

Does Gratitude Enhance Prosociality: A Meta-Analytic Review

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(*In press* Psychological Bulletin: <http://www.apa.org/pubs/journals/bul/>)

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The authors received no specific funding for this work.

LKM is the guarantor. LKM, EF and RJT drafted and offered critical appraisal of the manuscript. All authors contributed to the development of selection criteria and data extraction criteria. LKM and EF developed the search strategy, acquired the data. LKM analyzed the data and EF provided statistical expertise and support. All authors read, provided feedback and approved the final version of the manuscript.

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### Abstract

Theoretical models suggest that gratitude is linked to increased prosociality. To date, however, there is a lack of a comprehensive quantitative synthesis of results to support this claim. In this review we aimed to 1) examine the overall strength of the association between gratitude and prosociality, and 2) to identify the theoretical and methodological variables that moderate this link. We identified 252 effect sizes from 91 studies across 65 papers— (Total  $N = 18,342$  participants). The present meta-analysis revealed a statistically significant, and moderate positive correlation between gratitude and prosociality ( $r = 0.374$ ). This association was significantly larger among studies that assessed *reciprocal* outcomes relative to *non-reciprocal* outcomes, and in particular among studies that examined *direct*—compared to *indirect*—reciprocity. Studies that examined gratitude as an *affective state* reported significantly larger effect size studies assessing gratitude as a *trait*. Studies that examined *benefit-triggered* gratitude (in response to other's kindness) had a stronger effect than *generalized* gratitude that focuses on the appreciation of what is valued and cherished in life. Finally, studies that manipulated gratitude in-vivo (e.g., economic games) had larger effect sizes compared to those based on recalled incidents when the person felt grateful. We describe the theoretical and practical significance of the results.

**Keywords:** gratitude, prosociality, meta-analysis, direct reciprocity, indirect reciprocity

The Latin root of gratitude, 'gratia', translates to include the idea of being thankful. This thankfulness can be directed either at another's help or at an event (a beautiful day). Consistent with this, gratitude is conceptualized in the scientific literature as either (1) an *emotional* response to other's kindness (*benefit-triggered* gratitude), (2) a *mood* referred to as *generalized gratitude*, that focuses on the appreciation of what is valued and cherished in life (e.g., a beautiful day) (Lambert, Graham, & Fincham, 2009; McCullough, Emmons, & Tsang, 2002), or (3) a *trait* reflecting a wider life orientation towards appreciating others and the world we live in (Wood, Froh, & Geraghty, 2010). Gratitude, conceptualized in these various ways has been shown to be associated with a wide variety of important social and personal benefits, including improved physical and mental health (Lavelock et al., 2016), general well-being (Wood et al., 2010) and prosociality (Bartlett & DeSteno, 2006).

Although the literature linking gratitude to health and well-being has been reviewed (Lavelock et al., 2016, Wood et al., 2010) there is no systematic review of the link with prosociality. A systematic review of this link is important for two reasons. First, a number of different theoretical accounts have been offered to explain the role gratitude plays in promoting prosociality and the survival of altruism in the population. These include its role (1) as a moral barometer (McCullough, Kilpatrick, Emmons, & Larson, 2001), (2) supporting reciprocal exchange (Nowak, 2006; Nowak & Sigmund, 2005) and (3) in maintaining and building social bonds and relationships (Algoe, 2012). Thus, valuable theoretical insights can

be gained from exploring the relative contribution of these different theoretical accounts to the gratitude-prosociality link. Second, given both the individual (better health) and societal (increased prosociality) benefits of gratitude, interventions are increasingly being designed to enhance gratitude (see Emmons and McCullough, 2003). However, the effectiveness of such interventions has been questioned (Davis et al., 2016; Renshaw & Olinger Steeves, 2016; Wood et al., 2010). This low efficacy may reflect a lack of understanding about which aspects of gratitude to focus on (e.g., reciprocity, social bonds) in intervention development. Thus, by comparing predictions arising from the different theoretical models, as well as exploring methodological factors (e.g., subjective vs objective assessments of prosociality) that influence the strength of the gratitude-prosociality link, this meta-analysis will offer some insights into ways to focus gratitude interventions to increase prosociality and enhance well-being (Weinstein & Ryan, 2010).

### **Gratitude and Prosociality**

Drawing on the conceptual and theoretical overlaps in the way prosociality has been defined previously, we define prosociality as a broad range of behaviors, efforts or intentions designed to benefit, promote or protect the well-being of another individual, group, organization or society (Bolino & Grant, 2016; Dovidio, Piliavin, Schroeder, & Penner, 2006; George & Brief, 1992; Martin & Olson, 2015; Penner, Dovidio, Piliavin, & Schroeder, 2005).

There are a number of potential theoretical models proposed to explain the gratitude-prosociality link. These, and their associated predictions, are discussed below.

First, gratitude may act as a *moral motivator* that underlies both *direct and indirect reciprocity* (McCullough, Kimeldorf, & Cohen, 2008; Nowak & Roch, 2007). The principle of reciprocity is fundamental to explaining the survival of altruism in the population (Nowak, 2006). Reciprocity can be divided into *direct* and *indirect* types. Direct reciprocity occurs when the helper (A) is directly repaid by the recipient (B) at some later date (A helps B, B repays A). Direct reciprocity is only effective, however, when the helper and recipient are known to each other and can meet subsequently and recall their previous interaction. When this is not possible *indirect* reciprocity offers a solution for the survival of prosociality (Nowak, 2006). Indirect reciprocity comes in two flavors: *downstream* and *upstream* (Sigmund, 2010). Downstream indirect reciprocity occurs when the helper (A) gains *reputation* from helping a recipient (B) and this reputation gain increases the probability that they (A) will be helped by others (C) in the future (A helps B, then C helps A) (Nakamura & Masuda, 2011). Upstream indirect reciprocity occurs when the recipient of help (B) from a benefactor (A) goes on to help someone else (C) (A helps B, then B helps C) (Nowak & Roch, 2007).

The moral motivator account suggests gratitude is important for all three forms of reciprocity (direct, downstream and upstream) (McCullough, Kilpatrick, Emmons, & Larson,

2001). That is, McCullough and colleagues (McCullough et al., 2008; McCullough & Tsang, 2004) argued that gratitude operates to promote prosociality via three moral functions: *barometer*, *motivator* and *reinforcer*. As a *moral barometer* gratitude highlights to the recipients that they have been helped and, as a *moral motivator* it motivates the recipient to act prosocially toward either their benefactor (direct reciprocity) or other people (upstream indirect reciprocity). Indeed, Nowak and Roch (2007) suggest that upstream indirect reciprocity ‘hitchhikes’ on the back of direct reciprocity, with direct reciprocity acting as the main mechanism for the evolution of prosociality (cooperation in their model). Finally, as a *moral reinforcer*, gratitude encourages continued generosity. With respect to downstream indirect reciprocity, the main mechanism is reputation building. However, gratitude may still be important for downstream indirect reciprocity. That is, moral elevation may elicit generalized gratitude towards the helper (be it an individual or organization: see Ferguson, 2015). Moral elevation occurs when a person witnesses another person or organization uphold the highest moral standards (Schnall, Roper, & Fessler, 2010). Thus, for example, if an organization or individual (A) helps another (B) beyond the ‘call of duty’ (e.g., blood transfusion service, blood donation), not only will ‘A’ gain a good reputation, but this may result in feelings of moral elevation in an uninvolved observer (C). Such elevation can translate into gratitude (likely generalized gratitude of being thankful that these organizations/people exist) with help directed toward the source of the elevation (A) from the observer (C)

(see Ferguson, 2015; Haidt, 2003; Schnall et al., 2010). Consistent with the above, gratitude has been shown to promote all 3 forms of reciprocity: (1) upstream indirect reciprocity (Chang, Lin, & Chen, 2012; Halali, Kogut, & Ritov, 2016), (2) direct reciprocity (Hendrickson & Goei, 2009; Tsang, Schulwitz, & Carlisle, 2012), and (3) downstream indirect reciprocity (Langan & Kumar, 2015; Romani, Grappi, & Bagozzi, 2013).

Second, gratitude may act to strengthen social bonds. Specifically, the ‘*find-remind-bind*’ theory of gratitude developed by Algoe (2012) and colleagues (Algoe, Fredrickson, & Gable, 2013; Algoe, Kurtz, & Hilaire, 2016; Algoe & Zhaoyang, 2016), suggests gratitude functions to initiate, maintain and develop *social bonds*. The idea is that gratitude functions to strengthen social bonds, beyond simple economic exchange. The ‘*find-remind-bind*’ theory of gratitude builds on Fredrickson’s (2004b) ‘*Broaden-and-Build*’ theory of positive emotions. The ‘*Broaden-and-Build*’ theory suggests that, in general, positive emotions function to *broaden* an individual’s momentary repertoire of cognitions and actions to promote enhanced social bonds and help the individual to *build* personal, physical and mental resources. Specifically, focusing on gratitude, the ‘*find-remind-bind*’ theory postulates that feelings of gratitude, arising from another’s kindness increase the likelihood of being socially responsive to them (verbally with a thank you, for example). This functions to help people *find* new friendships, *remind* them of the value of existing relationships and *bind* and strengthen those social bonds. Emmons and Mishra (2012)

similarly argue that gratitude may function to enhance social ties and resources that people can subsequently rely on for help when experiencing difficulty. Together this all suggests that gratitude, in response to another's kindness, as opposed to generalized gratitude about what is personally valued (Lambert et al., 2009), should show a stronger association with prosociality. It also suggests that the gratitude-prosociality association should be stronger for exchanges between people who know each other versus strangers. However, it should be acknowledged that 'find-remind-bind' theory and reciprocity theory are not distinct accounts. That is, a direct prosocial response to others kindness (direct reciprocity) is likely to help *bind* close social bonds. The person feeling grateful for being helped may also go on to help another person (upstream indirect reciprocity) which result in *finding* new friends. Similarly, the person with a good reputation for helping (downstream indirect reciprocity) is more likely to be helped by others (Milinski, Semmann, & Krambeck, 2002) creating *new* friendships and *bonds*.

Third, cultural norms are known to play a major role in the expression of prosocial behavior (Gächter & Schulz, 2016) and emotions (Kim & Sasaki, 2014). Two cultural norms are particularly important to prosociality: individualism-collectivism and religiosity. Higher levels of collectivism have been linked to greater levels of prosociality (Lampridis & Papastyliaou, 2014). Also, gratitude linked to collectivist ideals emphasizes the maintenance of group harmony and reciprocity (Kee, Tsai, & Chen, 2008). Thus, it follows that in more



collectivist cultures people should be more likely to experience and respond to gratitude with prosocial acts. Therefore, we expect to see a stronger gratitude-prosociality link in more collectivist cultures. The second key cultural norm considered here is religiosity. There is evidence that gratitude is associated with higher levels of religiosity (Emmons & Mishra, 2012) and that religious observance is associated with increased prosociality (Henrich et al., 2010). As many world religions endorse doctrines that support both gratitude, reciprocity and helping via '*Golden Rules*' (e.g., "do unto others as you would have them do unto you" Mathew, 7:12, New International Version), we may also expect that the gratitude-prosociality association will be more culturally embedded for countries where religiosity is higher. Therefore, we predict that the gratitude-prosociality link should be stronger in countries with higher levels of religiosity.

Fourth, gratitude may be linked to prosociality via a third variable. Other prosocial traits (e.g., Agreeableness) (Zhao & Smillie, 2015) are strong candidate third variables. Indeed, while gratitude has been shown to be associated with other prosocial traits including empathy (McCullough et al., 2002) and forgiveness (Carlisle & Tsang, 2013; Satici, Uysal, & Akin, 2014), there is no systematic evaluation of the strength of the association between gratitude and prosocial traits in general. Showing that gratitude is linked to other prosocial traits will offer some initial evidence that, at least for the trait gratitude-prosociality link, other prosocial traits may act as a potential confounder.

Despite evidence supporting the link between gratitude and prosociality, and the theoretical reasons outlined above, there is considerable inconsistency regarding the strength of the association. For instance, Soscia (2007) reports a strong correlation between consumer gratitude and their propensity to recommend the store to friends ( $r = 0.78, p < .01$ ), while Watkins and colleagues (2006) report a more modest association ( $r = 0.34, p < .05$ ) between gratitude and direct reciprocity. These differences may reflect both different types of prosociality as well as different domains (i.e., commercial and general). To date, there is no comprehensive quantitative review of the gratitude-prosociality association and the salient moderators of this association.

### **Gratitude and the Other Prosocial Emotions**

Gratitude does not stand alone as the only emotion linked to prosociality. However, many authors regard gratitude as having a special place with respect to prosociality. For example, Nowak and Roch (2007) contend that while other positive emotions can evolve to support cooperation, gratitude has particular theoretical importance for reciprocity. Similarly, McCullough et al. (2008) suggest that gratitude has a wider impact on prosociality than other emotions, as it supports high-cost helping. Algoe and colleagues (Algoe, 2012) also suggest that gratitude is more important to relationship bonding than happiness or joy. Thus, a comparative analysis with other prosocial emotions is theoretically important to explore if,

indeed, gratitude has a 'special relationship' to prosociality. This would be evidenced by a larger overall effect size for gratitude than other prosocial emotions with prosociality.

With respect to the prosocial emotions Ferguson and Masser (in press) combined insights from Haidt's (2003) families of moral emotions and the Appraisal Tendency Framework (ATF) of emotions (Ferrer, Klein, Lerner, Reyna, & Keltner, 2016; Lerner & Keltner, 2000) to organize key clusters of emotions linked to prosociality. The ATF approach identifies seven emotions (gratitude, hope, pride, surprise, anger, guilt, and sadness) with theoretical links to prosociality (Ferrer et al., 2016). These can be usefully organized within Haidt's (2003) families of moral emotions. Haidt (2003) places gratitude in the family of 'other-praising emotions' along with awe and elevation. Moral elevation has been linked to prosocial behavior (Schnall, Roper, & Fessler, 2010). There is also evidence linking the family of 'self-conscious emotions' of shame, embarrassment and guilt (the SEG triad) and the 'other-suffering family' (sympathy, empathy, and compassion) to prosociality (Batson, 1991; Boster et al, 2016; Eisenberg & Miller, 1987; Tignor et al 2016). Within the 'other condemning emotions' of contempt, anger, and disgust (the CAD triad), anger has been linked to pro-sociality via two routes: (1) moral anger (Montada & Schneider, 1989) and (2) motivating altruistic punishment (Fehr & Fischbacher, 2004). We review briefly the literature supporting the links between the emotions, other than gratitude, and prosociality.

**Anger.** Anger motivates prosociality either by punishing free-riders (Fehr & Fischbacher, 2004), even if punishment is not implemented (Skatova & Ferguson, 2013) or re-compensating victims which is motivated by moral anger (Van de Vyver & Abrams, 2015; van Doorn, Zellenberg, & Breugelmans, 2014). Moral anger occurs when an individual perceives that an injustice has occurred and is motivated to redress it (van Doorn et al., 2014).

**Shame, Guilt & Pride.** Guilt is a private emotion whereas shame is a more public emotion (Amodio et al., 2007; Scheff, 2000; Tangney, 1995). Individuals may be motivated to avoid the guilt for not acting prosocially or the shame of acting selfishly (Saito, 2015) and indeed, both guilt and shame have been shown to lead to increased prosociality (Allpress, Brown, Giner-Sorolla, Deonna, & Teroni, 2014). Pride is also included in the SEG family by Haidt (2003), where he sees it as the positive pole of shame. Pride is defined by the Oxford English Dictionary as a “feeling of deep pleasure or satisfaction derived from one's own achievement”. To link pride to prosociality we need to distinguish *hubristic* (pride linked to arrogance and conceit) from *authentic* pride (linked to achievement), with only authentic pride linked to prosociality (Krettenauer & Casey, 2015; Tracy & Robins, 2007).

**Sympathy, Empathy, and Compassion.** There is a large and consistent database linking these emotions to prosociality (Batson, 1991; Eisenberg & Miller, 1987; Ferguson, 2016; Telle, & Pfister, 2015; Weng, Fox, Hessenthaler, Stodola & Davidson, 2015).

**Hope and Sadness.** Hope refers to a desire for the person to have a better future for themselves and/or others. Indeed, hope for a better future is one of the main motives given by volunteers in early stage clinical trials (Catt, Langridge, Fallowfield, Talbot, & Jenkins, 2011). Sadness may be seen as the opposite pole of hope, with increased sadness linked to hopelessness (Ferguson & Masser, in press). Sadness is a key emotion for the Negative State Relief (NSR) model of prosociality (Cialdini et al., 1987). The NSR model suggests people help to manage their own negative mood arising from observing another person's suffering.

While specific emotions are linked to prosociality there is evidence that both general positive affect (PA) and negative affect (NA) also motivate prosociality (see Ferguson & Masser, in press). People may act prosocially to maintain PA, and to manage or reduce NA (Cialdini et al., 1987; Ferguson, 2016). Thus, as well as exploring if gratitude has a stronger link to prosociality than specific emotions, we also examine if the gratitude-prosociality association was stronger than for PA and NA.

### **Moderators of the Gratitude-Prosociality Link**

We detail the predictions from the main theoretical moderators of the gratitude-prosociality link (reciprocity, social bond, individualism-collectivism, religiosity) and if the gratitude-prosociality link is stronger for trait or state gratitude. We also examine a number of methodological moderators and the association of trait gratitude with other prosocial traits.

### **Theoretical Moderators and Predictions**

**Reciprocity.** We argued above that gratitude is a potential mechanism in all forms of reciprocity (direct, downstream and upstream). Thus, we predict that the gratitude-prosociality link will be stronger for studies that focus on reciprocity in general, compared to studies that did not. We further examine whether the gratitude-prosociality link will be a stronger for studies that focus on *direct* as opposed to *indirect* (i.e. downstream and upstream) reciprocity. Despite the fact that gratitude has the capacity to incite all forms of reciprocity, it is less likely to be a central mechanism for downstream indirect reciprocity. Thus we would expect to observe a stronger gratitude-prosociality link for direct versus overall (downstream plus upstream) indirect reciprocity.

**Social Bonds.** Drawing on the ‘find-remind-bind’ theory we expect that gratitude triggered by others (benefit-triggered), as opposed to generalized gratitude (Lambert et al., 2009), should have a stronger association with prosociality. Similarly, the gratitude-prosociality link should be stronger when arising from close bonds vs strangers.

**Individualism-Collectivism and Religiosity.** We predict that the gratitude-prosociality link will be stronger in more collectivist countries, where gratitude and reciprocity are stronger cultural norms, and likely encourage the expression of gratitude and its link to prosociality. We also predict that the gratitude-prosociality link should be greater in

countries with higher levels of religiosity. We explored this by examining the level of religiosity within each country in which each study took place.

**Gratitude Measure—Emotion, Mood, and Trait.** Gratitude can be viewed either as a *state* (encompassing emotional reactions and mood) or as a *trait* (Parrott, 2001). Gratitude as an emotion occurs when an individual is helped by another person (Emmons & Shelton, 2002; Fredrickson, 2004a; Lazarus & Lazarus, 1996). McCullough and associates also defined gratitude as a *mood* reflecting neutral daily events like ‘waking up in the morning (pp.379)’ (Emmons & McCullough, 2003). These distinctions map onto Lambert et al.’s (2009) distinction between *benefit-triggered* (being grateful to someone) and *generalized* gratitude (grateful for valued and cherished events and people in our lives). With respect to trait gratitude, Wood et al. (2010) define it to include both a life-affirming process of ‘noticing and appreciating the positive in the world’ (p 891) as well as a tendency to experience gratitude in response to others kindness.

Wood and colleagues (2008) highlight a paucity of empirical evidence for the link between trait gratitude and prosociality compared to state gratitude. As trait gratitude includes both aspects of gratitude (*benefit-triggered* and *generalized* gratitude) we feel that the comparison between state and trait is more justified by equating the conceptualization of the two. To do this we grouped both aspects of state gratitude (emotion/benefit triggered and generalized/mood) into a single category. Based on the Social Cognitive Model of Gratitude

(SCMG) (Wood et al., 2008) and Trait Activation Theory (Tett & Guterman, 2000) we predict that the effect size for state gratitude will be stronger than for the trait gratitude. The SCMG conceives trait gratitude as a more distal predictor of prosociality than state gratitude (see also Ferguson, 2013). Indeed, this pattern of a weaker association for a trait than an emotion with respect to the same outcome is reported by others (see Fredrickson, Tugade, Waugh, & Larkin, 2003). Furthermore, the principle of trait activation suggests that any behavioral expression, such as prosociality, linked to a trait, requires activation of the trait by trait relevant cues (see Tett & Guterman, 2000). Thus, the assessment of a trait alone would not be sufficient to fully activate trait tendencies.

### **Methodological Moderators**

We examined a number of methodological factors that may influence the gratitude-prosociality association: (1) gratitude induction, (2) objectivity of prosociality assessment, (3) target of prosociality—individual versus group, and (4) gratitude measure—proxy versus actual.

**Gratitude Induction: Laboratory-Studies (Vignettes & Experimental/Economic Games) versus Surveys/Field Studies.** We explored whether *laboratory studies*, which use a direct exogenous manipulation of gratitude (e.g. Exline, Lisan, & Lisan, 2012; Tsang, 2007) or *Survey/Field Studies*, where participants completed a cross-sectional battery of gratitude and prosociality measures (e.g. Li & Chow, 2015), results in a larger effect size. We further



considered a subtle distinction within lab-studies: Vignettes (e.g. Graham, 1988; Xia & Kukar-Kinney, 2013) versus Experimental/Economic Games (e.g. Halali et al., 2016).

While vignettes are cost-effective, and can be easily standardized (Gould, 1996; Hughes & Huby, 2002), the lack of participant involvement in the vignettes may lead participants to simply respond in terms of normative theories of gratitude (Hegtvedt, 1990; Tsang, 2006b; Weiner, Russell, & Lerman, 1979). On the other hand, experimental manipulations/economic games involve laboratory inductions in which participants take an active role. For example, participants might be asked to recall an experience of being generously treated by others (e.g., Siegel, Thomson, & Navarro, 2014); or in an economic game where participants experienced gratitude after receiving a financial benefit (e.g. Leung, 2011). Experimental/economic game induced gratitude should better reflect the participants' genuinely experienced emotion, relative to vignette-induced gratitude, because of higher involvement (Levine & Moreland, 2004). Thus, we anticipate a stronger gratitude-prosociality link for experimental/economic game studies, compared to vignette studies.

We further coded the experimental studies into 'In-vivo', where the participant responds to the emotion immediately (these involved economic games, confederates doing something nice and vignettes), and 'Recall', where the participant recalls when someone was nice to them. We predict that the in-vivo elicitation will result in a larger effect. This is because

the in-vivo emotion, which is proximal to the behavior (being prosocial), is more likely to be stronger and related to the immediate context (Loewenstein, 2005; Schacter & Addis, 2007).

**Objective-Subjective Assessments of Prosociality.** We examined whether the prosociality assessment involved an actual expenditure of effort or money (objective); or whether it used self- or peer-reported *behavior* or *intention* to act prosocially (subjective). Given that subjective tendencies do not always result in actual behaviors (Ajzen, 1985, 1991), we expect that studies which examined prosociality subjectively to show a stronger association with gratitude than studies where prosociality was assessed objectively.

**Target of Prosociality—Individual versus Group.** Algoe, Haidt, and Gable (2008) reported that gratitude enhances both *dyadic* and *group* relationships. Furthermore, the definition of prosociality we adopt includes helping individuals and groups equally. Thus, it remains unknown whether gratitude-inspired prosociality would function in the same way when targeted as an *individual* or a *group*.

**Gratitude Measure—Proxy versus Actual.** Several studies employ proxy measures of gratitude. For example, Naito and associates (Naito & Sakata, 2010; Naito, Wangwan, & Tani, 2005) examined feelings of joy, warmth, and helpfulness after receiving help. Considering that a proxy measure is by definition an approximate assessment, it is logical to assume that it should, compared to a direct assessment, constitute a greater discrepancy between the operational and the conceptual definition of gratitude thus resulting in lower

validity (Carver & Scheier, 2008). Therefore, we examining if studies that employed proxy measures of gratitude have a smaller effect size compared to studies adopting a direct assessment of gratitude.

**Age.** As there may be developmental trends with respect to experiencing gratitude and the opportunity to be prosocial we include age as a *continuous* covariate. While, there is evidence that prosociality increases in early childhood (Fehr, Bernhard, & Rockenbach, 2008), the pattern across adolescence and into adulthood is mixed and consists of a variety of different trajectories with some increasing and some declining (see Kanacri et al., 2014). As such, we made no clear prediction about associations with age.

### **Gratitude-Prosociality and Other Prosocial Traits: A Potential Confounder**

Gratitude (especially trait gratitude) may be linked to prosociality simply because it is associated with other prosocial traits such as agreeableness. However, this has not been systematically examined. As a first step to explore this potential confounding mechanism we need to establish if there is a reliable link between trait gratitude and other prosocial traits.

## **Methods**

### **Main Analyses: Gratitude-Prosociality Link**

#### **Search Strategies**

Studies were identified by searching electronic databases (Science, Social Science and general scholarly databases, including ISI Web of Science, PsycARTICLES, PsycINFO,

Scopus, EconLit, Google Scholar, British Library EThOS, Applied Social Science Index & Abstracts (ASSIA), Business Source Premier (EBSCO), and Dissertation Online) and the reference lists from relevant articles. We used the following search terms for the main meta-analysis on Gratitude and Prosociality: 'Gratitude', 'Appreciation' and 'Prosocial Behaviors', 'Prosociality', 'Prosocial', 'Altruism', 'Altruistic', 'Cooperation', 'Helping', 'Compliance', 'Reciprocity', 'Cooperative' and 'Reciprocal'. In the initial screening phase, we examined the abstracts and titles of potentially relevant articles (N= 746). We removed any duplicated entries (N= 420). The full text of the remaining articles was inspected (N= 326), and thereby eliminated entries (N= 257) that were inconsistent with our eligibility criteria (see below). Furthermore, we examined the papers in order to remove entries that shared the same dataset, such as multiple analyses conducted with an identical dataset. Finally, we contacted authors for additional data where whose articles were published (or available online/published as book chapters for unpublished work) within the last five years that did not include sufficient information for us to compute the effect sizes.

### **Inclusion and exclusion criteria**

We used the following inclusion and exclusion criteria to select studies. First, we confined the search to papers written in English. Second, we did not impose any age limits on the participants in the present review but included age as a moderating variable instead. Third, all studies had to include measures of the relationship between gratitude (as a disposition or a

state) and prosociality (e.g. behavioral intention or overt behavior). Finally, we included only studies that reported quantitative findings. Applying all these inclusion and exclusion criteria we identified 65 papers with a grand total of 18,342 participants, consisting of 91 studies and 252 effect sizes. Figure 1 provides the information flow diagram prepared based on the PRISMA Statement (Liberati et al., 2009).

### **Coding Procedures**

Table 1 details the specific coding criteria used.

**Reciprocity versus Non-reciprocity and Reciprocity Nature.** We coded whether the prosociality measures reported were reciprocally driven or not. *Reciprocity* ( $k = 75$ ) was defined as an individual's attempt (or motivation) to respond to a positive action with another positive action. These were further differentiated into *Direct Reciprocity* ( $k = 51$ ), that refers to the direct reciprocation of favors received and 2) *Indirect Reciprocity* ( $k = 14$ ) that included both 'downstream' (the individual acts prosocially to someone whom they know to have helped a someone else previously  $k = 5$ ), and 'upstream' (the individual acts prosocially to a third party after receiving a favor from someone else  $k = 9$ ). Ten studies which examined both *direct* and *indirect* reciprocity but did not separately report how gratitude was associated with each type of reciprocity (e.g. Desteno, Bartlett, Baumann, Williams, & Dickens, 2010) were therefore excluded from the analysis that focused on the distinction between *direct* and *indirect* reciprocity.

We also coded studies that examined prosocial acts or behavioral intentions that were not driven by a need to repay (e.g. Study 1, McCullough et al., 2002) as involving *Non-Reciprocity* ( $k = 15$ ) (See Table 1 for details and examples).

**Social Relationships.** We coded benefit-triggered gratitude as any emotional felt gratitude in response to another's help (state measures only,  $k = 67$ ) and that generalized gratitude as an appreciation of valued people, and events in life assessed as both a state and trait ( $k = 14$ , see Table 1). We also coded studies as stranger ( $k = 54$ ) and close other (friend/family) ( $k = 9$ ).

**Country of participations, religiosity, and individualism-collectivism.** Altogether sixteen countries are represented. We categorized these countries initially on a continental basis (see Table 1). The majority of the studies were conducted in *North America* ( $k = 55$ ), along with *Western Europe* ( $k = 13$ ), *Asia* ( $k = 23$ ). Each country in the sample was also coded for its level of *religiosity* using the Gallup International Religiosity Index (Gallup International Survey, 2014) and *individualism-collectivism* using Hofstede and colleagues' (Hofstede, 2001; Hofstede, Hofstede, & Minkov, 2010) scoring procedures.

**Gratitude Measure—State/Mood versus Trait.** In the present review we grouped studies that examined gratitude as either a state or a mood under the category *State/Mood* ( $k = 65$ ) or as a *disposition* ( $k = 12$ ) (see Table 1 for examples).

**Gratitude Induction: Experiments versus Surveys.** Studies were divided into *Laboratory Studies* (involving a direct manipulation to induce gratitude) ( $k = 59$ ) and cross-sectional *Surveys/Field Studies* ( $k = 32$ ). Lab studies were further sub-divided into: *Experimental/Economic Games* ( $k = 34$ ), and *Vignettes* ( $k = 25$ ). Studies that were coded as *Vignettes* typically triggered participants' feelings of gratitude via hypothetical scenarios in which a protagonist was (or was not) helped. Studies coded *Experimental/Economic Games* involved gratitude induction via either laboratory induction of recalling being grateful or economic games during which one's experienced gratitude was elicited via receiving a financial benefit in the course of an economic interaction. We also coded the laboratory studies into in-vivo ( $k = 48$ ) and recall inductions ( $k = 11$ ). Illustrative examples are given in Table 1.

**Objectivity of Prosocial Measure.** We coded the objectivity of the prosocial measures. We defined an *objective* measure ( $k = 29$ ) as an actual expenditure of resources, time or effort and *subjective* measures ( $k = 61$ ) as a self-reported (or peer-reported) intentions to behave prosocially (i.e., *without* any actual commitment of resources) (Table 1).

**Target of Prosociality—Individual versus Group.** We coded whether the prosociality reported were targeted at an individual, a group, or an ambiguous entity. An *individually*-directed ( $k = 42$ ) prosocial measure is illustrated by Tsang (2006a) in which each participant decided how much to give to a specific co-player. By contrast, a *group*-directed

( $k=34$ ) prosocial measure is represented by the participants' decisions to show appreciation—for example, by writing a 'thank-you' note (Froh et al., 2014)—towards a group. We coded several studies as *ambiguously*-targeted ( $k = 13$ ) due to insufficient information. For example, if measures of individual and group helping were combined into a single index, or if the item was indexed helping in general while the authors did not designate this as a group- or an individually- targeted act (see Table 1 for examples).

**Gratitude Measure—Actual versus Proxy.** We also coded whether the gratitude measurement used was a proxy or an actual measure. We defined a *Proxy* measure ( $k = 9$ ) as a surrogate or an indirect assessment of gratitude. In contrast, we defined an *Actual* measure ( $k = 77$ ) as a direct assessment of gratitude as a state, mood or a disposition (see Table 1).

**Times Cited, Year of Publication and Age.** First, for all the published studies we coded the number of times that each article had been cited. This figure was obtained by examining the *times cited* metrics provided by the electronic databases used in the search (4<sup>th</sup> August 2016). To avoid double-counting we took the highest count metric available. Second, we included the years of publication (or availability) of our sampled articles/studies data ( $M: 2010.87$ ,  $SD: 4.88$ ). The earliest publication we included was in the 1980s (Graham, 1988) while the latest one was e-published in June 2016 (Layous, Nelson, Kurtz, & Lyubomirsky, 2016). For unpublished entries, we recorded either the year in which the papers were available or the year in which the studies were conducted. We coded the mean or median age



of participants reported in each study. If neither was available and an age range was given, we took the mode. Where the only information was a sample description (e.g., US college students) we imputed the age for the average US college student in the year that the study took place.

**Sensitivity Analysis.** As a number of effect sizes were derived from multivariate analyses (multiple regressions, path models, ANCOVA etc.), the effect sizes based on  $r$  may be over- or under-estimated. Therefore, we explore if the effect size estimates vary as a function of effect sizes that are *zero-order* (i.e. derived from univariate analyses) or derived from *partial coefficients*. Similar analyses had shown that it has the effect of generally reducing effect size estimates (Ferguson & Bibby, 2012).

### **Additional Meta-Analyses: Trait Association and Other Prosocial Emotions**

**Prosocial Traits.** To explore the association between trait gratitude and other prosocial traits we included the following additional search terms ('Agreeableness', 'Conscientiousness', 'Trait Empathy', and 'Forgiveness'). We included conscientiousness as a prosocial trait because there is evidence that it is associated with volunteering behavior (Ferguson, 2004; Lodi-Smith & Roberts, 2007) along with agreeableness which is associated with prosociality in general (Ferguson, Gancarczyk, Wood, Delaney, & Corr, 2016; Zhao & Smillie, 2015). This resulted in 30 studies with 128 effect sizes with a total N of 9,641.

**Other Prosocial Emotions.** To contextualize the gratitude-prosociality association we compared it to associations with the other prosocial emotions (i.e., hope, pride, surprise, anger, guilt, empathy, and sadness) as well a general NA and PA. We identified a number of existing meta-analyses that addressed prosociality with respect to NA (Carlson & Miller, 1987; Dalal, 2005), PA (Carlson, Charlin, & Miller, 1988), guilt (Boster et al., 2016), shame (Leach & Cidam, 2015), sadness (Carlson & Miller, 1987), empathy (Eisenberg & Miller, 1987), and happiness (Lyubomirsky, King, & Diener, 2005). To date, there have been no meta-analyses for hope, surprise, anger and pride.

Literature searches for surprise (search terms: 'Surprise', 'Prosocial behaviors', 'Cooperation', 'Helping', 'Compliance' and 'Prosociality') and hope (search terms: 'Hope', 'Hopeful', 'Prosocial behaviors', 'Cooperation', 'Helping', 'Compliance' and 'Prosociality') revealed no studies. Literature searches revealed 23 studies on pride (search terms: 'Pride', 'Prosocial behaviors', 'Cooperation', 'Helping', 'Compliance' and 'Prosociality') and 37 on anger (search terms: 'Anger', 'Helping', 'Cooperation', 'Third-party punishment', 'altruistic punishment', 'prosocial behaviors'). The search for anger was limited to papers published after Van Doorn et al.'s (2014) review on anger and prosocial behavior and we included all relevant papers from Van Doorn et al. (2014). With respect to anger we extended the definition of prosociality to include cooperation (giving to the public good and contribution of resources, which did not include an option to punish non-cooperators) along with

norm-enforcing punishment, whereby non-cooperators are punished either by other players (2<sup>nd</sup> party) or an impartial observer (3<sup>rd</sup> party) at a cost to the punisher. Punishment of this type is believed to enforce norms of fairness leading to greater cooperation (Fehr & Fischbacher, 2004; Gülerk, Irlenbusch, & Rockenbach, 2006). Furthermore, Peysakhovich, Nowak, and Rand (2014) distinguished cooperation from norm enforcement as two clear and distinct aspects of the cooperative phenotype. Thus, it seemed reasonable to distinguish the two. We conducted two additional meta-analyses to estimate the overall effect sizes for pride and anger on prosocial behaviors. We applied the same inclusion (and exclusion) criteria as used in the main analyses.

### **Overview of the Analysis—Data Synthesis, Meta-bias, and Additional Analysis**

We used the correlation  $r$  as the effect size metric for the present review. For studies that only reported the standardized  $\beta$ s we had applied Peterson and Brown's (2005) formula— $r = \beta + 0.05 \lambda$  (where  $\lambda = 1$  for non-negative  $\beta$ s, and  $\lambda = 0$  for negative  $\beta$ s)—in imputing the corresponding  $r$ s. We also computed  $r$  for studies that did not conduct correlational analyses via sample sizes along with  $t$ -values,  $\chi^2$  values,  $p$ -values, and standardized mean differences (i.e., Cohen's  $d$ ). In addition, we reverse-scored several measurements to assure that each *positive* effect size computed would represent a *direct* positive association between gratitude and prosociality.

We adopted the Random-effects model to calculate the combined effect size of gratitude on prosociality. Because our sample contained studies conducted with noticeably different features we did not follow the fixed-effect model because this assumes that all the studies included are functionally identical and share a single canonical effect size (Borenstein, Hedges, Higgins, & Rothstein, 2010; Hedges & Vevea, 1998). Additionally, the Random-effects model allows unconditional inferences (i.e., a generalizable conclusion to situations beyond the sampled studies) of the results (Field, 2001).

We found many studies that reported multiple Gratitude-Prosociality metrics. It was not uncommon for studies to either include both state and trait assessment of gratitude alongside a single prosociality measure (e.g. Spence, Brown, Keeping, & Lian, 2014), or to have a single gratitude measure alongside multiple prosociality measures (Watkins et al., 2006). These effect sizes that arise from the same study are not independent (Balliet, Mulder, & Van Lange, 2011; Borenstein, Hedges, Higgins, & Rothstein, 2009). As such, we referred to study as the unit of analysis meaning that each study included would contribute only one summary effect size to the main analysis (see Cooper, 1998). We computed effect sizes using Cooper's (1998) *Shifting-Unit-of-Analysis* method for studies that report multiple, non-independent effect sizes. For the moderator analyses, studies that included multiple predictors on the same sample for the same outcome (e.g., both direct and indirect reciprocity predicting gratitude for example) were excluded.

Similar to Balliet and Van Lange's (2013) reporting, we detail the 95% Confidence Intervals alongside certain indices of heterogeneity assessment like  $I^2$ , i.e. the cross-studies 'inconsistency index' (Higgins & Thompson, 2002; Higgins, Thompson, Deeks, & Altman, 2003), Cochran Q, and tau-squared (the 'study-to-study variances') (Borenstein et al., 2009). We also addressed the issue of publication bias via examining the funnel plot in which all effect sizes are plotted against the standard error. To empirically evaluate the extent of the symmetry of the funnel plot, and hence the severity of potential publication bias we examined the following indices, namely (1) the effect size estimates following Duval and Tweedie's (2000) Trim-and-Fill and (2) Egger's (Egger, Smith, & Phillips, 1997) regression intercept.

We applied the mixed-effects model in the categorical univariate moderator analyses (e.g., study type, reciprocity nature etc.) and the meta-regression analyses for the continuous moderators (e.g. times cited and years of publication). It should, nevertheless, be noted that the application of mixed-effects model may, compared to a fixed-effect model, render the analyses over-conservative and therefore susceptible to Type II-errors (Balliet & Van Lange, 2013; Lipsey & Wilson, 2001). All analyses in the present review were conducted using the Comprehensive Meta-Analysis (CMA) Version 2.0 (Borenstein et al., 2009). Meta-regression models were conducted using CMA Version 3.0 (Borenstein, Hedges, Higgins, & Rothstein, 2014).

**Coding Frame Reliability.** The first and third authors developed the initial coding frame. The first author coded all the studies initially. The first and third authors discussed all ambiguous cases, and agreed by discussion on the final coding. We formally tested the reliability of the coding frame on a random sample of 33% of studies ( $k = 30$ ) and a third rater (the second author, blind to the initial coding) applied the frame. The reliability coding frame was applied to all codes except those that were objectively attained (i.e., continents, religiosity, individualism-collectivism, year published, citations, journal vs dissertation, percentage female, average age and sensitivity analysis). The kappa coefficients all indicated substantial or greater agreement (mean Kappa = .92 SD = .11) (Landis & Koch, 1977; McHugh, 2012; Viera & Garrett, 2005).

## Results

### Overall Analyses

The list of effect sizes of the association between gratitude and prosociality and study characteristics are contained in Table 2. The analysis revealed a moderate positive association between gratitude and prosociality,  $r = 0.374$ , 95% confidence interval lower limit (LLCI) /Upper limit (ULCI) = 0.329/0.417,  $p < .0001$ . We observed a non-negligible level of variation in the distribution of effect sizes (Tau = 0.232, Tau-squared = 0.054). This might be explained by the considerable extent of heterogeneity (i.e.,  $I^2 = 90.98$ ;  $Q(90) = 998.16$ ,  $p < .0001$ ) inherent among the sampled studies.

To address the extent to which publication bias may have impacted upon the analysis we first examined the adjusted effect size estimates following Duval and Tweedie's (2000) Trim-and-Fill procedure using the Random-effects model. No studies were deemed missing below the average effect estimates. In contrast, fifteen studies with imputed effect size greater than the mean effect estimate were filled in, resulting in an effect estimate that was slightly higher than the pre-adjusted mean effect ( $r = 0.423$ , LLCI/ULCI = 0.379/ 0.465). This suggested that the present analysis might be potentially biased toward understating, rather than overstating, the summary effect. Such a potential vulnerability to understating the effect is the opposite to what one would normally expect from a review that is confounded by publication bias (i.e. the under-sampling of non-significant effect sizes which are prevalent among unpublished studies (Balliet & Van Lange, 2013; Cooper, 1998). Nevertheless, the non-significant Egger's regression coefficient (intercept = 0.50, standard error = 1.09, LLCI/ULCI = -1.67/2.67,  $p = .6473$  (two-tailed)) dispels any concern about bias toward underestimation. In sum, all these indicators suggest that the present analysis is not contaminated by publication bias. See Figure 2 for the funnel plot.

### **Moderator Analyses**

Table 3 details the results of the univariate moderator analyses. In this section, we explore each of the theoretical or methodological moderators.

**Reciprocity vs. Non-Reciprocity.** We coded whether the prosociality measures reported were reciprocity or non-reciprocity driven. The results indicated a statistically significant difference,  $Q(1) = 9.094, p = .0026$ , with studies which assessed *reciprocal* prosocial outcomes ( $r = 0.401$ , LLCI/ULCI= 0.350/ 0.449,  $k = 75$ ) resulting in a stronger association between prosociality and gratitude than did studies which focused on *non-reciprocal* prosocial outcomes ( $r = 0.257$ , LLCI/ULCI= 0.174/ 0.336,  $k = 15$ ).

**Reciprocity Nature: Direct versus Indirect.** Outcomes were coded as either *direct* or *indirect* reciprocity. The results showed that while in both cases the associations were significant, studies that examined *direct* reciprocity ( $r = 0.443$ , LLCI/ULCI= 0.385/ 0.497,  $k = 51$ ) had a stronger association between gratitude and prosociality, than studies that examined *indirect* reciprocity ( $r = 0.311$ , LLCI/ULCI= 0.191/ 0.422,  $k = 14$ ),  $Q(1) = 4.265, p = .0389$ . This indicates that gratitude is a stronger predictor of prosociality in the context of *direct* rather than *indirect* reciprocity. Furthermore, it was worth noting that there are similar effect sizes,  $Q(1) = 0.555, p = .456$ , for studies that assessed *non-reciprocal* prosociality ( $r = 0.257$ , LLCI/ULCI = 0.174 / 0.336,  $k = 15$ ) and those which examined *indirect* reciprocity ( $r = 0.311, k = 14$ ). Studies which measured *direct* reciprocity ( $r = 0.453, k = 51$ ), meanwhile, reported a significantly larger effect,  $Q(1) = 13.95, p < .001$ , than studies whose outcomes were *non-reciprocal*. This might suggest the moderating effect of *reciprocity versus*



*non-reciprocity* on the gratitude-prosociality association may be attributable to the *direct* instead of the *indirect* reciprocal exchanges.

**Upstream versus Downstream Indirect Reciprocity.** While the associations with both upstream ( $r = 0.147$ , LLCI/ULCI = 0.043/ 0.247,  $k = 9$ ) and downstream ( $r = 0.484$ , LLCI/ULCI = 0.253/ 0.662,  $k = 5$ ) indirect reciprocity were significant, the association was significantly stronger for downstream indirect reciprocity,  $Q(1) = 6.655$ ,  $p = .0099$ .

**Social Relationships.** We coded if gratitude was generated by a benefit-triggered relationship vs generalized gratitude. The results revealed a significant difference,  $Q(1) = 9.843$ ,  $p = .0017$ . While both associations were significant, the benefit-triggered gratitude ( $r = 0.421$ , LLCI/ULCI = 0.367/ 0.472,  $k = 67$ ) resulted in a significantly larger association than generalized gratitude ( $r = 0.272$ , LLCI/ULCI = 0.192/ 0.349,  $k = 14$ ).

We also explored if there was a difference between stranger vs close relationships, but there was no significant difference ( $Q(1) = 1.077$ ,  $p = .2992$ ), with both the close other-gratitude ( $r = 0.380$ , LLCI/ULCI = 0.328/ 0.430,  $k = 9$ ) and stranger-gratitude ( $r = 0.423$ , LLCI/ULCI = 0.358/ 0.484,  $k = 54$ ) links being significant.

**Continent of Participation, religiosity and individualism-collectivism.** We coded the continents in which the studies were administered and examined if this moderated the link between gratitude and prosociality. The majority of the studies reported a moderate positive relation between gratitude and prosociality with studies from *Western Europe* ( $r = .425$ ,

LLCI/ ULCI = 0.298/0.536,  $k = 13$ ) having the largest effect size, then *East Asia* ( $r = .399$ , LLCI/ ULCI = 0.318/0.474,  $k = 23$ ) followed by *North America* ( $r = .350$ , LLCI/ ULCI = 0.289/0.408,  $k = 55$ ). However, there was no significant moderating effect of continent,  $Q(2) = 1.685$ ,  $p = .4307$ . Regression analyses showed that effect-size estimates did not vary as a function of religiosity ( $\beta = -0.0012$ ,  $p = .416$ ) or individualism-collectivism ( $\beta = -0.0008$ ,  $p = .408$ ) within each country.

**Gratitude Measure: State versus Trait.** We coded whether the type of gratitude examined in the studies was referred to as a state/mood or as a disposition. The data revealed that the type of gratitude measures did result in different effect sizes,  $Q(1) = 15.866$ ,  $p = .0154$ , with the gratitude-prosociality association stronger for the studies which reported *state/mood* gratitude measures ( $r = 0.424$ , LLCI/ULCI = 0.371/ 0.474,  $k = 65$ ) than studies that examined *dispositional* gratitude ( $r = 0.301$ , LLCI/ULCI = 0.212/ 0.385,  $k = 12$ ).

**Type of Study and Gratitude Induction.** We examined whether studies that were classified as Laboratory Studies or Survey/Field studies had different Gratitude-Prosociality effect sizes. Gratitude was significantly associated with prosociality whether it was lab-based ( $r = .367$ , LLCI/ULCI = 0.312/ 0.419,  $k = 59$ ) or a survey/field study based ( $r = .385$ , LLCI/ULCI = 0.308/ 0.456,  $k = 32$ ). However, whether the study was lab-based or a Survey/Field study did not moderate the effect size,  $Q(1) = 0.145$   $p = .7037$ .

We then examined whether the way in which gratitude was induced within the 59 lab-based studies moderated the relationship between gratitude and prosociality. We anticipated that studies that were experimental/economic game-based would yield a stronger effect size than vignettes. The results, demonstrated that that gratitude-prosociality association was significant for vignettes ( $r = .403$ , LLCI/ ULCI = 0.316/ 0.484,  $k = 25$ ) and experimental/economic games ( $r = .335$ , LLCI/ ULCI = 0.267/ 0.399,  $k = 34$ ), but the two did not differ significantly,  $Q(1) = 1.528$ ,  $p = .2164$ .

We also explored if the effect size was larger in in-vivo vs recall based lab studies. The results, demonstrated that that gratitude-prosociality association was significant for in-vivo ( $r = .400$ , LLCI/ ULCI = 0.338/ 0.458  $k = 48$ ) and recall ( $r = .219$ , LLCI/ ULCI = 0.134/ 0.283,  $k = 34$ ) studies and that these effects differed significantly,  $Q(1) = 15.152$ ,  $p = .0001$ .

**Objective versus Subjective Prosociality.** We coded if the prosociality measure adopted was objective ( $r = 0.327$ , LLCI/ULCI = 0.262/ 0.388,  $k = 29$ ) or subjective ( $r = 0.395$ , LLCI/ULCI = 0.339/ 0.449,  $k = 67$ ). While both effects are significant the results revealed no significant moderating effect,  $Q(1) = 2.595$ ,  $p = .1072$ .

**Target of Prosociality: Individual versus Group.** We coded whether the prosocial behaviors or behavioral tendencies reported were targeted at an individual or a group. The associations between gratitude and prosociality were significant for *group*-directed

prosociality ( $r = .431$ , LLCI/ ULCI = 0.352/0.504,  $k = 34$ ), and for the *individually*-targeted prosociality ( $r = .354$ , LLCI/ ULCI = 0.306/0.399,  $k = 42$ ). However, these associations were not significantly different from each other,  $Q(1) = 2.766$ ,  $p = .0963$

**Proxy versus Actual Gratitude Measure.** We coded whether *proxy* or *actual* gratitude measures were used. While associations were significant for both actual measures ( $r = 0.368$ , LLCI/ULCI = 0.318/ 0.416,  $k = 77$ ) and proxy ( $r = 0.382$ , LLCI/ULCI = 0.237/ 0.510,  $k = 9$ ), these were not significantly different from each other,  $Q(1) = 0.034$ ,  $p = .8544$ .

**Times Cited, Year of Publications and Age.** We considered whether a study was larger effect sized would be more frequently cited. The results demonstrated an absence of significant moderating effect by times cited ( $\beta = -0.0002$ ,  $p = .63$ ). Categorical comparison between effect sizes from the published ( $r = 0.381$ , LLCI/ULCI = 0.331/ 0.424,  $k = 72$ ) and unpublished studies ( $r = 0.344$ , LLCI/ULCI = 0.240/ 0.440,  $k = 19$ ) indicated no significant difference,  $Q(1) = 0.429$ ,  $p = .5123$ . There was no effect of year of publication or the year in which the studies were conducted ( $\beta = -0.0038$ ,  $p = .50$ ). There was no effect of age either ( $\beta = 0.0034$ ,  $p = .17$ ). Taken together, these results highlighted that the effect estimate was not affected by how frequently cited the studies were, whether the studies were published or not, when the studies were conducted, and how old (or young) the participants were.

### **Sensitivity Analysis**

We explored the effect of whether the index of association was derived from a simple, univariate zero-order association ( $r = 0.386$ , LLCI/ULCI = 0.336/ 0.433,  $k = 74$ ), or ones that were derived from higher order partials ( $r = 0.320$ , LLCI/ULCI = 0.218/0.416,  $k = 17$ ). While both effects were significant, they were not significantly different from each other,  $Q(1) = 1.385$   $p = .2393$ .

### **Trait Gratitude-Prosocial Trait Associations**

Table 4 shows the effect size estimates for the association between indices of trait gratitude and other pro-social traits. The Egger's Intercept of 0.230 (LLCI/ ULCI = -1.871, 2.332,  $p = .824$  (two-tailed)) indicated no publication bias. The Random-Effect Trim-and-Fill analysis indicated zero imputed studies in the current sample, resulting in no change in the effect estimate. There were 30 studies with 128 effect sizes with an N of 9,641. The overall effect size was positive and significant ( $r = 0.296$ ,  $p < .001$ ). Thus, while trait gratitude and other prosocial traits are associated this effect is small and that trait gratitude cannot be considered as synonymous with a general prosocial disposition.

### **Gratitude, Other Prosocial Emotions, and Differential Predictive Power**

Tables 5 and 6 detail the individual effects and overall effect estimates for the pride-prosociality and anger-prosociality associations respectively. For pride there were twenty-three ( $k = 23$ ) studies with a total of 4,509 participants and 96 effect sizes. The effect

was positive and significant ( $r = .212, p < .001$ ) but smaller than that of the gratitude-prosociality link. There was also no evidence for publication bias with a non-significant ( $p = .257$ ) Eggers' intercept ( $-2.248, \text{LLCI/ULCI} = -6.257, 1.761$ ). The Random-Effect Trim-and-Fill analysis filled in three studies with imputed effects *larger* than the mean effect estimates, resulting in slightly *higher* post-adjusted effect estimates ( $r = 0.250, \text{LLCI/ULCI}: 0.156/0.339$ ) than the initial estimate ( $r = 0.212, \text{LLCI/ULCI}: 0.114/0.306, p < .001$ ).

Table 6 shows the effect sizes for the anger-prosociality link based on 41 studies that altogether included 8,066 participants and 136 effect sizes. The Egger's test (intercept:  $-1.683, \text{LLCI/ULCI} = -5.719/2.353, p = .404$  (two-tailed)) revealed no publication bias. Nonetheless, the Random-effect Trim-and-Fill analysis filled in three studies with effect sizes *smaller* than the initial estimates, resulting in a smaller albeit still significant post-adjusted effect estimate ( $r = 0.123, \text{LLCI/ULCI}: 0.017/0.227, Q = 1006.57$ ). However, as anger is related to two very distinct notions of prosociality (i.e., cooperation and norm enforcement) we included this as a moderator. This segregation was based upon *whether punishment was involved* (second- and third-party punishment) with studies examining 'Third-party Compensations' (e.g. Study 2, Gummerum, Van Dillen, Van Dijk, & Lopez-Perez, 2016) coded as 'no-punishment'. The difference between studies that involved a punishment ( $k = 11, r = 0.381, 0.307/0.451$ ) and those that did not ( $k = 20, r = -0.068, -0.227/0.094$ ) was

significant,  $Q(1) = 25.316, p < .001$ . Thus, anger appears linked primarily to norm-enforcing punishment rather than direct cooperation.

Table 7 highlights the comparison of the effect sizes derived from the analyses in this paper and meta-analyses reported by others. Overall gratitude has one of the largest effect sizes, with PA the largest. However, it is in the context of reciprocity that gratitude has its larger effect over other specific prosocial emotions.

### **Meta-Regression**

We conducted a meta-regression using the four main significant differential predictors from Table 3 (i.e. reciprocity versus non-reciprocity, benefit-triggered versus generalized, state versus trait, and in-vivo versus recall). The results shown in Table 8 indicate that none of these predictors remained significant.

## **Discussion**

### **Summary of Evidence**

The current meta-analysis makes 4 clear contributions to the gratitude-prosociality literature and debate. First, it establishes a clear link between gratitude and prosociality ( $r = 0.374$ ). Second, it shows that the gratitude prosociality link is sensitive to the type of gratitude induced (state vs trait, benefit-triggered vs generalized, with state and benefit-triggered, having larger effects on prosociality). Third, gratitude is not only a key ingredient of all form of reciprocity, with its influence on direct reciprocity the strongest, but

also importantly linked to exchanges that are based on close social relationships (benefit-triggered gratitude). With respect to other prosocial emotions, the overall effect of gratitude had the largest effect size, after general positive affect, with this primarily driven by gratitude's special function with respect to reciprocity.

In the following, we discuss the theoretical significance of the current findings and how these could be incorporated into existing gratitude interventions.

Before exploring these findings in more detail we first would like to acknowledge the limitations of the present analyses. This should give the reader a cleaner framework to interpret the findings. We applied the Mixed-effects model in both the categorical moderator analyses and the meta-regression for the continuous moderators. As discussed previously the mixed-effects model is over-conservative (Balliet & Van Lange, 2013). Nevertheless, it is an appropriate model to adopt as it assumes the existence of systematic variations in the effect sizes (i.e., moderators) alongside the random population variance (Voss, Kramer, Basak, Prakash, & Roberts, 2010).

We note that the studies reviewed were a mixture of experimental manipulations and cross-sectional assessments. Thus, while we are unable to make any clear definitive statement regarding causality, we feel that the experimental work—that exogenously manipulates gratitude—provides some evidence that gratitude has a causal role with respect to influencing prosocial behavior. Thus, we would encourage future researchers to experimentally



manipulate, where possible, gratitude to help establish causality. However, when randomization is not possible future researchers should consider using propensity score matching (Jackson, Thoemmes, Jonkmann, Ludtke, & Trautwein, 2012) or instrumental variables analysis (Shepherd, O'Carroll, & Ferguson, 2014) to infer causality as long as the sample sizes are sufficiently large.

Although there were 16 countries represented in our sample the majority of the studies were from North America or Western Europe ( $k = 68$ ). Thus, the current analysis may not generalize beyond Western, Educated, Industrialized, Rich and Democratic (WEIRD) societies (Henrich, Heine, & Norenzayan, 2010).

Finally, for a number of comparisons (upstream vs downstream) the  $k$ s were small in both cases and for others the  $k$ s were discrepant with one being larger than the others (e.g., actual vs proxy). We suggest that readers treat these with a degree of caution as results may be biased on small or large effect size (Greco, Zangrillo, Biondi-Zoccai, & Landoni, 2013).

### **Theoretical Implications**

Confirming the general expectation in the literature that gratitude is linked to prosociality, the overall effect size for the gratitude-prosociality link was positive and medium-sized (Cohen, 1988). This effect was significant regardless of (1) whether it was a lab based manipulation or survey/field study based, (2) whether it was based on an objective or subjective estimate of prosociality, (3) whether it was targeted at individuals or groups, (4)

the continent in which the research took place, and (5) whether gratitude was assessed via a proxy or an actual gratitude measure.

Importantly, however, this association was significantly moderated by a number of key theoretical constructs. There were stronger associations between gratitude and prosociality in studies that examined reciprocal prosocial exchanges, compared to non-reciprocal exchanges. This is wholly consistent with the theory that gratitude underlies all forms of reciprocity (direct, indirect upstream and indirect downstream) (Nowak & Roch, 2007). In addition, we observed a significantly stronger association between gratitude and reciprocity for *direct* versus *indirect* reciprocal exchanges. This may reflect the clearer social exchange that takes place in direct reciprocation where gratitude may also trigger a sense of closeness/bonding (see Algoe, 2012) as well as potentially obligation/indebtedness (Wood et al., 2016). The data presented in this paper does not allow us to distinguish these possibilities. There is evidence for a stronger gratitude-prosociality link in response to others' kindness (i.e. benefit-triggered) rather than as a generalized sense of gratitude (Lambert et al., 2009). However, there was no difference in the strength of the association between strangers and close social relationships. Thus, it seems that social ties are important, but whether these ties work by bonding existing relationships (close social ties) or finding new ones (strangers) or via an obligation to repay is unclear.

Interestingly it has been argued that for exchanges that involve family and relatives, where kin selection models may apply, gratitude is less important (McCullough et al., 2008). Kin selection models suggest that people would show differential helping towards those they are genetically closer to (see Nowak (2006) for review). The idea underlying kin-selection is '*inclusive fitness*' which is the sum of indirect and direct fitness. That is, by helping close relatives – who share genes with the helper – the helper increases the chances that the relative will survive to reproduce (indirect fitness). As such, as well as potentially being able to pass their own genes to the next generation (direct fitness) a proportion of the helpers' genes may be passed on to the next generation via an indirect fitness route. Thus, it is argued that gratitude is not necessary to motivate prosociality in the context of kin selection, as inclusive fitness is the driving mechanism (McCullough et al., 2008). However, recent theoretical work has questioned the concept of inclusive fitness and suggested instead that genes directed towards being social rather than selfish are able to explain the findings and inclusive fitness is not needed (Nowak, Tarnita, & Wilson, 2010). Thus, gratitude may be a key parameter in differentiating these approaches. Kin-selection would predict that gratitude is more important when helping non-kin compared to kin. The approach suggested by Nowak et al (2010) suggests that the degree of relatedness is not important and sociality is. Indeed, our results suggest that gratitude may, in fact, be more important for familial reciprocity. Here direct reciprocity is more likely as close social bonds are more likely to be strengthened via

reciprocity. We cannot test these competing accounts directly in our data as there is only one study (Kubacka, Finkenauer, Rusbult, & Keijsers, 2011) that looked at kin-directed gratitude.

We also observed that the gratitude-prosociality association is stronger for *downstream* compared to *upstream* indirect reciprocity. This is of particular theoretical significance as some authors have tied gratitude more specifically to *upstream* indirect reciprocity (e.g., Nowak & Roch, 2007). One suggestion regarding why the effect is stronger for downstream indirect reciprocity is that if the helper (A) helps (B) beyond the call of duty (blood donation, for example) then an uninvolved observer C may experience moral elevation towards 'A' which may trigger gratitude and helping towards 'A'. This gratitude may be generalized (grateful that such good people/organizations exist) rather than benefit-triggered. Indeed, in many of the empirical example studies in this meta-analysis, it is the case that the target of gratitude is an organization for acting in a very high moral fashion. Thus the gratitude felt in downstream indirect reciprocity may be stronger than the gratitude felt when the target has been helped (upstream indirect reciprocity) due to moral elevation.

The present results suggested that both trait and state forms of gratitude are linked to prosociality, although trait gratitude shows a weaker effect. The importance of both trait and state gratitude for prosociality has been extensively discussed (e.g. Kubacka et al., 2011; McCullough et al., 2001; Wood et al., 2008). Although the effect of trait gratitude is weaker it still explains about 9% of the variance in prosociality. As such, the effect of trait gratitude

is important and worthy of further exploration. For example, does trait gratitude predict all forms of prosocial behavior (e.g. voting, giving to charity, reciprocity related) over and above general prosocial traits like agreeableness or is trait gratitude only linked to prosociality focusing on reciprocation and social bonding? Specifically, is trait gratitude acting as a general trait or a domain-specific/context-dependent trait (see Ferguson & Lievens, in press; Robie & Risavy, 2016; Shaffer & Postlethwaite, 2012)?

The current study does not allow us to test the mechanisms through which trait gratitude influences prosociality. It might be due to some shared variance with general prosocial traits. Indeed, this study showed that trait gratitude and other prosocial traits are significantly linked. Thus future studies on trait gratitude should also measure other prosocial traits and look for the incremental effect of trait gratitude. Furthermore, the Social Cognitive Model of Gratitude (SCMG) suggest that state gratitude mediates the effects of trait gratitude (Wood et al., 2008). This mechanism should be explored while controlling for the influence of other prosocial traits.

**Prosocial Emotions, Gratitude, and Prosociality.** Overall gratitude showed the largest effect size with prosociality after general positive affect. It was greater than sadness, happiness, negative affect, empathy, shame, and anger. The effect of anger, however, was unique to punishing non-cooperators, rather than fostering cooperation directly. With respect to the family of ‘self-conscious emotions’ of shame, embarrassment and guilt, the effect of

gratitude was comparable to guilt, but greater than that of shame and pride. For the family of ‘other-suffering’ emotions, gratitude was greater than empathy. Thus, for prosociality overall gratitude appears to have a crucial role to play. However, this finding needs to be put into context. When we considered the overall effect of gratitude, gratitude is a key emotion.

However, it appears that the major effect of gratitude is with respect to reciprocal exchanges.

When non-reciprocal prosociality is considered the effect size for gratitude is comparable to that for empathy, happiness, negative affect, and guilt, but smaller than positive affect, and greater than shame and sadness. Thus, we can conclude that gratitude, across the broad spectrum of prosociality, is a key emotion, but in the domain of reciprocity it has a *special place*.

### **Practical Significance: Implications on Gratitude Intervention**

Compared to the other prosocial emotions examined in this review, general gratitude had one of the largest effect sizes and in particular for reciprocal exchanges, and especially for downstream indirect reciprocity. This suggests that gratitude is a good target for interventions to enhance prosociality and subjective well-being (see Davis et al., 2016; Renshaw & Olinger-Steeves, 2016; Wood et al., 2010). These interventions need to focus on reciprocal exchange. It would also appear that interventions working on *in-vivo* generation of gratitude instead of recall will be more effective.

The classic gratitude intervention was originated in studies by Emmons and McCullough (2003) and Froh, Sefick, and Emmons (2008) who instructed participants to recall up to five gratitude-inducing events that took place in their recent past. Although this gratitude induction may have focused on transitory feelings of gratitude, it may not have captured some other factors that influence the link between gratitude and prosociality. Indeed, the focus on recall in this technique may mean that it is not as powerful as it could be, as our analyses show that recall-based induce gratitude is weaker than more direct in-vivo inductions. Moreover, both direct reciprocal exchange and downstream indirect reciprocity had the largest effect sizes. Thus exchanges that emphasize mutual benefit or attracting help from others—thanks to previous good deeds—seem to be crucial. As such, we propose that to optimize their effectiveness on prosociality future gratitude interventions should include the element of direct in-vivo manipulations (economic games, confederates, vignette etc.).

For instance, Watkins and colleagues' (2003) 'Grateful Essay' training used both benefit-triggered gratitude and reciprocity. Practitioners could instruct the trainees to write about a particular person, for example, a close friend, for whom they feel grateful and how they either actually helped, or intended to help, that particular individual back (direct reciprocity). However, again this relied on recall. Participants could also be instructed to consider how their good deeds may influence others to help them when they need help (downstream indirect reciprocity) or how feelings of gratitude may influence them to help

others (upstream indirect reciprocity). This could be more vignette-based, or use a game approach whereby the target is either helped, witnessing another being help or is helped. Such a more in-vivo approach may be more successful than recall-based approaches. Indeed, in their gratitude intervention, Seligman and colleagues (2005) adopted a more in-vivo approach and had participant both write a thank-you note and deliver it to someone who had helped them in the past. This intervention also involves social closeness and bonding and positively responding to another's help (see Algoe et al. (2016)). Seligman and colleagues showed that this intervention was effective in increasing happiness and reducing depression in the weeks immediately following the intervention. Even though the changes we suggest are small, it is well-known that small changes in frames can significantly alter behavioral and emotional responses (Dolan & Kahneman, 2008). So while the suggested changes we offer may be small, they still constitute an empirical question of whether these small change could result in a large impact on the effectiveness of gratitude interventions.

## **Conclusions**

Gratitude underlies all forms of reciprocal relationship, which is linked to returning favors (direct reciprocity), being helped by others because you have helped another entity (downstream indirect reciprocity), and helping others because you have been helped (upstream or the 'pay-it-forward' indirect reciprocity). This is especially the case when gratitude is directed towards close social bonds, rather than feeling grateful for cherished



things in the world. Thus, this emotional focus on others cements the social bond and underscores gratitude's central role in the evolution of reciprocal prosocial behaviors.

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Table 1

*Working Definition of the Methodological and Theoretical Moderators*

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Theoretical Moderator: Reciprocity versus Non- reciprocity	Non-Reciprocity ( <i>k</i> = 15)	Studies which i) measured the effect of gratitude on prosocial behaviors (or behavioral intention) that were not concerned about repaying a benefit received, or ii) were survey-based	- Participants assigned to the on-going gratitude training session were to indicate ‘each day if they had helped someone with a problem or offered someone emotional support (pp. 382)’ – (Study 2, Emmons and McCullough, 2003)
	Reciprocity ( <i>k</i> = 75)	Studies whose measures of prosocial behaviors or intentions involved where the potential or actual opportunity to reciprocate was possible: i) Direct Reciprocity: a direct return of favors to the benefactors— an ‘A helps B and B helps A’ scenario (Nowak & Sigmund, 2007); ii) ‘Downstream’ Indirect Reciprocity: individuals acting prosocially towards those they observed to help others — an ‘A helps B, and C helps A’ scenario (Nowak & Sigmund, 2007); iii) ‘Upstream’ Indirect Reciprocity: individuals acting prosocially to a third-party after receiving a favor from someone else —an ‘A helps B, and B helps C’ scenario (Nowak & Sigmund, 2007);	i) ‘Direct Reciprocity’: Participants of the ‘Favour’ Condition decided how much money to distribute to their benefactors in the previous round. – (Tsang et al., 2012); ii) ‘Downstream’ Indirect Reciprocity: Participants of the ‘experimental’ condition read a vignette of a fictitious company engaging in Corporate Social Responsibility (CSR) investment (e.g. concern for fair trade, employees’ safety and human rights preservation etc.). Participants then rated how grateful they felt for that company’s CSR investment, and indicated how likely they would reward her via ‘positive word of mouth’ and ‘advocacy behaviors’ – (Romani et al., 2013) iii) ‘Upstream’ Indirect Reciprocity: Participants recalled a time being treated very generously by someone and then decided whether to donate their allowance to a local charity for children. – (Study 2, Siegel et al., 2014)
	Direct Reciprocity ( <i>k</i> = 51)	See the definition above.	See the example above.
	Indirect Reciprocity ( <i>k</i> = 14)	See the definitions above. Owing to the relatively small counts of both downstream ( <i>k</i> = 5) and upstream ( <i>k</i> = 9) studies, together with two studies whose outcomes concerned both types of indirect reciprocities, we combined all these to form a category Indirect Reciprocity in the main analyses.	See the example above.

Table 1 (contd')

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Theoretical Moderator: Reciprocity versus Non- reciprocity (contd')	Blank Entries ( <i>k</i> = 10)	Outcomes involved both <i>direct</i> and <i>indirect</i> reciprocities, but the authors did not specifically report how gratitude was related to each type of reciprocities.	Average of rating on items a) 'Do you want to help your father (i.e. the benefactor in the vignette) if he needs help in similar or other situations?', and b) 'Do you want to help others if they help in similar or other situations?' –(pp. 251, Naito et al., 2005)
Theoretical Moderator: Social Relationships	Benefit-triggered Gratitude ( <i>k</i> = 67) (Lambert et al., 2009)	The gratitude that results from a specific 'interpersonal transfer of benefit from a beneficiary to a benefactor. (pp. 1194)'	i) Participants' gratitude towards a confederate who unexpectedly offered the former a soda. – (e.g. Study 1, Goei & Boster, 2005); ii) Patron's gratitude toward the complimentary winery tour–(e.g. Kolyesnikova & Dodd, 2008)
	Generalized Gratitude ( <i>k</i> = 14) (Lambert et al., 2009)	An emotion, or an affective state, which stems from the appreciation of things which 'are meaningful and valuable to oneself. (pp. 1194)'	Gratitude Induction: 'Think back over the past week and write down on the lines below up to five things in your life that you are grateful or thankful for. (pp. 379)' (Emmons & McCullough, 2003)
	Close others ( <i>k</i> = 9)	Studies examining how gratitude felt towards friends, family members, or relatives would relate to prosociality.	Kubacka et al. (2011) examined how feelings of gratitude towards one's spouse would predict each partner's relationship maintenance behaviors.
	Strangers ( <i>k</i> = 54)	Studies examining how gratitude felt towards the experimenter, a confederate or a fellow participant, a casual acquaintance or a corporation would relate to prosociality.	Exline and Hill (2012, Study 2) examined how participants' gratitude towards the experimenter (for the allowance) would predict generosity towards a 'future participant'.
Theoretical Moderator: Country of Participations, Religiosity, and Collectivism	Continents ( <i>k</i> = 91)	We categorized the 91 studies from 16 countries (or regions) on a continental basis. Fifty-five studies were conducted in <i>North America</i> , along with 23 in <i>Asia</i> and 13 in <i>Western Europe</i> .	'North America': Studies that were conducted in the USA (e.g. Goei & Boster, 2005) or Canada (e.g. Rubin, 2012); 'Asia': Studies that were conducted in China (e.g. Tian, et al., 2016), Japan (e.g. Naito et al., 2005), India (e.g. Dewani et al., 2016), South Korea (e.g. Kim & Lee, 2013), Israel (e.g. Halali et al., 2016), Hong Kong (e.g. Zhao, 2010), Thailand (e.g. Wangwan, 2014), or Taiwan (e.g. Chang et al, 2012). 'Western Europe': Studies that were conducted in the United Kingdom (e.g. Ma, et al., 2014), Germany (e.g. Wetzel et al., 2014), France (e.g. Simon, 2013), Netherlands (e.g. de Hooge, 2014), Italy (e.g. Soscia, 2007) and Norway (e.g. Xie et al., 2015).

Table 1 (contd')

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Theoretical Moderator: Country of Participations, Religiosity, and Collectivism (contd')	Religiosity	We coded the level of religiosity using the Gallup International Religiosity Index (2014). In particular, the percentage of people from a country identifying themselves as, regardless of whether they attend a place of worship or not, 'a religious person'	Canada: 40%; China: 7%; France: 40%; Germany: 34%; Hong Kong: 26%; India: 76%; Israel: 30%; Italy: 76%; Japan: 13%; Netherlands: 26%; South Korea: 44%; Thailand: 94%; United Kingdom: 30%; United States of America: 56%. (No data was provided for Norway and Taiwan)
	Individualism-Collectivism	We coded the level of collectivism via Hofstede's (Hofstede, 2001; Hofstede et al., 2010) Individualism-Collectivism index. A higher score indicates higher likelihood of people defining their self-image as 'I' instead of 'we' (i.e. low collectivism)	Canada: 80; China: 20; France: 71; Germany: 67; Hong Kong: 25; India: 48; Israel: 54; Italy: 76; Japan: 46; Netherlands: 80; Norway: 69; South Korea: 18; Taiwan: 17; Thailand: 20; United Kingdom: 89; United States of America: 91.
Theoretical Moderator: Gratitude Measures	State/Mood ( $k = 65$ )	Gratitude examined or induced as a i) positive emotion upon receipt of an intentional, valued benefit (Tsang, 2006a, 2007); or ii) a mood over a designated period of time.	i) Participants rated items such as 'I am happy to have been helped by others,' and 'I have benefited from the goodwill of others.' – (Study 2, Spence et al., 2014); ii) Participants rated the amount of gratitude they 'experienced "since yesterday"'. (pp.637) – (Froh et al., 2009)
	Disposition ( $k = 12$ )	Gratitude examined as an enduring characteristic of thankfulness sustained across contexts and over time (Chan, 2013; McCullough et al., 2002)	Participants to rate themselves using the GQ-VI (McCullough et al., 2002). The sample items included 'I am grateful to a variety of people; As I get older I find myself more able to appreciate people' – (e.g. Tian et al., 2015)
Methodological Moderator: Type of Study (Lab-Studies vs. Survey /Field Studies)	Lab-Studies ( $k = 59$ )	Studies which employed a direct, exogenous manipulation (or induction) of participants' gratitude mood or affective states. We further classified THESE studies under this code into two sub-categories: 1) Experimental/ Economic Games; and 2) Vignette. We also break down this category into two sub-categories: 1) Lab-Studies: In-vivo; and 2) Recall.	' <u>Experimental/ Economic Games</u> ': Participants assigned to the 'Gratitude' condition received a favor from a confederate while working on a tedious task. They then decided whether to help that confederate fill out a time-consuming survey. -(Study 1, Bartlett and Desteno, 2006); ' <u>Vignette</u> ': Participants read a vignette about a student being helped. A year later, the protagonist came across the benefactor who asked for help from the former. Participants then indicated how eager they were to help the benefactor back –(Study 2, Yang et al., 2015)

Table 1 (contd')

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Methodological Moderator: Type of Study (Lab-Studies vs. Survey /Field Studies) (contd')	Survey /Field Studies ( <i>k</i> = 32)	Studies in which participants completed a battery of questionnaires (i.e. Survey Study). Studies involving manipulation of variables <i>other than gratitude</i> , but included <i>peripheral measures</i> on participant's gratitude (i.e. Field Study) were also coded as a 'Survey/Field study' in the present analysis.	' <u>Survey Study</u> ': Participants filled out a series of questionnaires including the Religiousness Scale (Strayhorn et al., 1990), Spirituality Scale (Delaney, 2005), in addition to trait gratitude (i.e. GQ-VI) and prosocial behaviors measures (e.g. Peer-helping behavior scale (Crick, 1996) and Child Altruism Inventory (Ma & Leung, 1991). -(Li & Chow, 2015); ' <u>Field Study</u> ': A between-subject video vignette study which examined the effect of Socio-Economic Statuses (janitor versus doctor) and Favours (whether or not the protagonist had bought a drink for his 'target') on compliance with a date request. Participants imagined themselves as the recipient of a date request, and were asked to rate how grateful, appreciative, or thankful they felt towards the protagonist throughout the episode. -(Hendrickson & Goei, 2009)
	Experimental/ Economic Games ( <i>k</i> = 34)	Laboratory Induction: Participants were asked to recall feeling grateful thanks to others' benevolence. Economic Games: Participants' gratitude was triggered by a co-player's conferment of a financial benefit in the course of an economic exchange.	'Laboratory Induction': Participants recalled an incident whereby 'another person did something for you that was very kind. (pp.47)' -(Study 1, Exline et al., 2012)
	Vignette ( <i>k</i> = 25)	A hypothetical scenario or story in which participants were induced to feel grateful as the protagonist was treated generously by someone.	Refer to the above examples of 'Lab Studies' (e.g. Yang et al., 2015).
	Lab-Studies: In-vivo ( <i>k</i> = 48)	Studies which involved endogenous induction of gratitude via i) economic games; ii) confederates doing something nice, or ii) vignettes.	Refer to the above examples of 'Lab Studies'. -(Study 1, Bartlett and Desteno, 2006).
	Lab-Studies: Recall ( <i>k</i> = 11)	Participants were instructed to recall instances of others' generosity/benevolence.	Refer to above example of Experimental/ Economic Games -(Study 1, Exline et al., 2012)

Table 1 (contd')

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Methodological Moderator: Objective versus Subjective Prosociality Assessment	Objective ( <i>k</i> = 29)	Prosociality assessments that entailed an actual expenditure of effort or money (or other money-equivalent resources).	Amount of money (i.e. a \$5-dollar note) to distribute to 'another participant who will be in the study at a later time (pp.213)' – (Exline and Hill, 2012; Study 2)
	Subjective ( <i>k</i> = 61)	Studies which assessed <i>self</i> -, or <i>peer</i> -reported prosocial behaviors, or one's <i>intention</i> to act prosocially to others.	Customer Purchase Intentions: 1) 'I would be very likely to buy something today'; 2) 'I would come back to this store.' 3) 'I would likely buy from this store in the future.' (7-point scales) –(Palmatier et al., 2009)
Methodological Moderator: Target of Prosociality: Individual versus Group	Individual ( <i>k</i> = 42)	Reciprocal, prosocial or cooperative acts or behavioral intentions that were directed toward an <i>individual</i> recipient.	Each participant decided how many raffle tickets of his/hers to distribute to his/her in-game partner. –(e.g. Tsang, 2006a, 2007)
	Group ( <i>k</i> = 34)	Participants' decisions to show appreciation to a group or organization by i) behaving prosocially toward or ii) harboring an intention to benefit that organization in the future.	i) Children participants were given a chance to write a thank-you card to the Parent-Teacher Association for their provision of a multimedia presentation. – (Froh et al., 2014); ii) Loyalty—Advocacy (Lam, Shankar, Erramili, & Murthy, 2004): 'I will encourage my friends to use this bank's services' and 'I will recommend this bank to others.' (7-point scales) –(Study 1 and 2, Xia and Kukar-Kinney, 2013)
	Ambiguous ( <i>k</i> = 13)	Studies which provided i) insufficient information to judge whether prosociality was individually- or group- directed, or ii) studies whose measures of individual and group helping were combined into a single index of helping.	i) Participants' weekly record of their 'acts of kindness for others (pp.4)' –(Layous et al., 2016); ii) Participants' ratings on the following items were combined to form an overall 'enhanced prosocial behaviors measure': a) 'Do you want to help your father (i.e. the benefactor in the vignette) if he needs help in similar or other situations?', and b) 'Do you want to help others if they help in similar or other situations?' –(pp. 251, Naito et al., 2005)
Methodological Moderator: Gratitude Measures: Actual versus Proxy	Actual ( <i>k</i> = 77)	Studies which adopted a direct or a 'real' measure or induction of gratitude as a state, mood or a disposition.	Customer' Gratitude Scale (adapted from Goei & Boster, 2005): 'I feel grateful/thankful to this company', 'I feel appreciative towards/ a sense of gratitude toward this company'. – (pp. 607, Simon, 2013); Participants reported a personal experience in which they felt grateful toward someone. – (de Hooge, 2014)



Table 1 (contd')

<b>Moderators</b>	<b>Codes</b>	<b>Working Definition</b>	<b>Examples in the current sample</b>
Methodological Moderator: Gratitude Measures: Actual versus Proxy (cont'd)	Proxy ( $k = 9$ )	Studies which employed an indirect or a 'surrogate' measure of gratitude.	'Positive Responses' evoked by being helped—e.g. 'Delighted' – (pp. 21, Wangwan, 2014)
Methodological Moderator: Published or not? (i.e. a 'yes'/'no' code on whether the study had been published)	Yes ( $k = 72$ )	Published journal articles	Tsang (2006, 2007)
	No ( $k = 19$ )	Doctoral theses, Book chapters, and Raw Data collected	Doctoral Theses: Langan & Kumar (2015), Leung (2011); Book Chapters: Mikulincer & Shaver (2010); Raw Data Collected; Ma, Tunney, & Ferguson (2015)
Methodological Moderator: Times cited, Years of Publications, and Participant Age	Times Cited	We included the times cited metrics (accurate as of 4 <sup>th</sup> August 2016) that are provided by either the Web of Science or Google Scholar.	
	Years of Publication	We included the year of publication (or availability) of our sampled articles/studies.	
	Participant Age	Sixty-one studies reported the average or the median age range of their participants. We imputed the average age of the 23 studies which only described their sample compositions (i.e. undergraduates) by taking mid-point of the usual age range of the undergraduate student population: 18-24 years (i.e. 21.0 years). Six studies did not provide any age data.	'Mean age given': 12.14 – (Froh et al., 2009); 31.80 (Study 2, Siegel et al., 2014) 'Median age range given': 35-44 years—imputed participant age: 39.50 (Romani et al., 2013); 'Only sample description given': 'Undergraduate Psychology students' (e.g. Emmons & McCullough, 2003; Leung, 2011; Tsang et al., 2012); 'No information': Huang (2015).
Sensitivity Analysis: Zero-order?	Yes ( $k = 74$ )	Zero-order figures (e.g. correlation $r$ s, independent sample $t$ -values etc.) used to compute the effect estimates.	'Zero-order Correlation $r$ s' – (e.g. Bock et al., 2016); 'Independent samples T-test $t$ -values' (e.g. Hwang & Kandampully, 2015)
	No ( $k = 17$ )	Imputation of effect sizes from a specific gratitude-prosociality path in a multiple-path model (e.g. Multiple Regressions, Structural Equation Modelling (SEMs))	'Multiple Regressions': -(e.g. Study 2, Kwak & Kwon, 2016); 'SEMs': -(e.g. Study 3, Xia and Kukar-Kinney, 2013);

Table 2

*Studies on the Gratitude-Prosociality Relationship*

Studies ( <i>k</i> = 91)	Gratitude Survey Measures or Direct Inductions	Prosocial Behavior/ Behavioral Tendencies Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Bartlett & Desteno (2006)						
Study 1	Experiment: Conferment of Benefits	Time Spent on Helping the Confederate	2006	105	0.333	0.1704/0.5018
Study 2	Experiment: Conferment of Benefits	Time Spent on Helping the Confederate	2006	97	0.290	0.0961/0.4627
Study 3	Experiment: Conferment of Benefits	Time Spent on Helping the Confederate	2006	35	0.427	0.1091/0.6654
Bartlett, Condon, Cruz, Baumann, & Desteno (2012)						
Study 1	Experiment: Conferment of Benefits	Socially Affiliative Decisions	2012	40	0.390	0.0892/0.6254
Study 2	Experiment: Conferment of Benefits	Costly Social Inclusion Behaviors	2012	25	0.630	0.3127/0.8208
Bock, Folsø, & Black (2016)						
Study 4	Survey: Gratitude Affect/ Behaviors/ Cognitions	Relationship Continuity (Hess, Ganesan, & Klein, 2003)	2016	226	0.285	0.1604/0.4005
Chang, Lin, & Chen (2012)						
Single-Study	Survey: GQ-VI (McCullough, Emmons, & Tsang, 2002)	Peer-reported Generosity Exhibited throughout a Semester	2012	174	0.160	0.0128/0.3004
Cohen (2012)						
Study 1	Experiment: Recall about Times when Being Benefited (Measures: GAC, McCullough et al. (2002))	Self-reported Urge to Reciprocate/ Verbal Reciprocity/ Reciprocal Actions	2012	57	0.394	0.1487/0.5936
Study 2	Experiment: Recall about Times when Helping Someone (Measures: Perceived Recipient's Gratitude)	Perceived Recipients' Urge to Reciprocate/ Verbal Reciprocity/ Reciprocal Actions	2012	59	0.350	0.1026/0.5559
de Hooge (2014)						
Study 1	Experiment: Recall of Personal Gratitude Experience	Total Gift-giving/ Money Willing to Spend on Gifts	2014	271	0.254	0.1395/0.3626
Study 4	Experiment: Recall of Personal Gratitude Experience	Gift-Giving/ Money to Spend/Time Spent on Gift Search	2014	138	0.371	0.2171/0.5065
Desteno, Bartlett, Baumann, Williams, & Dickens (2010)						
Single-Study	Experiment: Conferment of Benefits	Tokens Given: Give-Some Dilemma Game (GSDG)	2010	85	0.290	0.0819/0.4738
Dewani, Sinha, & Mathur (2016)						
Single-Study	Survey: GQ-VI and GAC (McCullough et al., 2002)	Purchase Intention (Sweeney, Geoffrey, & Johnson, 1999)	2016	398	0.235	0.1403/0.3261
Emmons & McCullough (2003)						
Study 2	Experiment: Recall of things that 'you are grateful for'	Offer Emotional Support/ Helped Somebody (Yes/No)	2003	157	0.148	-0.0066/0.2954
Exline & Hill (2012)						
Study 2	Experiment: Conferment of Benefits	Donations toward an 'Anonymous Future Participant'	2012	286	0.090	-0.0263/0.2039
Exline, Lisan, & Lisan (2012)						
Study 1	Experiment: Recall of an incident when 'another person did something for you that was very kind (pp. 47)'	In-the-moment kindness motives toward Benefactor/ Close Others (i.e. close friends and family)/ Strangers/ Enemies	2012	217	0.175	0.0425/0.3009
Froh, Bono, & Emmons (2010)						
Single-Study	Survey: GQ-VI and GAC (McCullough et al., 2002)	Child Social Behavior Questionnaire (Warden, Cheyne, Christie, Fitzpatrick, & Reid, 2003)	2010	700	0.300	0.2310/0.3660
Froh, Bono, Fan, Emmons, Henderson, Harris, Leggio, & Wood (2014)						
Study 1	Experiment: Conferment of Benefits	Writing Thank-you Cards to the Benefactors	2014	122	0.195	0.0181/0.3605
Froh, Yurkewicz, & Kashdan (2009)						
Single-Study	Survey: GAC and 'Gratitude in response to aids'	Offer Emotional Support/ Helped Somebody (Yes/No)	2009	71	0.172	-0.0545/0.3822
Goei & Boster (2005)						
Study 2	Survey: GAC and 'felt a deep sense of gratitude (pp.293)'	Compliance: Purchase of Raffle Tickets from Confederates	2005	96	0.280	0.0842/0.4549

Table 2 (contd<sup>3</sup>)

Studies ( <i>k</i> = 91)	Gratitude Survey Measures or Direct Inductions	Prosocial Behavior/ Behavioral Tendencies Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Goei, Roberto, Meyer, & Carlyle (2007)						
Study 1	Survey: 4-item Gratitude Survey (Goei & Boster, 2005)	Compliance: Purchase of Raffle Tickets from Confederates	2007	64	0.240	-0.0062/0.4587
Study 2	Survey: 4-item Gratitude Survey (Goei & Boster, 2005)	Compliance: Purchase of Raffle Tickets from Confederates	2007	186	0.240	0.0996/0.3711
Graham (1988)						
Study 1	Vignette: The protagonist (i.e. Tim) was selected by captain	A 'Yes/No' response to whether or not Tim would give Bob a new	1988	119	0.559	0.2958/0.7434
Study 2	Bob to join the school baseball team.	baseball as a thank-you gift for picking him	1988	105	0.346	0.1653/0.5042
Halali, Kogut, & Ritov (2016)						
Study 1A	Experiment: Resource Allocation (Tsang, 2006a)	Resources to Distribute to the Other Player	2016	146	0.371	0.2223/0.5034
Study 2	Experiment: Resource Allocation (Tsang, 2006a)	Resources to Distribute to the Other Player	2016	115	0.444	0.2844/0.5803
Hendrickson & Goei (2009)						
Single-Study	Survey: 4-item Gratitude Survey (Goei & Boster, 2005)	Compliance: Date Request Compliance	2009	115	0.490	0.3371/0.6177
Huang (2015)						
Single-Study	Survey: Customer Gratitude (Palmatier et al., 2009)	Behavioral Loyalty (De Wulf, Odekerken-Schroder, & Iacobucci, 2001)	2015	239	0.700	0.6290/0.7594
Hwang & Kandampully (2015)						
Single-Study	Vignette: Story about a Hypothetical Grocery Retailer's Corporate Social Responsibility (CSR) commitment	Participation Intention in that Hypothetical Grocery Retail's Prosocial Loyalty Programme (i.e. Pro-social LP)	2015	350	0.265	0.1669/0.3578
Janakiraman, Meyer, & Morales (2006)						
Study 2	Survey: Ratings on the item 'Thankful' (0 to 100)	Purchase Intentions	2006	297	0.253	0.1435/0.3567
Jin & Merkebu (2014)						
Single-Study	Survey: Customer Gratitude (measure via GAC)	Self-reported Favourable Reciprocal Behaviors (FRBs)	2014	398	0.794	0.7526/0.8287
Kim & Lee (2013)/ Lee, Kim & Pan (2014)*						
Single-Study	Survey: Customer Gratitude (measure via GAC)	Self-reported Favourable Reciprocal Behaviors (FRBs)	2013	297	0.640	0.5675/0.7026
Kim, Smith, & James (2010)						
Single-Study	Survey: Consumer Gratitude (measure via GAC)	Intention to Reciprocate (Zeithaml, Berry, & Parasuraman, 1996)	2010	272	0.710	0.6456/0.7644
Kolyesnikova & Dodd (2008)/ Kolyesnikova, Dodd & Wilcox (2009)*						
Single-Study	Survey: 3-item measure (e.g. 'Desire to say "thank-you" to the winery personnel (pp.207)' (Kolyesnikova et al., 2009))	Dollar Amount Spent at Wineries	2008	357	0.510	0.4289/0.5829
Kolyesnikova, Dodd, & Callison (2011)						
Single-Study	Experiment: Gratitude-inducing Direct Mail Messages	Purchase Intent/ Future Behavioral Intentions	2011	120	0.588	0.4571/0.6942
Krumrei-Mancuso (2016)						
Single-Study	Survey: Gratitude Disposition (measured via GQ-VI)	Self-reported Altruism (Smith, 2006)	2016	314	0.270	0.1642/0.3696
Kubacka, Finkenauer, Rusbult, & Keijsers (2011)						
Study 1	Survey: Gratitude toward Spouses (via GQ-VI)	Relationship Maintenance Behaviors	2011	390	0.311	0.2138/0.4013
Kwak & Kwon (2016)						
Study 2	Vignette: Story about Participants' Favourite Teams Partnering with a Local or an International Charity	Intention to Donate to that Charity	2016	201	0.424	0.3032/0.5310
Langan & Kumar (2015)						
Study 2	Vignette: Story about a Coffee Shop (Local vs. International) Engaging in a Donation (Money vs. Time)	Desire to Reciprocate (example items: 'Frequent that shop more often'; 'Go out of your way to shop there' etc.)	2015	185	0.746	0.6742/0.8037

\* denotes papers with duplicated data sets.

Table 2 (contd')

Studies ( <i>k</i> = 91)	Gratitude Survey Measures or Direct Inductions	Prosocial Behavior/ Behavioral Tendencies Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Layous, Nelson, Kurtz, & Lyubomirsky (2016)						
Study 1	Experiment: Specific and General Gratitude Training	Participants' Weekly Acts of Kindness towards Others	2016	233	0.186	-0.0388/0.3930
Study 2	Experiment: General Gratitude Positive Trigger	Participants' Weekly Acts of Kindness towards Others	2016	119	-0.030	-0.2093/0.1503
Leung (2011)						
Study 1	Economic Games: Two-person Public Goods Game Dilemma	Cooperation: Contributions to the Public Account	2011	124	0.450	0.2973/0.5803
Study 2	Economic Games: Two-person Public Goods Game Dilemma	Cooperation: Contributions to the Public Account	2011	84	0.560	0.3928/0.6914
Study 3	Economic Games: Two-person Public Goods Game Dilemma	Cooperation: Contributions to the Public Account	2011	110	0.340	0.1631/0.4957
Study 4	Economic Games: Two-person Public Goods Game Dilemma	Cooperation: Contributions to the Public Account	2011	90	0.500	0.3267/0.6407
Li & Chow (2015)						
Single-Study	Survey: Gratitude Disposition (measured via GQ-VI)	Self-reported and Teacher-reported Prosocial Behaviors	2015	243	0.133	0.0073/0.2546
Ma, Tunney, & Ferguson (2014a)						
Single-Study	Economic Games: One-shot Variant of Trust Game (TG)	Willingness to Reciprocate (Watkins et al., 2006)	2014	61	0.810	0.7012/0.8819
Ma, Tunney & Ferguson (2014b, Unpublished Study 1)						
Single-Study	Economic Games: One-shot Variant of Trust Game (TG)	Cooperation: Percentage of Repayment	2014	135	0.150	-0.0421/0.3317
Ma, Tunney & Ferguson (2015, Unpublished Study 2)						
Single-Study	Economic Games: A repeated version (i.e. Ten Trials, Multiple Roles) of the TG used in Ma and colleagues (2014)	Decisions to Help (at 'Helper' Trials)/ Percentage of Repayment (at 'Recipient' Trials)	2015	133	0.097	-0.0799/0.2673
Markowitz (2012)						
Study 1	Survey: Gratitude Disposition (measured via GQ-VI) Vignette: Story about Past Generation's Contribution (or the lack thereof) to the Transition of the current Fuel-efficient economy	Responsibility Toward Future Generation (RTFGs)	2012	551	0.360	0.2850/0.4306
Study 2a	Survey: Gratitude Disposition (measured via GQ-VI) Vignette: Story about Past Generation's Positive (or Negative) Intent to help Maintain the National Parks for Future Generations	Willingness to Impose an Increase in Taxes on Gasoline	2012	413	-0.011	-0.1074/0.0856
Study 2b	Survey: Gratitude Disposition (measured via GQ-VI) Vignette: Story about Past Generation's Positive (or Negative) Intent to help Maintain the National Parks for Future Generations	RTFGs Rating	2012	413	0.210	0.1159/0.3004
Study 3	Survey: Gratitude Disposition (measured via GQ-VI) Vignette: Story about Past Generation's Positive (or Negative) Intent to help Maintain the National Parks for Future Generations	Donation to the National Park Foundation	2012	273	0.175	0.0575/0.2878
McCullough, Emmons, & Tsang (2002)						
Study 1	Survey: Peer- and Self-reported Gratitude Disposition (GQ-VI)	Peer-reported Prosocial Behaviors/Tendencies	2002	238	0.324	0.2052/0.4333
Michie (2009)						
Single-Study	Survey: Self-Reported Gratitude toward Subordinates (GQ-VI)	Subordinates' Rating of Supervisors' Prosociality	2009	71	0.247	0.0149/0.4545
Mikulincer & Shaver (2010)						
Single-Study	Experiment: Conferment of Benefits	Time Spent on Helping	2010	80	0.430	0.2322/0.5936
Morales (2005)						
Study 2	Vignette: Story about a new luggage Store showing very neat, interesting displays (i.e. 'High-effort' Condition) as opposed to just keeping their displays organized (i.e. 'Low-effort' Condition)	Likelihood of Visiting that Store	2005	88	0.273	0.0677/0.4566

Table 2 (contd')

Studies ( <i>k</i> = 91)	Gratitude Survey Measures or Direct Inductions	Prosocial Behavior/ Behavioral Tendencies Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Naito & Sakata (2010)						
Study 1	Vignette: A hypothetical scenario where a protagonist—who lives alone and injured—was helped by a same-sex friend for an extended period of time (Naito, Wangwan, & Tani, 2005)	Enhancement of Prosocial Motivation (e.g. 'More than before, would you want to help your friend, if she were distressed in a similar situation?')	2010	135	0.386	0.2321/0.5209
Naito, Wangwan, & Tani (2005)						
Study 1-Japan	Vignette: Story about an injured protagonist being helped by his/her Parents, Best Friend or a Stranger for an extended period of time	Enhancement of Prosocial Motivation/ Requital: Giving and Verbal-Facial Expression of Gratitude	2005	212	0.446	0.2691/0.5930
Study 1-Thai	Vignette: Story about an injured protagonist being helped by his/her Parents, Best Friend or a Stranger for an extended period of time	Enhancement of Prosocial Motivation/ Requital: Giving and Verbal-Facial Expression of Gratitude	2005	284	0.418	0.2699/0.5460
Palmatier, Jarvis, Bechhoff, & Kardes (2009)						
Study 1	Survey: Customer Gratitude (measured via GQ-VI)	Customer Purchase Intention/ Customer Commitment	2009	155	0.587	0.4729/0.6814
Study 2	Survey: Gratitude-based Reciprocal Motives	Share of Wallet/ Customer Commitment	2009	446	0.332	0.2466/0.4120
Romani, Grappi, & Bagozzi (2013)						
Single-Study	Vignette: Story about a hypothetical business organization engaging in Corporate Social Responsibility (CSR) activities	Positive Word-of-Mouth/ Advocacy Behaviors	2013	188	0.550	0.4417/0.6425
Rubin (2012)						
Study 1	Economic Games: Iterated Ultimatum Game (UG)	Endowment (USD \$100) to Offer to Partner in Next Trial	2012	52	0.050	-0.2260/0.3186
Study 2	Economic Games: Give-Some Dilemma Game (GSDG)	Tokens Given: Give-Some Dilemma Game (GSDG)	2012	96	0.218	0.0186/0.4012
Siegel, Thomson, & Navarro (2014)						
Study 2	Experiment: Recall of an instance of being Generously Treated	Donation Behaviors to Charity (i.e. Toys for Tots)	2014	373	0.036	-0.1057/0.1767
Simon (2013)						
Single-Study	Survey: Customer Gratitude Survey (Goei & Boster, 2005)	Repurchase Intent (Maxham & Netemeyer, 2003)	2013	148	0.648	0.5403/0.7306
Soscia (2007)						
Single-Study	Vignette: Stories on various protagonists' Consumption Experience	Positive Word-of Mouth/ Repurchase Intent	2007	182	0.725	0.6484/0.7878
Spence, Brown, Keeping, & Lian (2014)						
Study 2	Survey: GQ-VI and State Gratitude Scale (SGS)	Organizational Citizenship Behavior (OCBs)	2014	67	0.145	-0.0431/0.3240
Study 3	Survey: GQ-VI and State Gratitude Scale (SGS)	Supervisor-, Co-worker-, Organisation-targeted OCBs	2014	104	0.196	0.0500/0.3332
Tian, Chu, & Huebner (2016)						
Single-Study	Survey: Gratitude Disposition (measured via GQ-VI)	Prosocial Behavior Questionnaire (Feng, 2009)	2016	324	0.520	0.4381/0.5933
Tian, Du, & Huebner (2015)						
Single-Study	Survey: Gratitude Disposition (measured via GQ-VI)	Prosociality Scale (Zhang, Zeng, & Yu, 2004)	2015	706	0.267	0.1600/0.3552
Tsang (2006a)						
Single-Study	Experiment: Conferment of Benefits	Resource Distribution (i.e. Money Given to Partners)	2006	40	0.550	0.2879/0.7356
Tsang (2007)						
Single-Study	Experiment: Conferment of Benefits (Tsang, 2006a)	Resource Distribution (Tsang, 2006a)	2007	149	0.572	0.4530/0.6712

Table 2 (contd<sup>3</sup>)

Studies ( <i>k</i> = 91)	Gratitude Survey Measures or Direct Inductions	Prosocial Behavior/ Behavioral Tendencies Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Tsang, Schulwitz, & Carlisle (2012)						
Single-Study	Experiment: Conferment of Benefits (Tsang, 2006a)	Resource Distribution (Tsang, 2006a)	2012	80	0.270	0.0541/0.4616
Wangwan (2014)						
Single-Study: High Schoolers	Vignette: Same as the ones used by Naito and Associates (Naito & Sakata, 2010; Naito, Wangwan, & Tani, 2005)	Enhancement of Prosocial Motivation (Naito et al., 2005; Naito & Sakata, 2010)	2014	414	0.120	0.0239/0.2139
Single-Study: Undergraduates	Vignette: Same as the ones used by Naito and Associates (Naito & Sakata, 2010; Naito, Wangwan, & Tani, 2005)	Enhancement of Prosocial Motivation (Naito et al., 2005; Naito & Sakata, 2010)	2014	191	0.109	-0.0334/0.2472
Watkins, Scheer, Ovnicek, & Kolts (2006)						
Study 1	Vignette: Story about a protagonist's receipt of a large and unexpected favor (i.e. moving apartment) from a friend	Prosocial Action Thoughts and Tendencies (i.e. PATT, Frijda, 1986, 1988)	2006	107	0.430	0.2618/0.5733
Study 2	Vignette: Story about a protagonist's receipt of a small favor	PATT/Self-reported Altruism	2006	152	0.362	0.2147/0.4924
Wetzel, Hammerschmidt, & Zablah (2014)						
Study 1	Survey: Customer Gratitude Survey (Palmatier et al., 2009)	Sales Growth	2014	192	0.160	0.0207/0.2932
Study 2	Survey: Customer Gratitude Survey (Palmatier et al., 2009)	Sales Growth	2014	302	0.360	0.2576/0.4544
Xia & Kukar-Kinney (2013)						
Study 1	Vignette: Story about a bank willing (or unwilling) to waive a credit card penalty fee that was or (was not) the protagonist's fault	Loyalty— i) Purchase Intention (Lam, Shankar, Eramilli & Murthy, 2004), and ii) Advocacy (Lam et al., 2004);	2013	290	0.571	0.4879/0.6438
Study 2	Vignette: Story about a protagonist who never had a late payment (or was late several times) missing the deadline by a day (or a month), and the bank was (or was not) willing to waive that charge.	Future Compliance (Xia & Kukar-Kinney, 2013)	2013	381	0.502	0.4226/0.5734
Study 3	Vignette: Story about a participant who contacted the bank to drop a credit card late fee, and was told the bank would refund them (or compensate them with reward points). Protagonists were then told this was a preferential (or a casual) arrangement by the bank.	Purchase Intention and Advocacy (Lam et al., 2004)	2013	225	0.412	0.2977/0.5154
Xia & Kukar-Kinney (2014)						
Study 2	Survey: Customer's Gratitude toward Preferential Treatment he/she received in the past (measured via GQ-VI)	Positive Word-of-Mouth (Lacey, Suh, & Morgan, 2007)/ Subsequent Purchases (Lam et al., 2004)	2014	206	0.248	0.1151/0.3720
Xie & Bagozzi (2014)						
Single-Study	Vignette: Stories of a Norwegian firm's Corporate Ethical ('Positive Narrative')/Unethical ('Negative Narrative') Actions	Consumer Support for Nonprofits	2014	210	0.267	0.1368/0.3886
Xie, Bagozzi, & Grønhaug (2015)						
Single-Study	Vignette: Narrative Scenarios of Corporate Environmental Irresponsibility (vs. Responsibility vs. Control)	Positive Word of Mouth/ Likelihood to Invest in the company	2015	210	0.480	0.2762/0.6425

Table 2 (contd<sup>2</sup>)

<b>Studies (<i>k</i> = 91)</b>	<b>Gratitude Survey Measures or Direct Inductions</b>	<b>Prosocial Behavior/ Behavioral Tendencies Measures</b>	<b>Years</b>	<b><i>N</i></b>	<b><i>r</i></b>	<b>95% LL/ ULCI</b>
Yang, Stoeber, & Wang (2015)						
Study 3	Vignette: The protagonist received help from a friend.	Willingness to help that friend in return	2015	165	0.493	0.3679/0.6005
Zhao (2010)						
Study 1	Survey: Gratitude Disposition (measured via GQ-VI)	Five-item Helping Tendencies Checklist	2010	381	0.520	0.4427/0.5897
Study 2a	Vignette: Receipt of an unexpected birthday gift from a friend	Prosocial Motivation/ Magnitude of Reciprocation	2010	123	0.406	0.2471/0.5442
Study 2b	Vignette: Receipt of help from a friend	Prosocial Motivation/ Magnitude of Reciprocation	2010	126	0.294	0.1255/0.4460
<b>Random Effects Model</b>			<b>18,342</b>	<b>0.3735</b>	<b>0.3287/0.4166</b>	

\* denotes papers with duplicated data sets

Table 3

*Results of the Univariate Categorical Analyses on the Gratitude and Prosociality Effect Size*

	Model Adopted: Mixed-Effects Model				Tau-squared		Effect Estimates	
	<i>Q</i>	<i>p</i> -value (two-tailed)	<i>k</i>	<i>N</i>	Tau <sup>2</sup>	Standard Error	<i>r</i>	95% Lower Limit / Upper Limit C.I.
<b>Reciprocity vs. Non-Reciprocity</b>	9.094	.0026**						
Non-Reciprocity			15	3,824	0.023	0.012	0.257	0.174/0.336
Reciprocity			75	14,385	0.060	0.013	0.401	0.350/0.449
<b>Nature of Reciprocity</b>	4.265	.0389*						
Direct			51	8,764	0.056	0.014	0.443	0.385/0.497
Indirect			14	3,725	0.054	0.025	0.311	0.191/0.422
<b>Nature of Indirect Reciprocity</b>	6.655	.0099**						
Upstream			9	2,598	0.020	0.013	0.147	0.043/0.247
Downstream			5	1,003	0.088	0.071	0.484	0.253/0.663
<b>Gratitude Type (Lambert, Graham, &amp; Fincham, 2009)</b>	9.843	.0017**						
Benefit-Triggered Gratitude			67	12,009	0.062	0.014	0.421	0.367/0.472
Generalized Gratitude			14	4,937	0.022	0.011	0.272	0.192/0.349
<b>Gratitude Felt Towards</b>	1.077	.2992						
Close Others			9	1,422	0.001	0.004	0.380	0.328/0.430
Strangers			54	10,087	0.074	0.018	0.423	0.358/0.484
<b>Country of Participation</b>	1.685	.4306						
North America			55	10,753	0.057	0.015	0.350	0.289/0.408
Asia			23	5,164	0.046	0.017	0.399	0.318/0.474
Western Europe			13	2,425	0.065	0.031	0.425	0.298/0.536
<b>Gratitude Measure</b>	5.866	.0154*						
Disposition			12	3,784	0.024	0.013	0.301	0.212/0.385
State/Mood			65	12,002	0.058	0.013	0.424	0.371/0.474
<b>Type of Study</b>	0.145	.7037						
Lab Studies			59	9,449	0.050	0.050	0.367	0.312/0.419
Cross-sectional Survey			32	8,893	0.058	0.058	0.385	0.308/0.456
<b>Lab-Studies Design</b>	1.528	.2164						
Experiment/ Economic Games			34	4,260	0.038	0.013	0.335	0.267/0.399
Vignette			25	5,189	0.059	0.021	0.403	0.316/0.484
<b>Gratitude Induction</b>	15.152	.0001***						
Lab-Studies: In vivo			48	7,503	0.054	0.014	0.400	0.338/0.458
Lab-Studies: Recall			11	1,946	0.010	0.008	0.210	0.134/0.283
<b>Objective/Subjective Prosociality</b>	2.595	.1072						
Objective			29	3,942	0.027	0.010	0.327	0.262/0.388
Subjective			61	14,265	0.061	0.014	0.395	0.339/0.449
<b>Target of Prosociality</b>	2.766	.0963						
Group			34	8,478	0.072	0.020	0.431	0.352/0.504
Individual			42	5,284	0.020	0.007	0.354	0.306/0.399
<b>Proxy/ Actual Gratitude Measure</b>	0.034	.8544						
Actual			77	15,308	0.056	0.012	0.368	0.318/0.416
Proxy			9	2,504	0.055	0.032	0.382	0.237/0.510
<b>Published?</b>	0.429	.5123						
Published			72	14,857	0.054	0.012	0.381	0.331/0.429
Unpublished			19	3,485	0.055	0.025	0.344	0.240/0.440
<b>Zero-order statistics used?</b>	1.385	.2393						
Yes			74	14,337	0.053	0.011	0.386	0.336/0.433
No			17	4,005	0.047	0.021	0.320	0.218/0.416

*Note.* *k* = Number of studies; *N* = Total number of participants involved; *Q* = Between-group Effect; \**p* < .05 (two-tailed); \*\**p* < .01 (two-tailed); \*\*\**p* < .001 (two-tailed).



Table 4

*Studies on the Gratitude-Prosociality Trait Relationship*

Studies	Gratitude Measures	Trait Prosociality Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Aghababaei & Tabik (2013)						
Single-Study	Dispositional Gratitude/ Gratitude to God	Big Five Factors (BFF)-Agreeableness and Conscientiousness	2013	256	0.256	0.138/0.367
Booker & Dunsmore (2016)						
Single-Study	Dispositional Gratitude	Trait Empathy/ Forgiveness Scale (Rye et al., 2001)	2016	263	0.185	0.066/0.299
Chan (2013)						
Single-Study	Dispositional Gratitude	Heartland Forgiveness Scale (Others, Self, and Situations)	2013	143	0.420	0.227/0.465
Chen, Chen, Kee, & Tsai (2009)						
Single-Study	Dispositional Gratitude	BFF- Agreeableness	2009	304	0.420	0.323/0.508
Datu (2014)						
Single-Study	Dispositional Gratitude	Heartland Forgiveness Scale (Others, Self, and Situations)	2014	210	0.352	0.227/0.465
Deshea (2003)						
Single-Study	Dispositional Gratitude	Willingness to Forgive (WTF) Scale/ Transgression-Related Interpersonal Motivations (TRIM)/ Transgression Narrative Test of Forgiveness (TNTF)	2003	42	0.349	0.051/0.590
Dwiwardani, Hill et al (2014)						
Single-Study	Dispositional Gratitude	Heartland Forgiveness Scale (Others, Self, and Situations)	2014	245	0.490	0.389/0.580
Eaton, Bradley, & Morrissey (2014)						
Single-Study	Dispositional Gratitude	Forgiveness Scale (Rye et al., 2001)	2014	327	0.434	0.258/0.582
Hill & Allemand (2011)						
Single-Study	Dispositional Gratitude	Big Five Factors (BFF)-Agreeableness and Conscientiousness/ Tendency to Forgive Scale (Brown, 2003)	2011	927	0.214	0.152/0.275
Kruger (2011)						
Single-Study	Dispositional Gratitude	Dispositional Empathy/ Heartland Forgiveness Scale (Others)	2011	113	0.292	0.113/0.452
Krurmei-Mancuso (2016)						
Single-Study*	Dispositional Gratitude	Dispositional Empathy/ Benevolence Subscale (Schwartz, 1992)	2016	154	0.334	0.232/0.429
Lin (2014)						
Single-Study	Dispositional Gratitude (GQ-VI)/ Higher-order Gratitude	BFFs- Agreeableness and Conscientiousness	2014	504	0.411	0.336/0.481
McCullough, Emmons, & Tsang (2002)						
Study 1	Dispositional/Mood Gratitude	BFFs- Agreeableness and Conscientiousness/ Dispositional Empathy	2002	877	0.283	0.183/0.377
Study 2*	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness/ Disposition to Forgive	2002	1,228	0.359	0.309/0.406
Study 3	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness/ Dispositional Empathy	2002	156	0.314	0.165/0.449
Miley & Spinella (2006)						
Single-Study	Dispositional Gratitude	Dispositional Empathy/ Heartland Forgiveness Scale (Others)	2006	154	0.245	0.090/0.388
Miley & Spinella (2007)						
Single-Study	Dispositional Gratitude	Trait Empathy	2007	310	0.250	0.143/0.352
Neto (2007)						
Single-Study	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness/ Forgiveness Scale (Mullet et al., 2003)	2007	152	0.280	0.126/0.421

\*denotes study that was included in the current main analysis

Table 4 (contd')

Studies	Gratitude Measures	Trait Prosociality Measures	Years	<i>N</i>	<i>r</i>	95% LL/ ULCI
Neto & Menezes (2014)						
Single-Study	Dispositional Gratitude	Forgivingness Scale (Lasting Resentment, Sensitivity to Circumstances, and Unconditional Forgiveness) (Mullet et al., 2003)	2014	147	0.200	0.040/0.351
Rey & Extremera (2014)						
Single-Study	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness/ TRIM	2014	535	0.139	0.055/0.221
Rye, Fleri et al. (2012)						
Pre-test Assessment	Dispositional Gratitude	Forgiveness Scale (Rye et al., 2001)	2012	99	0.332	0.133/0.489
Sandage & Williamson (2010)						
Single-Study	Dispositional Gratitude	Disposition to Forgive (McCullough, Worthington, & Rachal, 1997)	2010	203	0.270	0.137/0.393
Satici, Uysal, & Akin (2014)						
Single-Study	Dispositional Gratitude	Dispositional Forgiveness	2014	331	0.430	0.338/0.514
Smith (2012)						
Single-Study	Dispositional Gratitude	BF- Agreeableness/ Heartland Forgiveness Scale (Others,Self, Situations)	2012	191	0.075	-0.067/0.215
Strelan (2007)						
Single-Study	Dispositional Gratitude	Heartland Forgiveness Scale (Others,Self)	2007	275	0.365	0.258/0.463
Szcześniak & Soares (2011)						
Single-Study	Dispositional Gratitude	TRIM- Motivation to avoid and seek vengeance (both reverse-scored)	2011	338	0.281	0.180/0.377
Toussaint & Friendman (2009)						
Single-Study	Dispositional Gratitude	Heartland Forgiveness Scale/ TRIM- Avoidance and Revenge	2009	71	0.469	0.264/0.633
Wilks, Neto, & Mavoreli (2015)						
Single-Study	Dispositional Gratitude	Forgivingness Scale (Mullet et al., 2003)	2015	327	0.143	-0.017/0.296
Wood, Joseph, & Maltby (2008)						
Single-Study	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness	2008	398	0.138	0.041/0.233
Wood, Joseph, & Maltby (2009)						
Single-Study	Dispositional Gratitude	BFFs- Agreeableness and Conscientiousness	2009	201	0.177	0.040/0.308
<b>Random-Effects Model</b>				9,641	0.296	0.256/0.335

Table 5

*Studies on the Pride-Prosociality Relationship*

Studies	Pride Measures	Prosociality Measures	Years	N	r	95% LL/ ULCI
Antonetti & Maklan (2014)						
Study 1	Pride from making purchases with a sustainable brand	Intention to purchase	2014	415	0.069	-0.027/0.164
Study 2	Pride from making purchases with a sustainable brand	Intention to purchase	2014	135	0.149	-0.021/0.310
Bureau, Vallerand, Ntoumanis, & Lafreniere (2013)						
Study 2	Authentic and Hubristic Pride	Self-reported Moral Behaviors	2013	296	-0.077	-0.189/0.038
Cavanaugh, Bettman & Luce (2015)						
Study 3	Experimental Induction	Distant-Others Helping	2015	176	-0.064	-0.209/0.085
Study 4	Experimental Induction	Distant-Others/ Close-Others Helping	2015	206	0.054	-0.083/0.189
de Hooge (2014)						
*Study 1	Experimental Induction	Money to be spent on a gift/ Total Gift-giving	2014	271	0.230	0.114/0.340
*Study 4	Experimental Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	138	0.290	0.129/0.436
Study 5	Experimental Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	243	0.152	0.027/0.273
Study 6	Experimental Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	242	0.109	-0.018/0.232
Dorfman, Eyal, & Bereby-Meyer (2014)						
Study 1	Experimental Induction	Fishing Game: Amount of Fishes Returned	2014	83	0.246	-0.006/0.468
Study 2	Experimental Induction	Fishing Game: Amount of Fishes Returned	2014	85	0.199	-0.013/0.393
Etzebarria, Ortiz, Apodaca, Pascual & Conejero (2015)						
Study 1	Experimental Induction/ Trait Moral Pride	Time Spent on Helping Others	2015	94	0.444	0.173/0.652
Study 2	Trait Moral Pride	Time Spent on Helping/ Self-reported Habitual Prosociality	2015	77	0.261	-0.035/0.515
Gouthier & Rhein (2011)						
Single-Study	Organizational Pride	Customer Services Commitment	2011	733	0.535	0.481/0.585
Helm, Renk, & Mishra (2016)						
Single-Study	Brand Pride	Brand Citizenship Behaviors	2016	283	0.580	0.497/0.652
Krettenauer & Casey (2015)						
Single-Study	Authentic and Hubristic Pride	Self-reported Helping Behaviors	2015	216	0.165	0.033/0.292
*Michie (2009)						
Single-Study	Authentic Pride (Tracy & Robins, 2007)	Supervisor's Prosociality- Social Justice/ Altruism	2009	71	0.247	0.015/0.454
*Soscia (2007)						
Single-Study	Experimental Induction	Intent to Repurchase/ Positive Word-of-Mouth	2007	182	0.271	0.130/0.400
van der Schalk, Bruder, & Manstead (2012)						
Study 1	Fairness (vs. Unfairness)-induced Pride	Money shared with 'Responder'	2012	210	0.061	-0.075/0.195
Study 2	Fairness (vs. Unfairness)-induced Pride	Money shared with 'Responder'	2012	132	0.028	-0.432/0.198
van Leeuwen, van Dijk, & Kaynak (2013)						
Study 1	Collective Pride	Helping of disadvantaged outgroup members	2013	67	0.432	0.214/0.609
Study 2	Collective Pride	Helping of disadvantaged outgroup members	2013	61	0.119	-0.027/0.164
Verbeke, Belschak, & Bagozzi (2004)						
Study 1	Authentic Pride	Organizational Citizenship Behaviors (OCBs)	2004	93	0.282	0.083/0.459
<b>Random-Effects Model</b>				4,509	0.212	0.114/0.307

\*denotes studies that were included in the current main analysis.

Table 6

*Studies on the Anger-Prosociality Relationship*

Studies	Anger Measures	Prosociality Measures	Years	N	r	95% LL/ ULCI
**de Hooge (2014)						
Study 1	Induction	Money to be spent on a gift/ Total Gift-giving	2014	271	-0.479	-0.566/-0.381
Study 4	Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	138	-0.592	-0.691/-0.471
Study 5	Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	243	-0.260	-0.374/-0.139
Study 6	Induction	Money spent / Total Gift-giving/ Time spent on gift-search	2014	242	-0.191	-0.309/-0.066
Drouvelis & Grosskopf (2016)						
Single-Study	Induction	Public Goods Games Contribution/ Costly Prosocial Punishment	2016	330	-0.007	-0.170/0.156
Gummerum, Van Dillen, Van Dijk, & Lopez-Perez (2016)						
Study 1	Incidental Anger	Third-Party Punishment (TPP)	2016	137	0.265	0.102/0.414
Study 2	Incidental Anger	Third-Party Compensation (TPC)	2016	137	-0.185	-0.342/-0.017
Study 3	Moral Outrage vs. Personal Anger	Third-Party Compensation (TPC)	2016	139	0.166	-0.001/0.323
*Halperin (2008)						
Study 3	Group-based Anger	Support for education to alter perceptions of outgroup	2008	847	0.370	0.310/0.427
*Halperin, Ruanawll, Dweck, & Gross (2011)						
Study 1	Inter-group Anger Induction	Support for Negotiation with Palestinians	2011	262	-0.010	-0.130/0.111
Study 2	Inter-group Anger Induction	Support for Negotiation with Palestinians	2011	262	0.030	-0.091/0.150
Halmburger, Baumert, & Schmitt (2015)						
Phase 1	Moral Outrage	Behavioral Intervention Strength	2015	68	0.626	0.456/0.752
Phase 2	Moral Outrage	Behavioral Intervention Strength	2015	65	0.525	0.323/0.682
*Iyer, Schmader, & Lickel (2007)						
Study 1	Moral Outrage	Intention to Compensate, Advocate Withdrawl etc.	2007	194	0.559	0.454/0.649
Study 2	Moral Outrage	Intention to Compensate, Advocate Withdrawl etc.	2007	170	0.386	0.250/0.507
Jordan, McAuliffe, & Rand (2015)						
Study 1	Induction	Third-Party Punishment (TPP)	2015	323	0.341	0.240/0.434
Study 2	Induction	Third-Party Punishment (TPP)	2015	96	0.531	0.370/0.661
Landmann & Hess (2016)						
Study 1	Moral Outrage	Third-Party Punishment (TPP) and Compensation (TPC)	2016	136	0.227	0.061/0.381
Study 2	Moral Outrage	Third-Party Punishment (TPP) and Compensation (TPC)	2016	85	0.216	0.003/0.410
*Lotz, Okimoto, Schlosser, & Fetchenhauer (2011)						
Study 1	Moral Outrage	Intention to Help Victim/ Punish Transgressors	2011	178	0.330	0.192/0.455
*Montada & Schneider (1989)						
Single-Study	Moral Outrage	Intention to Execute Prosocial Activities	1989	823	0.400	0.341/0.456
*Nelissen & Zeelenberg (2009)						
Study 1	Anger towards Norm Violators	Third-Party Punishment (TPP)	2009	91	0.178	-0.029/0.371
Study 2	Anger towards Unfair Allocators	Third-Party Punishment (TPP)	2009	89	0.467	0.287/0.616
O'Reilly, Aquino, & Skarlicki (2016)						
Study 1a	Moral Outrage	Third-Party Punishment (TPP) Intention	2016	164	0.560	0.445/0.657
Study 1b	Moral Outrage	Third-Party Punishment (TPP) Intention	2016	136	0.235	0.069/0.388
Study 2	Moral Outrage	Third-Party Punishment (TPP) Intention	2016	409	0.391	0.306/0.470
Polman & Kim (2013)						
Study 1	Induction	Contribution in a Public Goods (PG) Dilemma Game	2013	145	-0.416	-0.542/-0.272
Study 3	Induction	Contribution in a Public Goods (PG) Dilemma Game	2013	194	-0.315	-0.436/-0.182

\*denotes articles quoted in Vam Doorn et al.'s (2014) review as direct evidence of the anger-prosociality association. \*\*studies included in the current main analysis.

Table 6 (contd')

Studies	Anger Measures	Prosociality Measures	Years	N	r	95% LL/ ULCI
Roberts, Strayer, & Denham (2014) Study 1	Trait Anger	Friendly Behaviours/ Willingness to Comply with others	2014	99	-0.529	-0.658/-0.371
**Rubin (2012) Study 1	Induction	Monetary offer to propose in the next Ultimatum Game trial	2012	52	-0.190	-0.440/0.087
Study 2	Induction	Contribution in a Give-some game	2012	96	-0.125	-0.317/0.078
Seip, Van Dijk, & Rotteveel (2014) Study 1	Induction	Costly Non-Cooperator Punishment: Public Goods Games	2014	81	0.377	0.173/0.550
Study 2	Induction	Costly Non-Cooperator Punishment: Sequential Trust Game (STG)	2014	88	0.492	0.307/0.641
Study 3	Induction	Costly Non-Cooperator Punishment: Sequential Trust Game (STG)	2014	38	0.234	-0.092/0.515
**Soscia (2007) Single-Study	Vignette: Stories on various protagonists' Consumption Experience	Intent to Repurchase/ Positive Word-of-Mouth	2007	182	-0.280	-0.409/-0.141
*Tagar, Federico, & Halperin (2011) Study 1	Anger towards Palestinians	Willingness to promote peaceful conflict resolution	2011	501	0.141	0.054/0.226
Study 2	Inter-group Anger Induction	Support of non-violent policies/ conflict resolution	2011	60	0.363	0.085/0.589
*Vitaglione & Barnett (2003) Study 4	State and Trait Empathic Anger	Intention to Help Victim/ Punish Transgressors	2003	191	0.405	0.279/0.517
*Wakslak, Jost, Tyler, & Chen (2007) Study 1	Moral Outrage	Support for resource redistribution for under-represented groups	2007	108	0.476	0.316/0.610
Study 2	Moral Outrage	Willingness to help the disadvantaged	2007	120	0.386	0.223/0.529
Zhou, Jiao, & Zhang (2017) Single-Study	Induction	Second/ Third-Party Punishment Magnitude	2017	76	0.226	0.000/0.429
<b>Random-Effects Model</b>				8,066	0.162	0.057/0.263

\*denotes articles quoted in Vam Doorm et al.'s (2014) review as direct evidence of the anger-prosociality association. \*\*studies included in the current main analysis.

Table 7

*Comparison of Effect Sizes for Other Prosocial Emotions*

<i>Emotions</i>	<i>Authors</i>	<i>r</i>	<i>Notes</i>
Gratitude	This study		
	Overall	.37	
	Reciprocity	.40	
	Non-reciprocity	.25	
Pride	This study	.21	
Anger	This study- Direct	-.07	
	Cooperation ( <i>k</i> = 20)		
Anger	This study- Norm	.38	
	Enforcement ( <i>k</i> = 11)		
Anger	Overall Prosociality	.16	
<i>Previous Meta-Analysis</i>			
<i>Emotions</i>	<i>Authors</i>	<i>r</i>	<i>Notes</i>
Negative Affect	Carlson and Miller (1987)	.27	<i>Negative Mood</i> (referred to as ‘bad mood (pp.93)’) with ‘ <i>Helpfulness</i> measured within one hour of the mood-lowering event (pp.94)’
Negative Affect	Dalal (2005)	-.10	<i>Negative Affect</i> and <i>Organizational Citizenship Behaviors</i> (OCBs) (defined as ‘the intentional employee behavior that is discretionary and not rewarded but that nonetheless improves the functioning of the organization (pp.1241)’). The <i>r</i> reported was the corrected coefficient.
Positive Affect	Carlson, Charlin, and Miller (1988)	.54	<i>Positive Mood</i> (referred to as ‘good mood (pp.213)’) with the ‘measurement of <i>Helpfulness</i> that took place within 30 minutes of the positive mood induction (pp.216)’)
Positive Affect	Dalal (2005)	.34	<i>Positive Affect</i> and <i>OCBs</i> . The <i>r</i> is the corrected coefficient.
Happiness	Lyubormirsky, King, and Diener (2005)	.22	<i>Happiness</i> (defined as ‘frequent experience of positive emotions (pp.820)’ and <i>Prosocial Behavior</i> (represented by ‘volunteering’, ‘helping experimenter’, ‘donating blood’ and so on) across <i>Experimental</i> , <i>Cross-sectional</i> , and <i>Longitudinal</i> studies. The <i>r</i> is our calculated weighted overall effect based on their reported results.
Sadness	Carlson and Miller (1987)	.08	Zero-order correlation between studies coded ‘Sadness or Temporary Depression’ (defined as ‘the extent to which subjects feel specifically downcast, sad, or depressed as a result of the negative mood induction (pp.96)’ with the main effect estimates.

Table 7 (contd')

<i>Emotions</i>	<i>Authors</i>	<i>r</i>	<i>Notes</i>
Shame	Leach and Cidam (2015)	.18	Shame (defined as emotional 'experience of a failure to be moral, competent or socially appropriate (pp.983)') and Prosocial Motivation or Behavior (defined as 'any motivation or behavior intended to benefit another individual or group (pp.987)'). The <i>r</i> estimate is derived from the Hedge's <i>g</i> of 0.372.
Guilt	Carlson and Miller (1987)	.50	Zero-order correlation between studies coded 'Guilt' (defined as 'bad feelings due to perceptions of having caused harm to someone else or otherwise having done something which they shouldn't have lost (pp.96)') with the main effect estimates.
Guilt	Boster, Cruz, Manata, DeAngelis, and Zhuang (2016)	.26	Experimentally varied Guilt and Compliance (defined as behavioral compliance or helping behavior which take the form of either an 'overt action (pp.56)' or a 'pledge to act (pp.56)').
Anger	Carlson and Miller (1987)	-.187	Zero-order correlation between studies coded 'Anger' (defined as 'subjects' experience of anger as a result of the induction (pp.96)') with the main effect estimates.
Empathy	Eisenberg and Miller (1987)	.17 .24	Self-reported empathy Reported Empathy Following Experimental Manipulations of empathy

Table 8

*Meta-Regression*

	B (SE)	95% (L, U)
Intercept	0.3469	-0.270, 0.964
Benefit-triggered (1) vs. Generalized (0)	0.370	-0.202, 0.941
Reciprocity (1) vs. no reciprocity (0)	-0.257	-0.982, 0.469
In-vivo (1) vs. Recall (0)	0.213	-0.006, 0.431
State (1) vs. Trait (0)	0.015	-0.417, 0.446
R <sup>2</sup>	0.21	



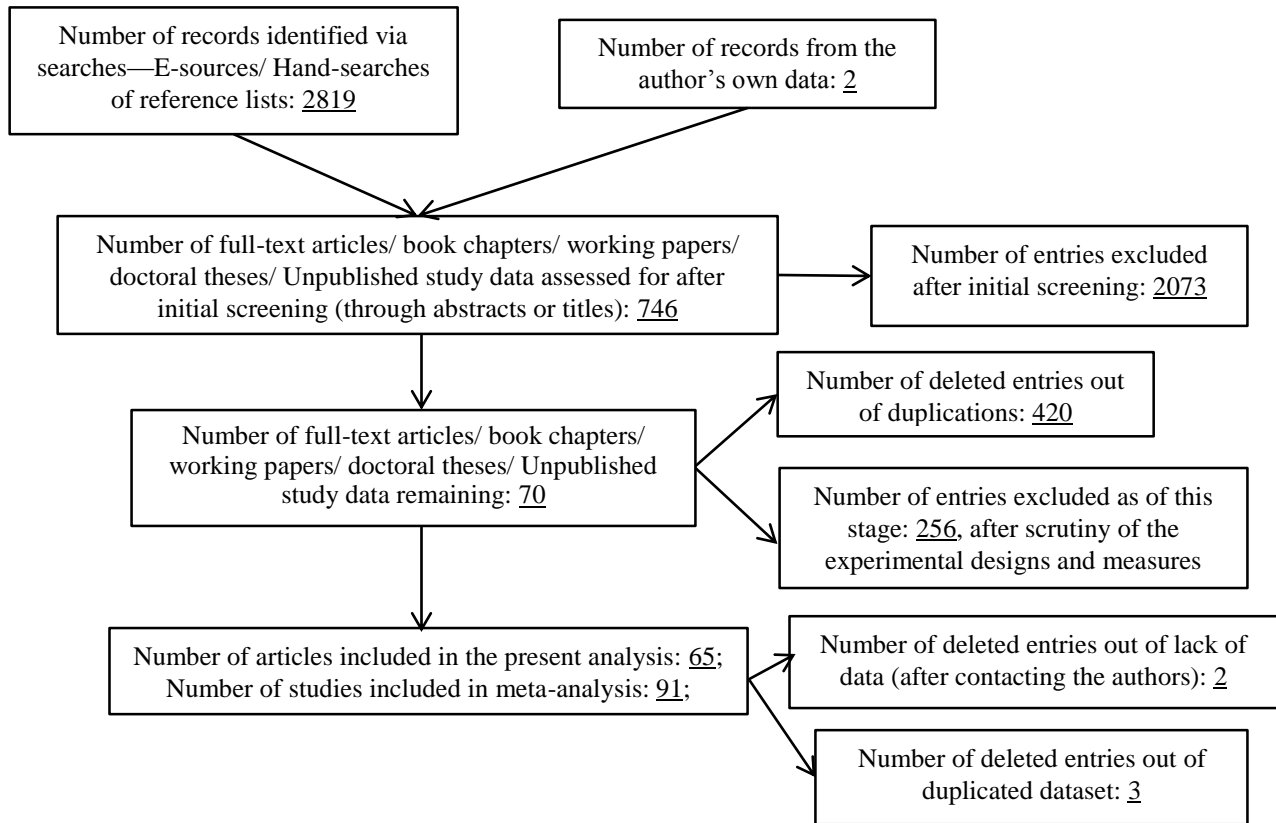


Figure 1. PRISMA Statement 2009 Flow Diagram of Information through different phases of the present review (Liberati et al., 2009).

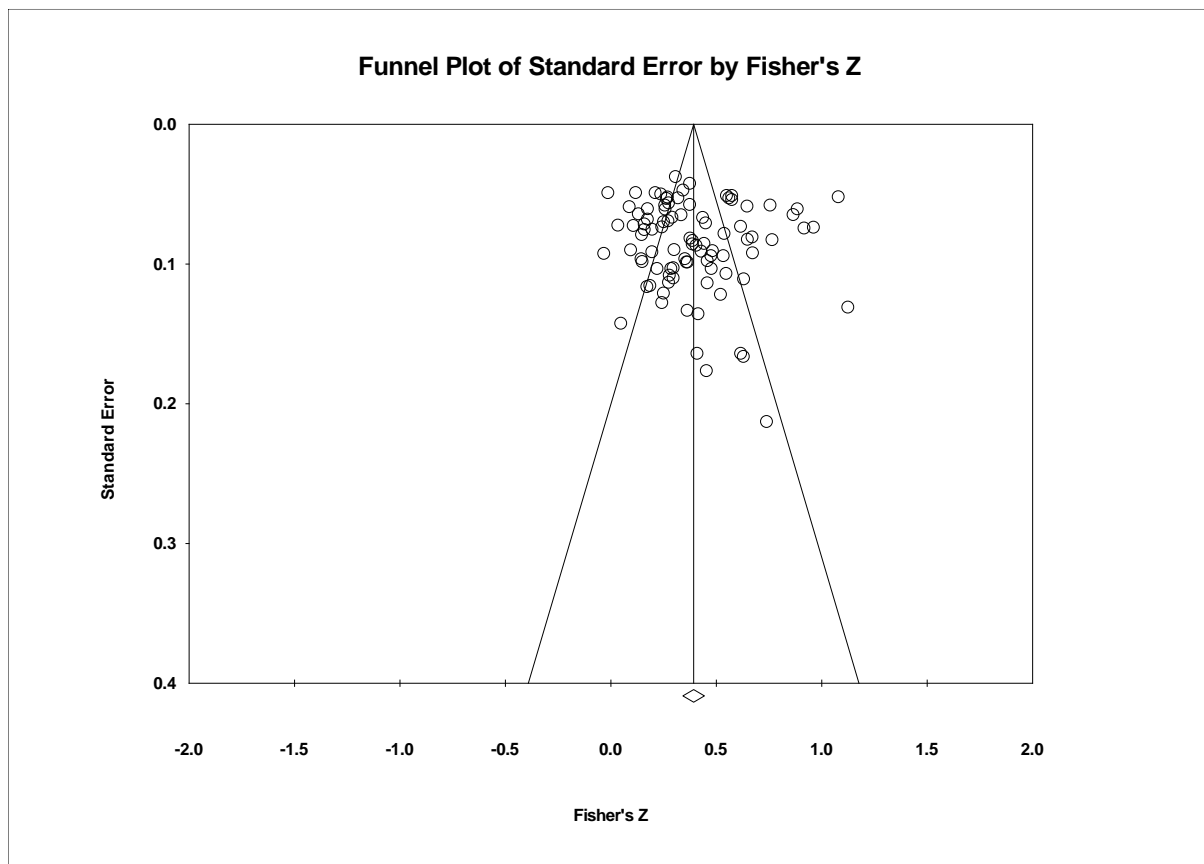


Figure 2. The Funnel Plot (with observed studies only)

## Appendices and Supplemental Materials

## Supplementary Table 1

*Additional Information on Participants of Studies included in the main meta-analysis (k= 91)*

Studies (k = 91)	N	Sample Composition	Continent of participation	Percentage of Female participants	Average Age of participants	Published?
Bartlett & Desteno (2006)						
Study 1	105	Undergraduates	North America	66.67%	21.00**	Yes
Study 2	97	Undergraduates	North America	72.16%	21.00**	Yes
Study 3	35	Undergraduates	North America	57.14%	21.00**	Yes
Bartlett, Condon, Cruz, Baumann, Desteno (2012)						
Study 1	40	Undergraduates	North America	76.19%	21.00**	Yes
Study 2	25	Undergraduates	North America	52.00%	21.00**	Yes
Bock, Folse, & Black (2016)						
Study 4	226	Community	North America	52.00%	40.00	Yes
Chang, Lin, & Chen (2012)						
Single-Study	174	Undergraduates	Asia	44.25%	19.68	Yes
Cohen (2012)						
Study 1	57	Undergraduates	North America	59.00%	19.60	No
Study 2	59	Undergraduates	North America	56.00%	19.50	No
de Hooge (2014)						
Study 1	271	Undergraduates	Western Europe	45.76%	20.41	Yes
Study 4	138	Undergraduates	Western Europe	55.07%	20.96	Yes
Desteno, Bartlett, Baumann, Williams, & Dickens (2010)						
Single-Study	85	Undergraduates	North America	Not Available	21.00**	Yes
Dewani, Sinha, & Mathur (2016)						
Single-Study	398	Community	Asia	49.00%	40.00**	Yes
Emmons & McCullough (2003)						
Study 2	157	Undergraduates	North America	75.30%	21.00**	Yes
Exline & Hill (2012)						
Study 2	286	Undergraduates	North America	58.39%	19.30	Yes
Exline, Lisan, & Lisan (2012)						
Study 1	217	Undergraduates	North America	46.54%	19.20	Yes
Froh, Bono, & Emmons (2010)						
Single-Study	700	Middle Schoolers	North America	51.70%	11.74	Yes
Froh, Bono, Fan, Emmons, Henderson, Harris, Leggio, & Wood (2014)						
Study 1	122	Elementary Schoolers	North America	51.60%	9.03	Yes
Froh, Yurkewicz, & Kashdan (2009)						
Single-Study	71	Middle Schoolers	North America	46.10%	12.14	Yes
Goei & Boster (2005)						
Study 2	96	Undergraduates	North America	53.85%	21.00**	Yes
Goei, Roberto, Meyer, Carlyle (2007)						
Study 1	64	Undergraduates	North America	100%	19.69	Yes
Study 2	186	Undergraduates	North America	59.14%	19.87	Yes
Graham (1988)						
Study 1	119	Elementary Schoolers	North America	50.00%	8.35	Yes
Study 2	105	Elementary Schoolers	North America	50.00%	8.44	Yes
Halali, Kogut, & Ritov (2016)						
Study 1A	146	Undergraduates	Asia	56.00%	21.00**	Yes
Study 2	115	Undergraduates	Asia	60.00%	21.00**	Yes
Hendrickson & Goei (2009)						
Single-Study	115	Undergraduates/Community	North America	50.00%	22.04	Yes
Huang (2015)						
Single-Study	239	Community	Asia	70.00%	Not Available	Yes
Hwang & Kandampully (2015)						
Single-Study	350	Community	North America	60.30%	40.47	Yes
Janakiraman, Meyer, & Morales (2006)						
Study 2	297	Undergraduates	North America	Not Available	21.00**	Yes
Jin & Merkebu (2014)						
Single-Study	398	Community	North America	49.20%	Not Available	Yes
Kim & Lee (2013)/ Lee, Kim & Pan (2014)*						
Single-Study	297	Community	Asia	59.00%	40.50**	Yes
Kim, Smith, & James (2010)						
Single-Study	272	Community	North America	40.00%	40.35	Yes

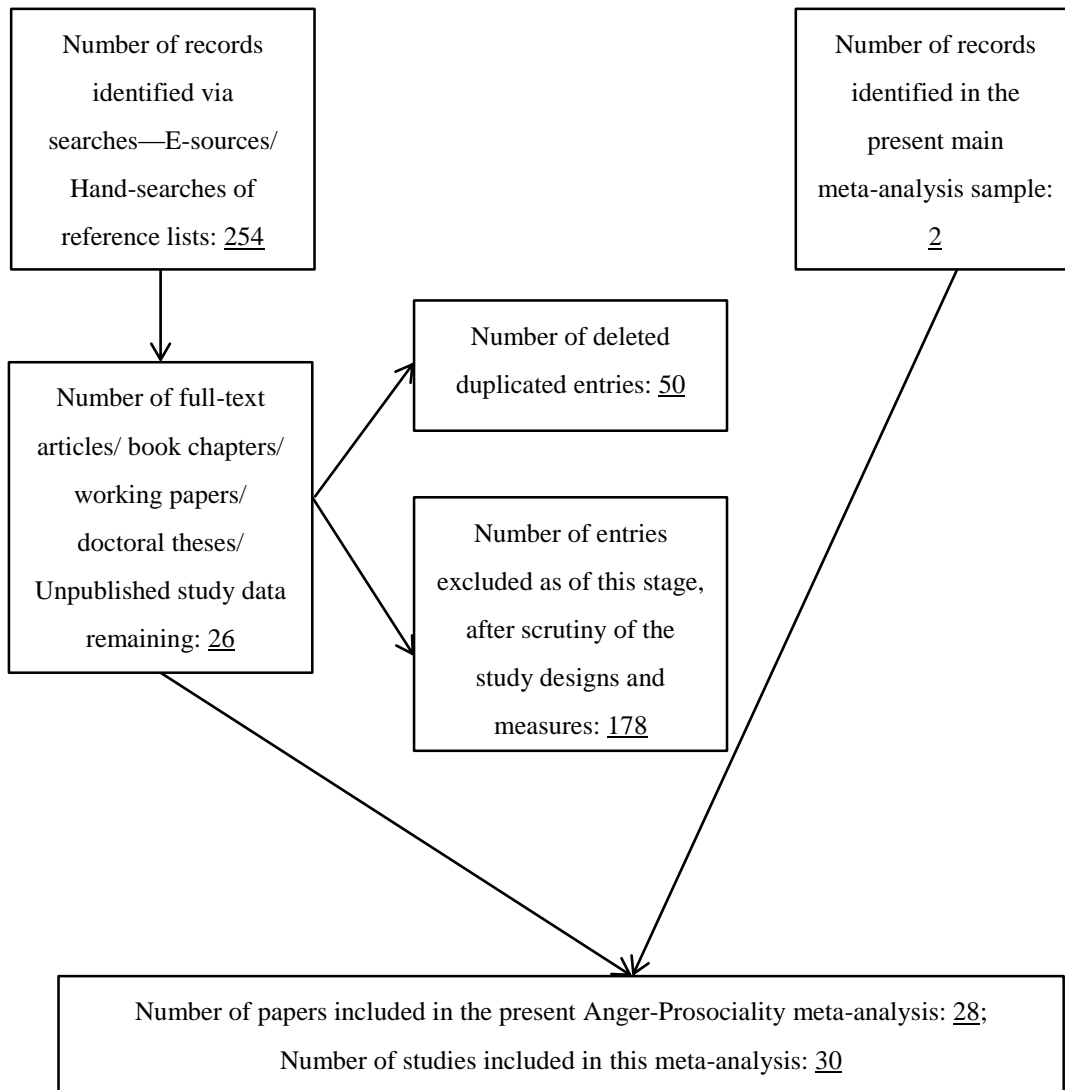
Supplementary Table 1 (contd')

Studies ( <i>k</i> = 91)	<i>N</i>	Sample Composition	Continent of participation	Percentage of Female participants	Average Age of participants	Published?
Kolyesnikova & Dodd (2008)/ Kolyesnikova, Dodd & Wilcox (2009)*						
Single-Study	357	Community	North America	54.00%	41.00	Yes
Kolyesnikova, Dodd, & Callison (2011)						
Single-Study	120	Undergraduates/ Community	North America	50.80%	33.50	Yes
Krumrei-Mancuso (2016)						
Single-Study	314	Community	North America	54.50%	34.36	Yes
Kubacka, Finkenauer, Rusbult, & Keijsers (2011)						
Study 1	390	Community	Western Europe	50.00%	30.64	Yes
Kwak & Kwon (2016)						
Study 2	201	Community	North America	53.00%	51.00	Yes
Langan & Kumar (2015)						
Study 2	197	Community	North America	Not Available	33.00	No
Layous, Nelson, Kurtz, & Lyubomirsky (2016)						
Study 1	233	Undergraduates	North America	69.60%	20.02	Yes
Study 2	139	Undergraduates	North America	75.50%	19.60	Yes
Leung (2011)						
Study 1	124	Undergraduates	Asia	62.10%	20.00**	Yes
Study 2	84	Undergraduates	Asia	66.67%	20.00**	Yes
Study 3	110	Undergraduates	Asia	60.91%	20.00**	Yes
Study 4	90	Undergraduates	Asia	60.00%	20.00**	Yes
Li & Chow (2015)						
Single-Study	243	High Schoolers/ Church-goers	Asia	52.00%	18.10	Yes
Ma, Tunney, & Ferguson (2014)						
Single-Study	61	Undergraduates	Western Europe	59.02%	21.80	Yes
Ma, Tunney, & Ferguson (Unpublished Study 1)						
Single-Study	135	Undergraduates	Western Europe	60.00%	21.10	No
Ma, Tunney, & Ferguson (Unpublished Study 2)						
Single-Study	133	Undergraduates	Western Europe	59.40%	22.70	No
Markowitz (2012)						
Study 1	551	Community	North America	56.10%	44.50**	No
Study 2a	413	Community	North America	68.80%	31.00	No
Study 2b	413	Community	North America	68.80%	31.00	No
Study 3	273	Community	North America	58.50%	29.00	No
McCullough, Emmons, & Tsang (2002)						
Study 1	238	Undergraduates	North America	73.11%	21.00	Yes
Michie (2009)						
Single-Study	71	Business Settings	North America	60.67%	37.14	Yes
Mikulincer & Shaver (2010)						
Single-Study	80	Undergraduates	Asia	62.50%	21.00**	No
Morales (2005)						
Study 2	88	Students	North America	Not Available	Not Available	Yes
Naito & Sakata (2010)						
Study 1	135	Undergraduates	Asia	100%	19.39	Yes
Naito, Wangwan, & Tani (2005)						
Study 1- Japan	212	Undergraduates	Asia	65.09%	19.25	Yes
Study 1- Thai	284		Asia	42.96%	20.31	Yes
Palmatier, Jarvis, Bechkoff, & Kardes (2009)						
Study 1	155	Undergraduates	North America	Not Available	21.00**	Yes
Study 2	446	Business Firms	North America	Not Available	Not Available	Yes
Romani, Grappi, & Bagozzi (2013)						
Single-Study	188	Community	Western Europe	53.80%	39.50**	Yes
Rubin (2012)						
Study 1	52	Undergraduates	North America	61.54%	19.51	No
Study 2	96	Community	North America	63.54%	24.71	No
Siegel, Thomson, & Navarro (2014)						
Study 2	373	Community	North America	54.16%	31.80	Yes
Simon (2013)						
Single-Study	148	Undergraduates	Western Europe	57.00%	25.00**	Yes
Soscia (2007)						
Single-Study	182	Graduate Students	Western Europe	100%	Not Available	Yes
Spence, Brown, Keeping, & Lian (2014)						
Study 2	67	Community	North America	64.00%	33.60	Yes
Study 3	104		North America	44.00%	38.68	Yes

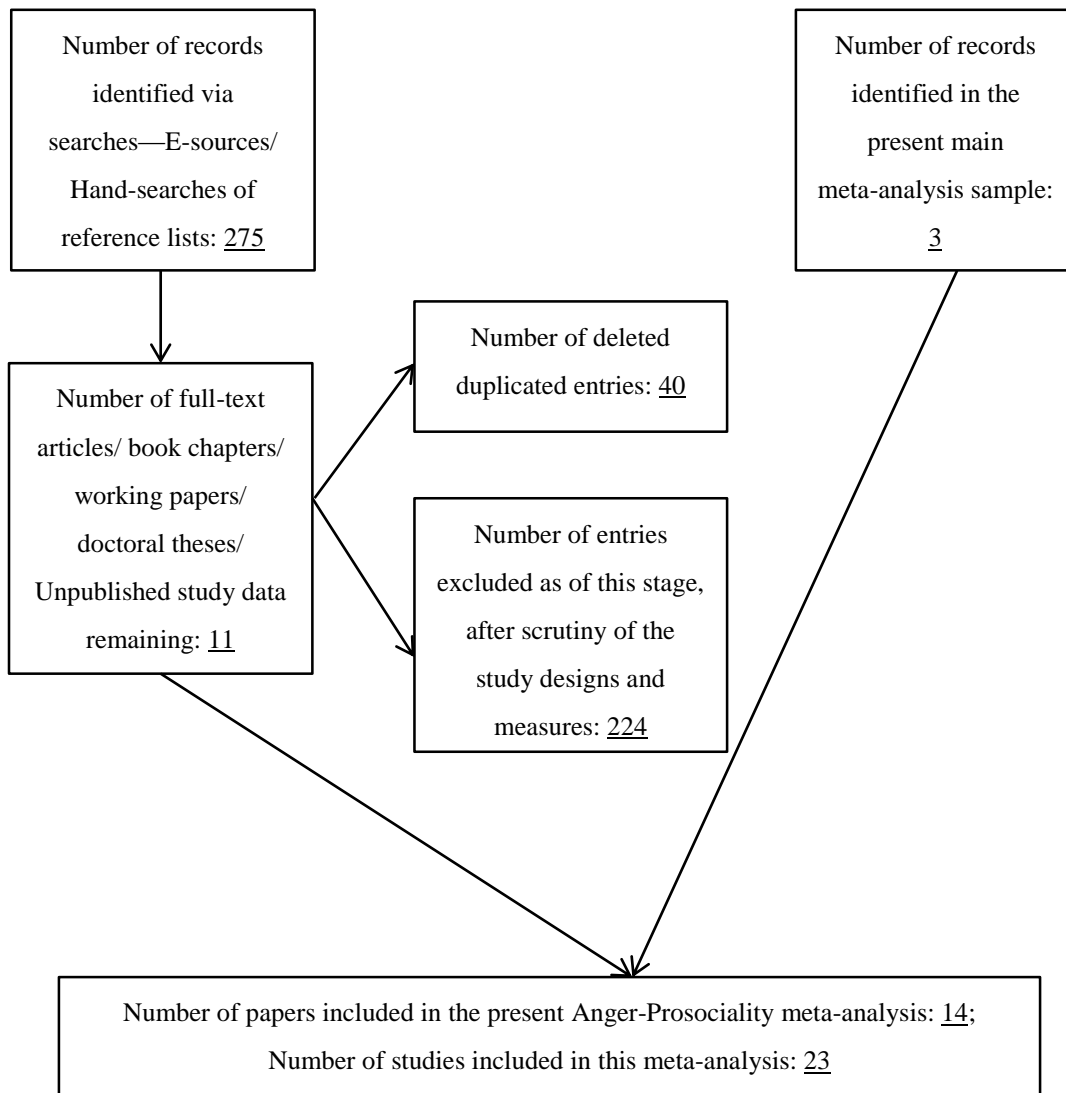
Supplementary Table 1 (contd')

Studies ( <i>k</i> = 91)	<i>N</i>	Sample Composition	Continent of participation	Percentage of Female participants	Average Age of participants	Published?
Tian, Chu, & Huebner (2016)						
Single-Study	706	Elementary Schoolers	Asia	46.88%	11.07	Yes
Tian, Du, & Huebner (2015)						
Single-Study	324	Elementary Schoolers	Asia	45.68%	11.39	Yes
Tsang (2006)						
Single-Study	40	Undergraduates	North America	100%	21.00**	Yes
Tsang (2007)						
Single-Study	149	Undergraduates	North America	80.54%	21.00**	Yes
Tsang, Schulwitz, & Carlise (2012)						
Single-Study	80	Undergraduates	North America	100%	21.00**	Yes
Wangwan (2014)						
Single-Study-High School	414	High Schoolers	Asia	57.49%	16.30	Yes
Single-Study-Undergraduate	191	Undergraduates	Asia	67.54%	20.60	Yes
Watkins, Scheer, Ovnicek, & Kolts (2006)						
Study 1	107	Students	North America	Not Available	Not Available	Yes
Study 2	152	Students	North America	Not Available	Not Available	Yes
Wetzel, Hammerschmidt, & Zablah (2014)						
Study 1	192	Business Firms	Western Europe	Not Available	Not Available	Yes
Study 2	302	Business Firms	Western Europe	Not Available	Not Available	Yes
Xia & Kukar-Kinney (2013)						
Study 1	290	College Students and Staff Members	North America	Not Available	39.00	Yes
Study 2	381	Undergraduates	North America	52.00%	23.10	Yes
Study 3	225	Undergraduates/Community	North America	52.00%	26.90	Yes
Xia & Kukar-Kinney (2014)						
Study 2	206	Community	North America	57.00%	35.00	Yes
Xie & Bagozzi (2014)						
Single-Study	210	Community	Western Europe	49.00%	49.50**	Yes
Xie, Bagozzi, & Grønhaug (2015)						
Single-Study	210	Community	Western Europe	48.00%	49.50**	Yes
Yang, Stoeber, & Wang (2015)						
Study 3	165	Undergraduates	Asia	53.94%	20.20	Yes
Zhao (2010)						
Study 1	381	Upper Primary and Lower Secondary School Students	Asia	45.67%	12.30	No
Study 2a	123	Upper Primary and Lower Secondary School Students	Asia	40.56%	11.46	No
Study 2b	126	Upper Primary and Lower Secondary School Students	Asia	40.56%	11.46	No

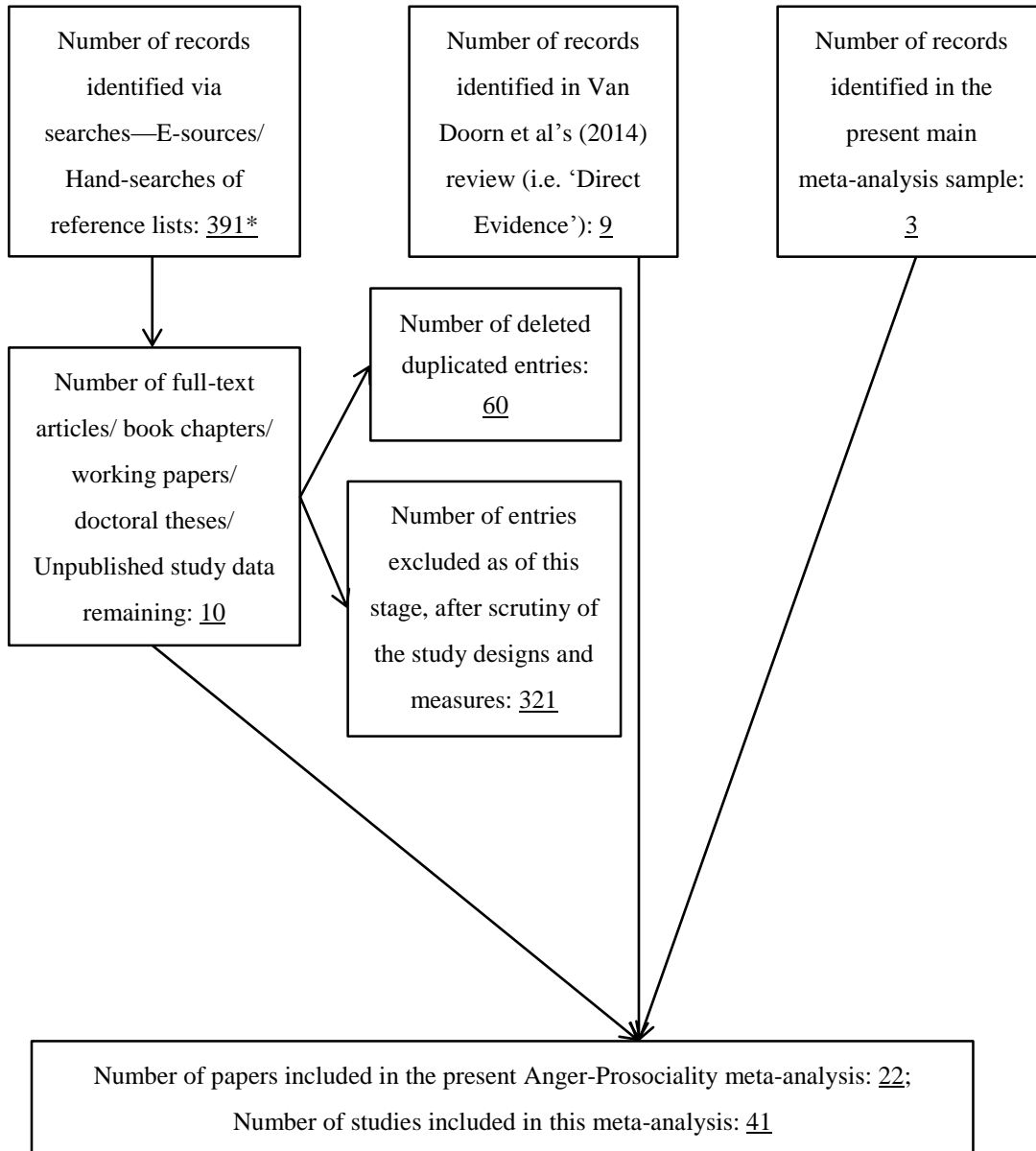
Note. \*\* Imputed values. See Methods for details in relation to how age data were imputed at present.



*Supplementary Figure 1.* PRISMA Statement 2009 Flow Diagram of Information through different phase of the review on the Trait Gratitude-Prosocial Disposition association (Libertati et al., 2009).



*Supplementary Figure 2.* PRISMA Statement 2009 Flow Diagram of Information through different phase of the review on the Pride-Prosociality association (Libertati et al., 2009).



\*search restricted to published or unpublished materials dated after Van Doorn et al's (2014) review.

*Supplementary Figure 3. PRISMA Statement 2009 Flow Diagram of Information through different phases of the review on the Anger-Prosociality association (Liberati et al., 2009).*