation strategies. In brief, higher level of neuroticism and lower levels of extraversion, openness to experience, agreeableness, and conscientiousness were associated with lower typically adaptive emotion regulation strategies and greater typically maladaptive emotion regulation strategies. Additionally, in most cases, the relationships were stronger in clinical samples than in nonclinical samples, in females than males, and in samples reporting dispositional emotion regulation compared to samples reporting situational emotion regulation.

##### 4.1. Main results

###### 4.1.1. Neuroticism and emotion regulation

Higher neuroticism was linked with greater avoidance, suppression, rumination, and worry strategies and lower reappraisal, problem-solving, and mindfulness strategies. The magnitude of the effect sizes was large for worry, moderate for avoidance, rumination, and mindfulness and small for reappraisal and problem solving. These results are consistent with Connor-Smith and Flachsbart (2007) study which has found that neuroticism is positively lined to avoidance tendencies and inversely associated with reappraisal and problem solving. However, these findings are inconsistent with Connor-Smith and Flachsbart (2007) results who have found an inverse relation between neuroticism and acceptance. Individuals who score high on neuroticism are characterized by more vulnerability to stress, tendency to experience negative emotions, and greater impulsivity than people who are more emotionally stable (Costa & McCrae, 1992). Neuroticism is strongly based on avoidance and behavioral inhibition tendencies (Miles & Hempel, 2003; Rothbart & Bates, 1998). Considering avoidance and behavioral inhibition characteristics of this trait, it might be supposed that people who declare greater neuroticism may use more strategies that cut them off from the negative experiences through avoidance and suppression strategies. However, these strategies are rarely useful and could even exacerbate negative experiences and as a result make rumination and worry more probable. Additionally, greater avoidance and behavioral inhibition might be linked with lower active and adaptive emotion regulation strategies such as cognitive reappraisal, problem-solving, and mindfulness. Furthermore, a large number of studies suggests that the positive relationship between neuroticism and maladaptive emotion regulation strategies and the inverse association between neuroticism and adaptive emotion regulation strategies may be strengthened during less supportive and more nonsupportive emotion socialization process (Eisenberg et al., 1996; Eisenberg et al., 1999; Eisenberg & Fabes, 1994; Kim et al., 2017; Kochanska et al., 2004; Laible et al., 2008; Mangelsdorf et al., 1990). Thus, being more neurotic raise the possibility of greater typically maladaptive and lower typically adaptive emotion regulation strategies.

###### 4.1.2. Extraversion and emotion regulation

Higher extraversion was linked with greater reappraisal, problem-solving, mindfulness, and acceptance strategies and lower avoidance,

suppression, worry, and rumination, and worry strategies. The strength of the effect sizes was small for reappraisal, problem solving, mindfulness, acceptance, avoidance, suppression, rumination, and worry. These results are consistent with Connor-Smith and Flachsbart (2007) study which has found that extraversion is positively lined to reappraisal and problem solving and inversely associated with avoidance tendencies. However, these findings are inconsistent with Connor-Smith and Flachsbart (2007) results who have found a positive relation between extraversion and acceptance. Individuals who are extravert report greater positive emotionality, need for stimulation, sociability, and more expressivity than introvert people (Costa & McCrae, 1992). Extraversion is strongly based on approach tendencies (Miles & Hempel, 2003; Rothbart & Bates, 1998). Based on these characteristics, it might be supposed that people who report greater extraversion may use more active and typically adaptive emotion regulation strategies (i.e., reappraisal, problem solving, mindfulness, and acceptance) and less avoidance and typically maladaptive emotion regulation strategies (i.e., avoidance, suppression, rumination, and worry). Furthermore, it is well-known that the positive relationship between extraversion and adaptive emotion regulation strategies and the inverse associations between extraversion and maladaptive emotion regulation strategies may be strengthened during more supportive emotion socialization process (Kim et al., 2017; Kochanska et al., 2004; Mangelsdorf et al., 1990). As a result, being more extravert increases the possibility of greater typically adaptive and lower typically maladaptive emotion regulation strategies.

###### 4.1.3. Openness to experience and emotion regulation

Higher openness to experience was associated with greater reappraisal, problem-solving, mindfulness, and worry strategies and lower avoidance and suppression strategies. The magnitude of the effect sizes was small for reappraisal, problem solving, mindfulness, suppression, and worry. These results are consistent with Connor-Smith and Flachsbart (2007) study which has found that openness to experience is positively lined to reappraisal and problem solving. However, these findings are inconsistent with Connor-Smith and Flachsbart (2007) results who have found a positive relation between openness to experience and acceptance and did not notice any significant association between openness to experience and avoidance tendencies. People who score high on openness to experience are characterized by greater openness to inner feelings and emotions, creativity, imagination, intellectual curiosity, and appreciation of art and beauty compared to low openness to experience individuals (Costa & McCrae, 1992). These tendencies may be associated with strategies that require openness to emotions and considering new perspectives such as reappraisal, problem-solving, mindfulness, and worry but also lower strategies that cut people off from experiences through avoidance and suppression. At this time, no work has examined whether emotion socialization modifies the strength and direction of the relationship between openness to experience and emotion regulation. In theory, it could be hypothesized that people who report greater openness to experience may be interested in others' point of view, facilitate the conversations about emotions, and may be open to people' emotion regulation strategies. As a consequence, it might be supposed that emotion socialization modifies the strength and direction of the relationship between openness to experience and emotion regulation. However, it is only a theoretical assumption which requires more detailed investigation in the future.

###### 4.1.4. Agreeableness and emotion regulation

Higher agreeableness was associated with greater reappraisal, problem-solving, and mindfulness strategies and lower avoidance and suppression strategies. The strength of the effect sizes was small for reappraisal, problem solving, mindfulness, avoidance, and suppression. These results are consistent with Connor-Smith and Flachsbart (2007) study which has found that agreeableness is positively lined to reappraisal and problem solving. Furthermore, in this study as well as in



the research of Connor-Smith and Flachsbart (2007) agreeableness was not significantly associated with acceptance. Individuals who are high in agreeableness report greater straightforwardness, trust, altruism, compliance, and tender-mindedness (Costa & McCrae, 1992) than people with low agreeableness (Costa & McCrae, 1992). In theory, considering these characteristics, there is no reason to link agreeableness to emotion regulation strategies. However, it might be supposed that the relationship between agreeableness and emotion regulation strategies may be formed through more supportive emotion socialization process (Kim et al., 2017; Kochanska et al., 2004; Mangelsdorf et al., 1990). Thus, being more agreeableness increases the possibility of greater typically adaptive and lower typically maladaptive emotion regulation strategies.

#### 4.1.5. Conscientiousness and emotion regulation

Higher conscientiousness was linked with greater reappraisal, problem-solving, mindfulness, and acceptance strategies and lower avoidance and suppression strategies. The magnitude of the effect sizes was small for reappraisal, problem solving, mindfulness, acceptance, and avoidance. These results are fully consistent with Connor-Smith and Flachsbart (2007) study which has found that conscientiousness is positively lined to reappraisal, problem solving, and acceptance. People who score high on conscientiousness are characterized by greater self-discipline, organization, control of impulses, and goal-directed behavior compared to low conscientiousness individuals (Costa & McCrae, 1992). It might be supposed that the planned, consistent, and persistent characteristics of this trait may be associated with greater typically adaptive (i.e., reappraisal, problem-solving, mindfulness, and acceptance) and lower typically maladaptive emotion regulation strategies (i.e., avoidance and suppression). Again, at this time, no work has examined whether emotion socialization modifies the strength and direction of the relationship between conscientiousness and emotion regulation. Theoretically, it might be supposed that people who report greater conscientiousness may facilitate the conversations about effective ways of coping and emotion regulation (especially problem solving) as it might important for them to develop the ability to maintain goal-directed behavior in spite of emotional arousal. As a result, being more conscientious increases the possibility of greater typically adaptive and lower typically maladaptive emotion regulation strategies.

#### 4.2. Moderators

The group type, age, gender, and emotion regulation focus were included in the analyses as the moderators of the relationship between personality traits and emotion regulation strategies. Stronger associations were consequently observed in clinical samples than in nonclinical samples, in females than males, and in samples reporting dispositional emotion regulation compared to samples reporting situational emotion regulation. Group type explained from 0% to 74% of the variance in 4 relationships. Age explained 40% and 55% of the variance in 2 associations. Gender explained from 46% to 100% of the variance in 5 relationships. Emotion regulation focus explained from 7% to 100% of the variance in 9 associations. These results are consistent with Connor-Smith and Flachsbart (2007) study which has found that the Big Five personality traits and coping were strongly linked with coping in young samples, and samples reporting dispositional rather than situation-specific coping. However, in their study, gender was not a consistent moderator.

As it has already been mentioned, people suffering from mental disorders and females may have less opportunities to develop the knowledge about emotions and the autonomous emotional self-regulation in comparison to other groups and males (Borowski et al., 2018; Johnson et al., 2017; Perry et al., 2017; Silk et al., 2011). Thus, people suffering from mental disorders and females may declare greater emotional reactivity, attention to emotions, and distress intolerance than non-clinical samples and males (Ali, Seitz-Brown, & Daughters,

2015; Benfer, Bardeen, & Fergus, 2017; Mankus, Boden, & Thompson, 2016; Ripper, Boyes, Clarke, & Hasking, 2018). It might be supposed that people with greater emotional reactivity, attention to emotions, and distress intolerance may be more sensitized to the experienced emotions. As a result, the strength of the relationship between personality traits and emotion regulation strategies may be more accentuated in clinical samples than in nonclinical samples and as more females are included in the study. Thus, it is not surprising the magnitude of the association between personality traits and emotion regulation strategies may be especially more accentuated in clinical samples than in nonclinical samples and if more females are included in the study for emotion regulation strategies that require ability to tolerate and stay open-minded to experienced emotions (i.e., problem solving, reappraisal, mindfulness, acceptance, and avoidance). Finally, it might be assumed that characteristics of the situation and the need for concrete and specific emotional self-regulation may tend to wash out the dispositional magnitude of the association between personality traits and emotion regulation strategies in the specific situation. Thus, stronger relationships may be observed in samples reporting dispositional emotion regulation in comparison to samples reporting situational emotion regulation.

#### 4.3. Implications and generalizability

Emotion Regulation Therapy is a theoretically derived and evidence based therapy developed to support individuals with high levels of chronic distress. It is suggested that emotion regulation therapy should target motivational mechanisms, regulatory mechanisms including self-referential (i.e., worry and rumination), and behavioral (i.e., avoidance) responses (see Renna, Quintero, Fresco, & Mennin, 2017). Emotion regulation interventions reduce anxiety, depression, and stress symptoms in the groups of anxiety and depressive disorders (Mennin, Fresco, O'Toole, & Heimberg, 2018; Mennin, Fresco, Ritter, & Heimberg, 2015). This meta-analysis has a few practical implications for the further development of emotion regulation therapy. Based on these findings, it might be assumed that emotion regulation trainings might be especially useful for people who have high neuroticism and low extraversion, openness to experience, agreeableness, and conscientiousness as this personality configuration was associated with emotional dysregulation. Additionally, these results suggest that teaching emotion regulation skills should be an important element for people who suffer from mental disorders, females, and people exposed to difficult situations as stronger associations were observed in clinical samples in comparison to nonclinical samples, as more females were included in the study, and in samples reporting dispositional emotion regulation compared to samples reporting situational emotion regulation.

#### 4.4. Limitations and future directions

This meta-analysis has a few limitations. First, there was only one coder which made it impossible to test for intercoder reliability. As such, there was no way to check for accuracy and as a result there might be some bias in the data collecting, coding process, and interpretation of data. Future studies could benefit from using multiple independent coders during the content analysis process. Second, all measures were self-reported and were thus subject to biases of self-perception. Thus, common method biases should be considered in this meta-analysis. More specifically, it could be supposed that shared method variance may result in small overestimation of the study results. Third potential problem is that no measurement error correction was performed for the Big Five personality traits and emotion regulation strategies. This may have a considerable impact on the effect sizes, in terms of a downward bias in estimates of mean correlations and in terms of producing artificial variation in effect sizes across studies (Hunter & Schmidt, 2004). Fourth, despite the fact that the effects of dependency among effect

sizes rather should be considered low in this study, it might be useful to account for dependency of multiple effect sizes from one study in the future (Hunter & Schmidt, 2004). Fifth, there are many other individual differences dimensions and emotion regulation strategies which might also be related to each other. Sixth, no study examined the relationship between the Big Five personality trait facets and emotion regulation strategies which make impossible to evaluate whether some personality trait facets are strongly linked with emotion regulation strategies than do broad traits. Seventh, the number of effect sizes for some studies were rather small (for example of openness to experience, agreeableness and conscientiousness with rumination and worry) which might restrict the generalizability of the findings. Eighth, it was impossible to evaluate the causal relationship between the Big Five personality traits and emotion regulation strategies. Finally, there are many other moderators which may modify the strength of the association between the Big Five personality traits and emotion regulation strategies (for example culture). However, it will be possible to overcome these limitations as more studies are accumulated in the future.

#### 4.5. Conclusion

In summary, lower level of neuroticism and higher levels of extraversion, openness to experience, agreeableness, and conscientiousness were associated with greater typically adaptive emotion regulation strategies (reappraisal, problem solving and mindfulness) and lower typically maladaptive emotion regulation strategies (avoidance and suppression). Additionally, the relationships were stronger in clinical samples than in nonclinical samples, in females than males, and in samples reporting dispositional emotion regulation compared to samples reporting situational emotion regulation.

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2018.11.025>.

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