The effects of being kind: a Review and Meta-analysis of the Acts of Kindness intervention

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Preface

Performing this meta-analysis about acts of kindness was one learning process… learning to perform a meta-analysis, learning to work with Comprehensive Meta-Analysis and improving my English writing skills.

My research only focused on the effect of being kind on the performer of these kind acts. But what about the receiver of these acts of kindness? During my research I realized that kind and helpful actions of others had a positive influence…

Firstly, *prof. dr. Bohlmeijer and dr. Schotanus-Dijkstra,* thank you for your motivational and positive words during our conversations, mails and feedback. They gave me the confidence to continue.

Secondly, *my parents and sister*, thank you for your inspiring discussions and confidence in what I did. They gave me the inspiration for continuing writing.

Thirdly, *Eros (my four-legged buddy)*, thanks for all our morning and afternoon walks and distraction. They gave me fun, a refreshing look and structure in my days.

And last but not least, *everyone who helped* me with advise and information related to this meta-analysis. Due to your help I could perform this meta-analysis.

Researching acts of kindness did change me… Awareness and simply being a bit more helpful and kind for each other can make the world a little bit better (and ourselves too ☺). And what does it cost? A friendly "good morning", helping someone in the supermarket or offering a listening ear… simple things that only require a little attention for another.

Kim Tönis

Abstract

Introduction: A growing number of studies focuses on the acts of kindness intervention, an intervention in which participants perform acts of kindness for others, such as helping a fellow student with an assignment or helping with cooking. A first meta-analysis demonstrated that the acts of kindness intervention enhanced the level of subjective well-being. However this meta-analysis did not include the quality of the studies and included a broader diversity of interventions (for example prosocial purchases). Therefore, the aim of the current study is to examine the effectiveness of the classical acts of kindness intervention on well-being and distress and to test possible moderators.

Methods: PubMed, PsycINFO, Cochrane, Scopus and Web of Science were searched, references were cross-checked, websites of the top three authors (based on the Scopus results) and unpublished trials were searched. Ten papers met the inclusion criteria and were included, describing 11 studies. These studies aimed to test the effectiveness of the acts of kindness intervention compared to a condition on adults. Included outcome measures were hedonic well-being (e.g. happiness, positive affect and life satisfaction), eudaimonic well-being (meaningfulness, self-esteem, psychological well-being, autonomy, competence and connectedness) and distress components (depression, stress and anxiety).

Results: The intervention had a significant effect on eudaimonic well-being (g=0.18) and hedonic well-being (g=0.17) in comparison to placebo control conditions post-intervention. These results were not robust, perhaps due to missing studies. Heterogeneity was low to medium. One significant moderator was found for eudaimonic well-being, namely duration .

Discussion: The results showed that the acts of kindness can be effective in enhancing eudaimonic and hedonic well-being, although results have to be interpreted with caution due to low amounts of included studies. High quality studies published in peer-reviewed journals are needed to test which intervention characteristics (for example duration and intensity of the performed acts of kindness) are effective for different types of samples (e.g. clinical samples).

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Introduction

Positive psychology was introduced by Seligman and Csikszentmihalyi (2000). Personal experiences inspired them towards a huge change in the focus of research within psychology. These experiences made them think about the focus of the psychology after the second World War, namely on healing and assessing suffering individuals. This led to the conclusion that psychology is more than the study of damage, weakness and pathology, it emphasis also the study of virtue and strength (Seligman & Csikszentmihalyi, 2000). Positive psychology focuses on both pathology and treatment on one side and positive aspects and strengths on the other side. This can be found in the aim of positive psychology, namely to change from an unilateral focus of "repairing the worst things in life to also building the best qualities in life" (Seligman, 2002, p.3). According to Seligman and Csikszentmihalyi (2000) positive psychology focus on three levels. Firstly, the subjective experiences like well-being, satisfaction, optimism and happiness. Secondly, positive traits at the individual level, like forgiveness, interpersonal skill or wisdom. Thirdly, virtues that move individuals in the direction of better citizenship, like tolerance and altruism.

Improving (mental) well-being (part of the subjective experiences level) is one of the aims of positive psychology. "Mental health is a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (World Health Organization, 2004, p.10). This definition consists of three components of mental well-being. Emotional well-being, which consists of three elements: life satisfaction, positive affect and happiness (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). Social well-being consists of social actualization, social acceptance, social coherence, social contribution and social integration (Keyes, 1998). Psychological well-being consists of self-acceptance, autonomy, mastery, personal growth, purpose in life and positive relations (Ryff, 1989). These three components can be found in two longstanding traditions. Firstly, hedonic well-being focuses on happiness and consists of emotional well-being. Secondly, eudaimonic well-being concerns optimal functioning in social and individual life and consists of social and psychological well-being (Lamers et al., 2011). Increasing one or more levels positive psychology focuses on (subjective, individual and citizenship level), where (mental) well-being and its components are part of is, are the aim of different types of positive psychology interventions (PPI's).

Positive Psychology Interventions (PPI's)

Parks and Biswas-Diener (2013) define PPI's by three criteria. They state that a PPI is an intervention 1) aimed at increasing a level positive psychology focuses on (e.g. positive emotions), 2) that is empirically proven to be effective in increasing the target variable(s) and 3) that has a positive outcome for the target population. Based on these criteria Schueller and Parks (2014) differentiate five categories of interventions that can be defined as PPI's: 1) sensations and experiences savoring, 2) gratitude cultivating, 3) engaging in acts of kindness, 4) processes of positive relationships prompting and 5) meaning and hope pursuing.

Seligman, Steen, Park, and Peterson (2005) performed a large RCT to validate the effectiveness of five online PPI's (gratitude, three good things that happened that day, reflecting on personal strengths, signature strengths in a new way using and the identification of signature strengths) in order to create an evidence-based practice. The results of this RCT demonstrated that not all interventions had long term effects on happiness and depressive symptoms, which indicates the need of RCT's for specific PPI's. But more RCT's do not lead to the same results in outcomes and effect sizes for one intervention and therefore meta-analytic reviews are needed to estimate effect sizes and keep an overview (Cuijpers, 2016).

Two meta-analysis have been conducted to examine the effect of PPI's in general on well-being and depressive symptoms. Based on 51 interventions, Sin and Lyubomirsky (2009) concluded that PPI's can be effective in increasing well-being (r=0.29) and decreasing depressive symptoms (r=0.31). Bolier et al. (2013) found, a low to moderate effect sizes for depression (d=0.23), psychological well-being (d=0.20) and subjective well-being (d=0.34) based on 40 papers. One of the included interventions is the acts of kindness intervention.

Acts of kindness as PPI

A growing number of studies have focused on this acts of kindness intervention, a PPI in which participants perform kind acts such as helping with homework, visiting an elderly family member or helping with cooking (Nelson et al., 2015; Ouweneel, Le Blanc, & Schaufeli, 2014). This instruction to (actively) help or interact with someone is also given in the practicing compassion intervention (Mongrain, Chin, & Shapira, 2011) and the making others happier intervention (Layous, Kurtz, Margolis, Chancellor, & Lyubomirsky, 2016).

The choice to perform an act of kindness is made conscious (Smalley, 2010). This choice has been proven to influence the effect of the intervention. Sheldon, Boehm, and Lyubomirsky (in press) examined the role of variation (repeating vs. not repeating the performed kind acts) in the acts of kindness intervention. Repeating the kind acts of the

previous weeks led to a decrease in happiness after the intervention, whereas varying in kind acts (performing novel acts) led to an increase in happiness.

Acts of kindness has been used both as an independent intervention (e.g. Nelson, Layous, Cole, & Lyubomirsky, 2016) and as part of an intervention program (e.g.Cohn, Pietrucha, Saslow, Hult, & Moskowitz, 2014; Drozd, Mork, Nielsen, Raeder, & Bjørkli, 2014; DuBois, Millstein, Celano, Wexler, & Huffman, 2016; Taylor, Lyubomirsky, & Stein, 2017). Regarding the latter, the intervention programs were tested for at least three different target groups and a diversity of outcome measures. Cohn et al. (2014) found a significant decrease in depression (in comparison to a waitlist control) for the DAHLIA intervention in a group patients with diabetes type 2 . DuBois et al. (2016) found positive effects on gratitude, optimism, anxiety, depression, distress (based on a pre- and post-intervention comparison) in a patients with diabetes type 2. Drozd et al. (2014) found an increase in happiness in the Better Days intervention condition (based on the pre- and post-intervention comparison) and an increase in balance of affect (compared to the control condition) in the normal population. Taylor et al. (2017) found significant effects on psychological well-being and positive affect for the intervention condition (in comparison to the waitlist control) in group individuals with depression and/or anxiety symptoms. However, acts of kindness was only part of a broader intervention and it is therefore unknown whether the acts of kindness contributed to these positive effects, or the comprehensive intervention as a whole.

The effectiveness of the acts of kindness as independent intervention has been evaluated on a diversity of outcome measures in a broad variety of participants. For example, acts of kindness was investigated in an experiment in a group of nine to eleven year old children and showed a positive effect on peer acceptance and positive affect (Layous, Nelson, Oberle, Schonert-Reichl, & Lyubomirsky, 2012). Another study evaluated the effect in an experiment in a group adults and found positive effects on life satisfaction (Buchanan & Bardi, 2010) and Trew and Alden (2015) found decreases in avoidance goals in a group of socially anxious participants. Another study explored various modalities of the intervention: Layous, Nelson, Kurtz, and Lyubomirsky (2016) added one week prior to the acts of kindness intervention to test whether engaging in positive writing activities (about someone the writer is grateful to, about a kind act of someone the writer is grateful to, about the best possible self or about a positive experience) leads to more effortful acts of kindness than the control group who listed the activities of the previous week. They found that engaging in positive writing activities led to more effortful acts of kindness than engaging in the control condition.

Besides differences in outcome measures and participants there were also differences in the instructions the participants received, intensity and duration of the intervention. Instructions varied from performing acts that make others happy or benefit them (e.g. Alden & Trew, 2013), performing nice things for other persons (Nelson et al., 2016) to interact or help others in a considerate or supportive way (Mongrain et al., 2011). Others add examples of kind acts to the instructions like sending a thank you mail (Layous, Kurtz, et al., 2016) or reporting on the performed acts of kindness (Kerr, O'Donovan, & Pepping, 2015). The intensity varies from performing three acts of kindness per week (e.g. Layous et al., 2012) to five acts of kindness per day once a week (e.g. Nelson et al., 2015). The duration of the intervention varies from one week (e.g. Ouweneel et al., 2014) to six weeks (e.g. Nelson et al., 2015). A theoretical scenario of a student who helps a classmate with an assignment and gets complimented for it of Layous and Lyubomirsky (2012) explains the importance of the duration of activities aimed at increasing happiness (e.g. acts of kindness) for the long term. This compliment leads to positive emotions and encourages the student to use the complimented teaching ability in a new job as homework tutor (positive behavior with positive consequences). The positive emotions are temporary, but the chain of positive events (thoughts, emotions and behavior) endures the impact of the kind act. This chain of positive events does not have to be activated immediately after the kind act and sustained practice is needed for lasting effects (Layous & Lyubomirsky, 2012). Lyubomirsky, Tkach, and Sheldon (2004) compared the intensity of the acts of kindness intervention by instructing the participants to perform five acts of kindness spread over the week or all in one day for the intervention lasting six weeks. They found that performing acts of kindness in one day had a larger effect on well-being than performing them spread over the week (as cited in Lyubomirsky, Sheldon, & Schkade, 2005). Although this study suggest that a higher intensity has a larger effect, it is yet unclear what the most optimal intervention delivery is for performing acts of kindness.

Reviews and meta-analysis on Acts of kindness

Because of the growing number of studies on acts of kindness, it is relevant to conduct a systematic review and meta-analysis to assess the effects across studies. Curry, Rowland, Zlotowitz, McAlaney, and Whitehouse (2017) performed this next step for the acts of kindness intervention. They included 21 studies and found a small to medium effect size (d=0.36) for kindness interventions (were the acts of kindness intervention part of is) in a broad variation of samples (including youth, ‘typical’ and ‘social anxious’ participants).

However this meta-analysis had some limitations which could be addressed in a future meta-analysis, therefore this current meta-analysis is performed. Firstly, Curry et al. (2017) focused on acts of kindness in a broader sense by also including prosocial purchases. This current meta-analysis focuses purely on acts of kindness as an intervention in which participants are asked to perform a specified number of kind acts to someone else. This includes the decision to whom and what kind act has been performed. Secondly, the meta-analysis of Curry et al. (2017) had only analyzed the effects on subjective well-being, which is only one part of mental well-being. Examining the effectiveness on both elements of mental-wellbeing (eudaimonic and hedonic well-being) and distress (depression, stress and anxiety) can give insight into the specific usefulness to improve these elements. Thirdly, the meta-analysis of Curry et al. (2017) did not compare the intervention characteristics (for example duration and intensity of the intervention) to conclude whether there are differences in effectiveness between the variations of the intervention. This knowledge can be used to increase the effectiveness of used acts of kindness interventions and the use acts of kindness in an intervention. Fourthly, the meta-analysis of Curry et al. (2017) did only took the sample size as quality criteria in consideration. This current meta-analysis includes a broader definition of the methodological quality and assesses its possible moderating effect.

Current study

The aim of the present study is to conduct a review and meta-analysis about the effectiveness of the acts of kindness intervention on eudaimonic and hedonic well-being and distress (depression, stress and anxiety). This was done by comparing the intervention condition with an active or placebo control group for both adults with and without a psychological problem. The second aim was to test whether the quality of the studies, duration of the intervention, intensity of the intervention, the specification of number of kind acts a participant has to perform (specified or not-specified) and type of target group (with or without a psychological problem) moderated the effectiveness. These aims fill in the mentioned gaps in the literature concerning the acts of kindness intervention. These two aims are translated into four research questions: What is the effectiveness of the acts of kindness intervention on 1) eudaimonic and hedonic well-being, 2) distress (depression, stress and anxiety) and 3) negative and positive affect in comparison to both an active and a placebo control condition for adults with and without psychological problems? (4) What moderators influence this effectiveness?

Method

The Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) guidelines of 2015 (Moher et al., 2015) were followed for conducting and reporting about this study.

Search strategy

The electronic databases PubMed, PsycINFO, Cochrane, Scopus and Web of Science were searched for papers published until March 7, 2017. The search string was ((“kindness” OR “practicing compassion”) AND (experiment* OR control OR condition OR random* OR trial OR RCT OR empirical)). References of the included articles were cross-checked to find additional studies. Unpublished trials were searched in four Clinical Trial Registers (www.clinicaltrials.gov, www.clinicaltrialsregister.eu, www.isrctn.com and www. http://apps.who.int/trialsearch/) on March 21, 2017. The overview of papers published on the websites of Kristin Layous, Sonja Lyubomirsky and S. Katherine Nelson-Coffey were searched on March 30, 2017 for additional papers. These three authors were chosen because they were the top three authors within the search string; S. Lyubomirsky (11 papers), K. Layous (7), and S.K. Nelson (5) according to the electronic database Scopus (the database with the most hits within the used search string).

Study selection and study characteristics

After removing duplicates, possible eligible studies were screened in three phases: (1) the title, (2) the abstract and keywords and (3) the full paper. Studies were included if they (1) were published in a peer-reviewed journal in the English language; (2) included adults as participants (>17 years old); (3) examined the effects of the acts of kindness, at least specified with the instruction to perform acts of kindness or acts of compassion during the intervention period; (4) included a (placebo and/or active) control condition; (5) examined the effects of the acts of kindness with at least one outcome measure related to mental well-being; and (6) provided (by consultation) an effect size or sufficient information to calculate a post-intervention effect size.

Studies were excluded from the meta-analysis if: (1) the effect of the acts of kindness intervention on the receiver was measured (Baskerville et al., 2000); (2) the acts of kindness were offered within a larger intervention (Taylor et al., 2017) or combined with another intervention (e.g. Layous, Lee, Choi, & Lyubomirsky, 2013); (3) the participants were not explicitly asked to perform kind acts, but for example were asked to count kind acts (e.g. Gander, Proyer, Ruch, & Wyss, 2012) and (4) a non-validated outcome measurement was

used to assess a mental well-being related construct (e.g. Rudd, Aaker, and Norton (2014) who asked “To what degree do you feel you created happiness in your own life?” on a seven-point likert scale).

The included papers were coded to find data on the participants characteristics, intervention and comparison characteristics for both active and placebo control conditions, outcome characteristics, and methodological characteristics (see Table 1 and Table 2). An active control condition is a condition in which participants are asked to do activities aimed at increasing mental well-being or decreasing distress like depression, stress or anxiety (e.g. gratitude intervention, self-kindness or behavioral experiments). A placebo control condition is a condition in which participants are asked to do something, without the intention to increase the mental well-being or distress (e.g. monitoring of life details or writing early memories). This difference in control conditions is made to differentiate between the effect of the acts of kindness intervention itself (in comparison that is intended to have no influence on mental well-being or distress) and the acts of kindness intervention compared with control activities that were aimed to influence mental well-being or distress.

The included outcome measures (as assessed with validated measures) were eudaimonic well-being, hedonic well-being, depression, stress and anxiety (distress) and negative affect. Negative affect can be seen as part of hedonic well-being, where it forms a balance with positive affect. Because the different studies included positive and negative affect as two separate outcome measures (without calculating the balance) only positive affect is included as part of hedonic well-being. In case of more than one outcome measures for one construct (eudaimonic or hedonic well-being), the effect sizes were pooled.

Effect size calculation

For the studies that provided information about mean and standard deviation (pre- and postscores of the included outcome measure), this information was extracted for the intervention and both control conditions. Based on the method as described by Spijkerman, Pots, and Bohlmeijer (2016) the effect size was calculated in two phases. Firstly, the standardized pre-post effect sizes were calculated for each condition by subtracting the mean of the pre-test score of the mean of the post-test score ($M_{post} - M_{pre}$) and dividing this by the pre-test score standard deviation (SD_{pre}). This effect size represents the amount of standard deviations the pre-test score differs from the post-test score for the relevant condition. Secondly, the difference between the effect of the experimental condition (d_{IV}) and both control conditions (d_{active} and $d_{placebo}$) were calculated (Δd). This Δd represents the difference

in change between the intervention and (active or placebo) control condition in standard deviations.

When this information was not available, (1) the in the paper given Cohen's *d* was used, (2) Cohen's *d* was calculated based on the regression analysis results and degrees of freedom or (3) the authors were mailed for additional information (see Table 2). Comprehensive Meta Analysis (CMA) was used to calculate Hedges's *g*, to correct for small sample bias (Spijkerman et al., 2016). Cohen's *d* and Hedges's *g* effect sizes can be intrepreted in the same way, whereas an effect size of 0.56-1.2 can be considered as large, 0.33-0.55 as medium and >0.32 as small (Lipsey and Wilson, as cited in Cuijpers, 2016).

Risk of bias (methodological quality)

The methodological quality of all studies was rated using the method described by Spijkerman et al. (2016) and Cuijpers (2016) based on the Jadad Scale (Jadad et al., 1996) and Cochrane Collaboration's tool (J P T; Higgins et al., 2011). The methodological quality assessment of this study consisted of six criteria. Firstly, the absence of: selection bias (random sequence generation), detection bias (blinding of outcome assessments) and performance bias (blinding of participants). Secondly, the presence of intention-to-treat analysis, sample size data (power analysis or a sample size larger than 50 participants per condition) and baseline balance between groups (baseline comparability). Each item was rated independently as absent (0) or present (1). When the information of one of the criteria was missing, that criteria was rated as absent (0). After assessing the quality independently the differences were discussed to reach agreement. Studies rated with the maximum quality score (six points) were identified as "good", studies rated with five or four points were rated as "fair" and studies with less than four points were rated as "poor" (based on Spijkerman et al., 2016). The results of this quality assessment can be found in Table 3 (Appendix 1).

Statistical analysis

CMA (version 3.3.070) was used to conduct the meta-analytic analysis. A broad variation in the participants and intervention characteristics (see Table 1 and Table 2) led a priori to the decision to use the random effects model. This random effects model assumes that effect sizes can differ as the result of random error and random variation, so studies do not have to be identical and may introduce an own underlying variance (Cuijpers, 2016). This model reduces the likelihood of type-II errors by calculating broader 95% Confidence Intervals (95% CIs) (Bolier et al., 2013).

The effectiveness of the acts of kindness intervention was determined in six separate meta-analyses: (1) eudaimonic well-being, (2) hedonic well-being, (3) depression; (4) stress, (5) anxiety and (6) negative affect, if at least four studies included this outcome measure. Positive affect was added after writing the results, although it was part of hedonic well-being, because it was the most frequent measured outcome measure.

In case of more than one intervention condition in a study, these were pooled to overcome a unit-of-analysis error (Higgins, Deeks, & Altman, 2011). Then the outliers where visually searched and excluded. Studies were considered outliers when the 95% CI did not overlap the 95% CI of the effect size of the separate meta-analysis. To examine the homogeneity and heterogeneity of the effect sizes Q-statistic and I^2 statistic were used. A significant Q-test gives evidence for heterogeneity, but its strength depends on the amount of included studies (Cuijpers, 2016). A I^2 of 25 was considered as low heterogeneity, whereas I^2 = 50 was considered as medium heterogeneity and I^2 = 75 as high heterogeneity (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006). The uncertainty of I^2 is increased by a small amount of included studies and participants (Cuijpers, 2016).

Four possible moderators were tested in a mixed effects analysis for each of the six outcome measures for both control conditions when the outcome measure was included in at least four studies: (1) duration of the intervention: short (≤ 2 weeks) vs. long (> 2 weeks); (2) intensity of the intervention: three acts of kindness vs. five acts of kindness (per day); (3) type of target group: with vs. without a psychological problem (as indicated in the primary papers: socially anxious individuals and clinical sample) and (4) the quality of studies: good (six points) vs. fair (four or five points) vs. poor (less than four points).

To assess publication bias the funnel plot (standard error against Hedges's *g*), the classical fail-safe N and Duval and Tweedie's trim and fill were used for each outcome measure for each control condition comparison. A symmetrically distribution of the studies in the "funnel plot" indicates the absence of publication bias, whereas an asymmetrical distributed funnel plot indicates the presence of publication bias (Borenstein, Hedges, Higgins, & Rothstein, n.d.). The second method, the classical fail-safe N (fail-safe number) gives an indication of the number of non-significant and unpublished studies that are necessary to decrease the effect size (overall) to become non-significant (Egger, Smith, Schneider, & Minder as cited in Spijkerman et al., 2016). The third method, Duval and Tweenie's trim and fill estimates the number of studies in the asymmetric part of the funnel plot, trims off this asymmetric part and then estimates the true mean and variance of the complete funnel plot (Duval & Tweedie, 2000).

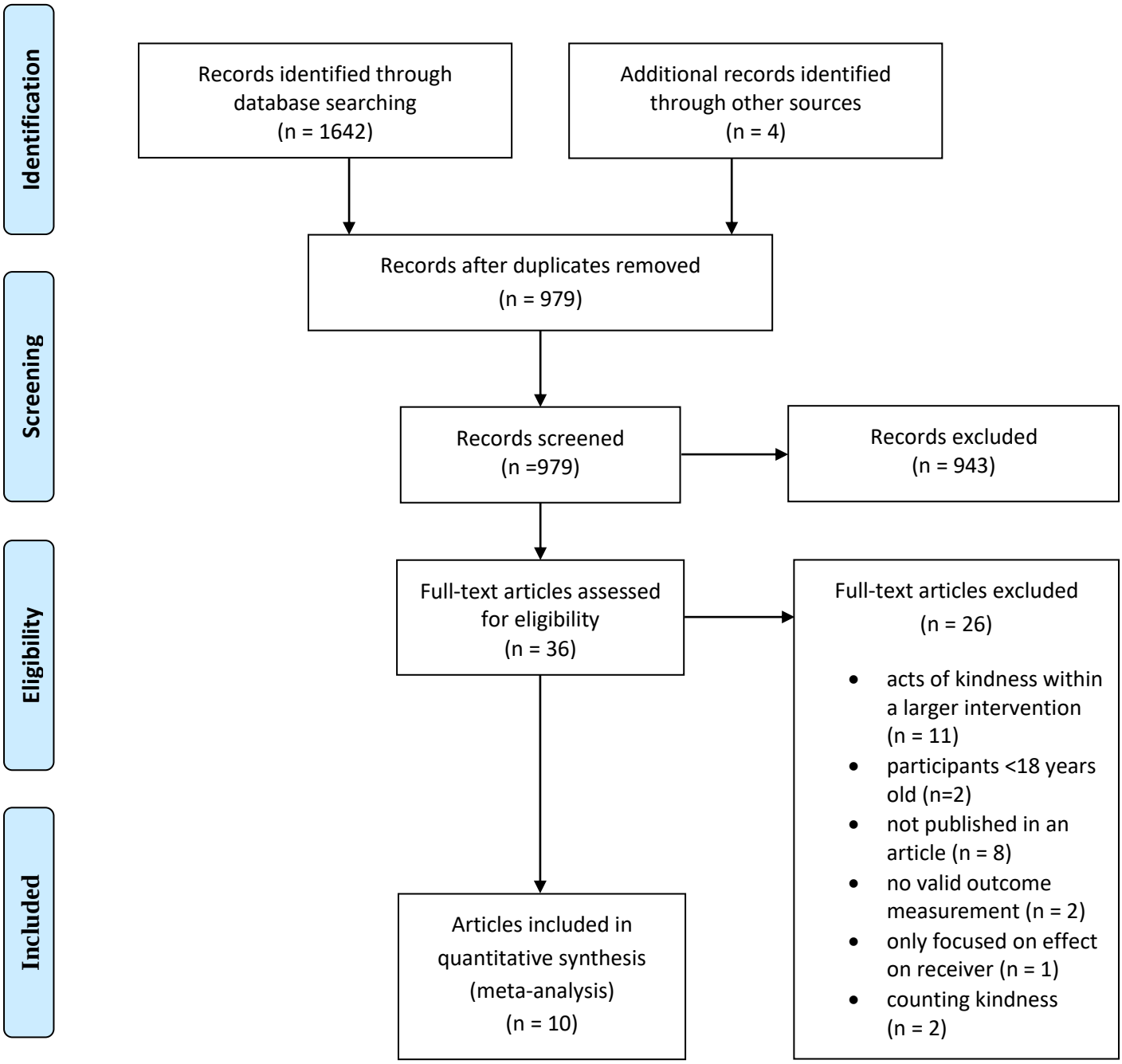

Figure 1. Studie flow diagram following The PRISMA statement. Adapted from "Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement," by D. Moher, A. Liberati, J. Tetzlaff, D. G. Altman, The PRISMA Group, 2009, *PLoS Med* 6(7),p.3.

Results

Paper selection

The used search string produced 1642 papers in the five online searched databases. After removing duplicates (five manually and 662 by Endnote), 975 remained for the first and second screening phase (title, abstract and keywords). The remaining papers (n=32) were screened in the last phase by the full-text review. Eight studies were included, of which seven contained acts of kindness and one contained practicing compassion (a related intervention in which participants are instructed to interact or help others). Searching in four Clinical Trial Registers produced one relevant title, that was excluded because of the target group (< 18 years old). Cross-checking the references of included papers did not led to new relevant papers. The websites of Kristin Layous, Sonja Lyubomirsky and Katherine Nelson-Coffey produced three relevant titles. One was excluded because it was published in a book. The others were included, one was about acts of kindness and one was about making others happy, leading to a total of ten papers (11 studies). The flow chart can be found in Figure 1.

Characteristics of included studies

Three studies were conducted in Canada and the United States of America [USA], and one study in Australia, The Netherlands, Spain and United Kingdom. The last was conducted in two countries (South Korea and the USA). These and other study characteristics can be found in Table 1 (participants, intervention and comparison characteristics) and Table 2 (additional intervention and comparison characteristics, outcome and methodological characteristics).

Participants characteristics

The included conditions of the papers comprised 1758 participants that completed at least the post-test questionnaire. 795 in both intervention conditions, 325 in the active control condition and 638 in the placebo control condition. In all studies, the majority (>50%) of the participants was female. The mean age ranged from 18.6 to 43 years, and more than half of the studies included adults with a mean age younger than 21 years. In just over half of the included studies, the intervention and control condition consisted each of less than 50 participants at post-test. The smallest post-test sample size (per condition) was 8 (Chancellor, Margolis, Jacobs Bao, & Lyubomirsky, 2016) and the largest sample size was 246 (Mongrain et al., 2011). The majority of the studies (n=8) focused on students (n=4) and the general population (n=4). The remaining three studies focused on participants with a psychological problem: social anxiety (n=2) and a broad diversity of psychological problems, e.g. depression and eating disorders (n=1).

Table 1

Characteristics of studies examining the acts of kindness intervention

Authors		Participants characteristics					Intervention and comparison characteristics					
		Gender (% Men)	Age M(SD)	Target group	Disorder (or not)	n_{total}	IV 1 (n)	IV 2 (n)	C_{pla} (n)	C_{act} (n)	Duration (weeks)	Intensity
Alden & Trew (2013)		27.5	19.56 (3.05)	Under-graduates	High social anxiety	126[1]	Acts of Kindness (43[1])		Life details (43[1])	Behavioral experiments (40[1])	4	3 per day 2 d/w
Buchanan & Bardi (2010)		44.2	26 (6)	Adults	Not	86[1]	Acts of Kindness (31[1,2])		No acts (27[1,2])	Acts of novelty (28[1,2])	10 days	Not mentioned
Chancellor, Margolis, et al.(in press)		27.3	35.60 (8.99)	Employees of Coca-Cola	Not	49[1]	Acts of Kindness (8[1])		Count prosocial actions (17[1])	Receivers of kindness and count prosocial actions (24[1])	4	5 per day
Kerr, O'Donovan, et al. (2015)		25	43 (11.1)	Psycho-logical treatment seekers	Psycho-logical problems	47[1]	Acts of Kindness (16[1])		Monitoring of mood (15[1])	Gratitude intervention (16[1])	14 days	5 per day
Layous, Kurtz, et al. (2016)	Study 1	15.8	18.55 (0.82)	Under-graduates	Not	121[1]	Make others happy (66[1])		Track activities (55[1])	**	4	Not mentioned
	Study 2	18.5	18.93 (1.05)	Under-graduates	Not	180[1]	Make others happier (65[1])	Make the same person happier(57[1])		Make yourself happier (58[1])	4	Not mentioned
Mongrain, Chin, et al. (2010)		16.4*	33.63 (11.52)	Adults	Not	471[1,2]	Practicing compassion (225[1,2])		Early Memory (246[1,2])		1	5-15 min. per day 7 d/w
Nelson, Della Porta, et al. (2015)		47	19.11 (1.25) [USA] and 20.77 (1.86) [SK]	Students	Not	160[1,3]	Acts of Kindness 50[1,2])	Acts of kindness with autonomy support(51[1,2])	Describe and focus on academic work (no autonomy support) (59[1,2])		6	5 per day 1 d/w
Nelson, Layous, et al. (2016)		40	29.95 (11.47)	Diverse sample	Not	354[3]	Acts of kindness for others (120)		Track activities (116)	Self-kindness (118)	4	3 per day

Table 1 (*Continued*)

Characteristics of studies examining the acts of kindness intervention (*continued*)

Ouweneel, Le Blanc, et al. (2014)	Study 2	16	20.88 (1.94)	Students	Not	49	Acts of kindness (25)	Describe experiences of that day (24)		1	5 per day
Trew & Alden (2015)		26.03	20.47 (3.66)	Under-graduates	High social anxiety	115[1]	Acts of kindness (38[1])	Life Details (36[1])	Exposure only (41[1])	4	3 per day 2 d/w

Note. * = not all participants did fill in this question; ** = reported in separate paper; [1] = number of participants finished the intervention; [2]= sample size obtained through the author; [3] = the study included an extra condition, which is not included in this meta-analysis; C_{act} = active control condition; C_{pla} = placebo control condition; d/w = days/week; IV = intervention; n = sample size

Table 2

Additional characteristics studies examining the of acts of kindness intervention

Authors		Receiver of the kind act	Location	Outcome characteristics								Methodological Quality[9]
				Questionnaire	Outcome measurement	Hedges's *g* difference between Intervention and control conditions				Percentage completers of questionnaire (%CS)		
						IV1-Cpla[1]	IV 2 – Cpla[1]	IV 1 - Cact[1]	IV 2-Cact[1]	total	IV1 (IV 2)	C_{pla} (C_{act})	
Alden & Trew (2013)		Not explicitly mentioned	Canada	PANAS	Positive affect[6]	0.42		0.54		88.7	91.5	93.5 (81.6)	1
					Negative affect	-0.43		-0.12					
Buchanan & Bardi (2010)		Not explicitly mentioned	United Kingdom	SWLS	Life satisfaction[6]	0.61[2]		0.21[2]		-	-	- (-)	1
Chancellor, Margolis, et al. (in press)		Choice of a list of 10 coworkers	Spain	QIDS-SR-[8]	Depression[10]	-		-		55.7	42.1	50 (68.6)	5
					Autonomy[7]	0.54[3]		-					
					Competence[7]	0.57[3]		-					
Kerr, O'Donovan, et al. (2015)		Not explicitly mentioned	Australia	PIL	Meaningfulness of own life[5]	0.14		0.01		100	100	100 (100)	4
				DASS-21	Depression	0.13		0.20					
					Anxiety	-0.75		-0.19					
					Stress	-0.39		0.00					
Layous, Kurtz, et al. (2016)	Study 1	Meaningful person	United States of America	SHS	Happiness[6]	0.07				87.1	94.3	79.7	4
				SWLS	Life satisfaction[6]	0.08							
				mDES	Positive affect[6]	0.03							
					Negative affect	-0.38							
				QEWB	Eudaimonic well-being[5]	0.28							
				BMPN	Autonomy[7]	0.31							
					Competence[7]	-0.05							
					Connectedness[7]	0.21							

Table 2 (Continued)

Additional characteristics studies examining the of acts of kindness intervention (*continued*)

Layous, Kurtz, et al. (2016)	Study 2	Meaningful person	United States of America	SHS SWLS mDES RSES PSS BMPN 	Happiness[6] Life satisfaction[6] Positive affect[6] Negative affect Self-esteem[5] Perceived stress Autonomy[7] Competence[7] Connectedness[7]			0.12 0.24 0.18 -0.04 0.08 0.00 -0.07 -0.05 -0.07	0.20 0.23 -0.15 0.04 -0.26 0.28 -0.52 -0.06 -0.30	69.5	71.4 (65.5)	- (71.6)	4
Mongrain, Chin, et al. (2010)		Not explicitly mentioned	Canada	SHI RSES CES-D	Happiness[6] Self-esteem[5] Depression	0.20[4] 0.02[4] -0.16[4]				65.5	61.5	69.7	4
Nelson, Della Porta, et al. (2015)		Not explicitly mentioned	United States of America and South Korea	SHS SWLS mDES	Happiness[6] Life satisfaction[6] Positive affect[6] Negative affect	-0.12 0.11 0.02 0.28	0.17 0.07 -0.18 -0.40			-	-	- (-)	3
Nelson, Layous, et al. (2016)		Not explicitly mentioned	United States of America	MHC-SF AAS 	Psychological FL Psychological well-being[5] Eudaimonic FL Hedonic FL Positive affect[6] Negative affect	0.05[4] 0.36[2] 0.07[4] 0.03[4] 0.20[4] 0.06[4]		0.21[4] 0.30[2] 0.22[4] 0.11[4] 0.01[4] 0.06[4]		-	-	- (-)	5
Ouweneel, Le Blanc, et al. (2014)	Study 2	Study related (persons or location)	Nether-lands	JAWS	Positive affect[6] Negative affect	0.26 -0.26				-	-	- (-)	2
Trew & Alden (2015)		Not explicitely mentioned	Canada	I-PANAS-SF DSA	Positive Affect[6] Social anxiety	-0.32 -0.68		-0.02 -0.17		94.3	95	97.3 (91.1)	2

Note. [1] = Cohen's *d* calculated based on the pre and post scores (exceptions are indicated); [2] = Cohen's *d* as given in the article (calculated based on a t-test of the pre-post difference scores); [3] = Cohen's *d* calculated based on regression results; [4] = Cohen's *d* calculated based on pre and post scores (obtained through the author); [5] =Eudaimonic well-being; [6] = Hedonic well-being; [7] = needs; [8] = although non-validated questionnaires were not included, this questionnaire was included because the internal consistency (alpha) was calculated and the outcomes were measured with three items; [9] = meaning of the score (6 = good, 4-5 = fair and >4 = poor), based on sequence generation, blinding of both outcome and participants, complete outcome data, power analysis or sample size > 50 and baseline comparability, see Table 3; [10] = placebo and active control conditions combined

AAS = Affect-Adjective Scale; BMPN = Balanced Measure of Psychological Needs; C_{act} = active control condition; C_{pla} = placebo control condition; CC = Combined Control Conditions; CES-D = Center for Epidemiological Studies Depression Scale; %CS = percentage completers of the questionnaire (percentage of the participants starting the intervention that finish the post-measurement); DASS-21 = Depression Anxiety and Stress Scale; DSA = Daily Social Anxiety; FL = flourishing; g = Hedges's *g*; IV = intervention; JAWS = Job-related Affective Well-being Scale; mDES = modified Differential Emotions Scale; MHC-SF = Mental Health Continuum-Short Form; OM = outcome measure; (I-)PANAS(-SF) = (International) Positive and Negative Affect Schedule (- Short Form); PIL = Purpose in Life; PSS = Perceived Stress Scale; QEWB = Questionnaire for Eudaimonic Well-being; QIDS-SR = Quick Inventory of Depressive Symptomatology Self-Report; RSES = Rosenberg Self-Esteem Scale; SHI = Steen Happiness Index; SHS = Subjective Happiness Scale; SWLS = Satisfaction with Life Scale; - = unknown

Intervention and comparison characteristics

The 11 in this meta-analysis included studies contained in total 17 control conditions. Four studies included one control condition and one study reported the results of one control condition although it included two control conditions (Chancellor et al., 2016). The remaining six studies included both an active and placebo control condition. Placebo control condition activities (activities that were not intended to increase well-being) included monitoring of activity (n=6), describing early memories (n=1), mood monitoring (n=1), counting prosocial actions (n=1), and unknown activities (n=1). Active control condition activities included exposure/behavioral experiments (n=2), acts of novelty (n=1), being a receiver of the acts of kindness of someone else (n=1), gratitude activities (n=1), make yourself happier (n=1), and self-kindness (n=1).

The duration of the interventions varied from one week (e.g. Mongrain et al., 2011) to six weeks (e.g. Nelson et al., 2015) and the intensity from three acts of kindness all in one day (e.g. Alden & Trew, 2013) to five acts of kindness a day (e.g. Nelson et al., 2015). 36.4% of the interventions did explicitly mention the receiver of the kind acts, that means that the performers of the kind acts got a specific instruction about the receiver of their performed kind acts. In those cases the instruction asked the participants to perform the acts of kindness to someone of a list of coworkers (Chancellor et al., 2016), someone who means a lot to the participant (Layous, Nelson, et al., 2016, study 1 and 2) or study related persons (as in education, at the university or academic tasks related) (Ouweneel et al., 2014).

Outcomes measures, measurements and questionnaire completers

Different outcome measures were used for a variety of mental well-being related constructs. Mood (positive and/or negative affect or emotions) was the most frequently measured outcome measure (n=7), followed by happiness and life satisfaction (n=4), depressive symptoms, autonomy and competence (n=3), connectedness, stress, self-esteem and the combination of anxiety and social anxiety (n=2). On the level of the type of outcome measure, hedonic well-being was the most frequent included outcome (n=15), followed by psychological needs (n=8), eudaimonic well-being (n=5), negative affect (n=4), flourishing and depression (n=3) and stress and anxiety (n=2).

The most frequently used outcome measurements were the Satisfaction With Life Scale (n=4), the modified Differential Emotions Scale and the Subjective Happiness Scale (n=3), the Positive and Negative Affect Schedule, the Balanced Measure of Psychological Needs and Rosenberg Self-Esteem Scale (n=2).

The percentage completers of the questionnaires was calculated as the percentage persons that finished the post-measurement of the persons that filled in the pre-measurement. The overall percentage completers varied from 55.7 to 100 percent (M=80.1%) in seven out of the eleven studies. The percentage completers in both intervention conditions (n=8) varied from 42.1 to 100 percent (M=77.7%). Of the six placebo control conditions, 81.7 percent completed the questionnaires (varying from 50 to 100 percent). The percentage completers in the active control conditions varied from 68.6 to 100 percent (M=82.6%, n=5). Of all control conditions, a mean of 82.1 percent completers was found (varying from 50 to 100 percent), suggesting that 17.9 percent of the participants that started with a control activity did not complete the post-test questionnaire.

Effectiveness of individual conditions

Besides the effectiveness of the interventions compared to the control conditions (as given in the meta-analysis), the effect sizes for all intervention and control conditions separately are calculated and can be found in Table 4 in Appendix 2. Results demonstrated that the acts of kindness intervention was the most effective on decreasing social anxiety (d= -1.03) (Trew & Alden, 2015) and increasing positive affect (d=0.48) (Alden & Trew, 2013). Results demonstrated that the effectiveness of the placebo control condition varied from d= -0.35 for social anxiety (Trew & Alden, 2015) to d=0.45 for competence (Layous, Kurtz, et al., 2016, study 1). The effectiveness of the active control condition varied from d= -0.86 for social anxiety (Trew & Alden, 2015) to d=0.38 for autonomy (Layous, Kurtz, et al., 2016, study 1). Remarkable is the fact that all conditions had the strongest (negative) effect on social anxiety, indicating that taking action (engaging in the acts of kindness intervention or performing a control activity) has an effect on social anxiety.

Study quality

After independently assessing the quality of the studies (risk of bias), two study criteria were discussed and full agreement was found. The methodological quality of the studies varied from meeting five criteria (n=2) to meeting only one of the six quality criteria (n=2). Just over half of the studies were qualified as fair (meeting four or five criteria) and the rest as poor (meeting less than four criteria). A mean overall quality of 3.2 was found, indicating that the overall quality can be qualified as poor. The most described quality criteria in the studies was ‘blinding of outcome measurement’ (n=10), because most studies used online questionnaires to assess the outcomes. The less described quality criteria was ‘sequence generation’ (n=1), which means that it was unclear which methods were used to randomize the participants.

Meta-analysis

The main pre-post effect sizes can be found in Table 5 and the 95% Confidence Intervals (CI) can be found in Figure 2 (for the intervention-placebo control condition comparison, Appendix 3) and Figure 3 (for the intervention-active control condition comparison, Appendix 4). To conduct the meta-analysis, at least four studies had to be included for each outcome measure. Therefore, analysis were conducted for eudaimonic well-being, hedonic well-being, negative affect and positive affect of the studies using a placebo control, and for hedonic well-being and positive affect of the studies using an active control condition. When a study included more than one element of a compound outcome measure (eudaimonic or hedonic well-being), the pooled effect size was calculated for that study.

For both comparisons, no outliers and low to moderate levels of heterogeneity (varying from I^2=18.11 to I^2=39.67) were found. Although the found levels of heterogeneity had to interpreted with care because of the small amount of included studies, the results indicate that the total variance in the effect sizes was not explained by heterogeneity.

Effects on eudaimonic well-being

Eudaimonic well-being was measured as the combination of autonomy, competence, connectedness, meaningfulness, self-esteem, psychological well-being and a scale for eudaimonic well-being. After pooling two studies (Chancellor et al., 2016; Layous, Kurtz, et al., 2016, study 1) five studies remained. Table 5 showed that a small but significant effect (g=0.18, 95% CI: 0.00 to 0.36, p=0.049) was found for the acts of kindness intervention compared to the placebo control condition, indicating that the acts of kindness intervention increases eudaimonic well-being more compared to the placebo control condition.

Effects on hedonic well-being

Hedonic well-being was measured as the combination of positive affect, (subjective) happiness and life satisfaction. Based on eight studies (two pooled studies: Layous, Kurtz, et al., 2016, study 1; Nelson et al., 2015) a small but significant effect was found for the comparison between the intervention and placebo control condition (g=0.17, 95% CI: 0.03 to 0.32, p=0.021) as presented in Table 5. Indicating that the acts of kindness intervention had a significant larger effect on hedonic well-being than the placebo control condition.

After pooling the effect sizes for one study (Layous, Kurtz, et al., 2016, study 2) five studies remained for calculating the effect size for the comparison between the intervention and active control condition. Table 5 showed that a small and non-significant effect (g=0.14, 95% CI: -0.05 to 0.32, p=0.142) was found.

Effects on negative affect

Based on five studies a low negative, but non-significant effect was found (*g*= -0.17, 95% CI: -0.38 to 0.03, p=0.096) for the comparison between the intervention and placebo control condition, as presented in Table 5.

Effects on positive affect

Although positive affect was included in hedonic well-being it was included as separate outcome measure because it was the most frequent measured outcome measure. For positive affect, as showed in Table 5, a non-significant effect size was found for the acts of kindness intervention compared to placebo control conditions (n=6, *g*=0.09, 95% CI: -0.10 to 0.28, p=0.362). This indicates that there was no significant difference in the effect of the acts of kindness intervention in comparison to the placebo activities on positive affect.

After comparing the acts of kindness intervention and active control conditions a non-significant effect (n=4, *g*=0.11, 95% CI: -0.12 to 0.34, p=0.352) was found, as presented in Table 5. This suggests that the acts of kindness intervention did not had a larger or smaller effect on positive affect than the active control activities.

Publication bias

Lau, Ioannidis, Terrin, Schmid, and Olkin (2006) stated that at least 30 studies (per outcome measure) must be included for the publication bias to be powerful. Due to the small amounts of studies per outcome measure in this meta-analysis the following publication bias results have to be interpreted with much caution.

Firstly, possible publication bias was assessed for the outcome measures in acts of kindness intervention compared to the placebo control condition. This was done for eudaimonic well-being, hedonic well-being, negative affect and positive affect because these outcome measures were included in at least four studies. The classical fail-safe numbers for eudaimonic well-being (N=4), hedonic well-being (N=9) and negative affect (N=2) indicated that these outcome measures did miss studies to become robust. Adjusting Hedges's *g* after producing Duval and Tweedie's trim and fill did not led into a change of *g* for hedonic well-being and positive affect. An adjustment of *g* led to a small decrease of eudaimonic well-being (*g*=0.16, 95% CI: -0.01 to 0.33) and a small increase in negative affect (*g*=-0.03, 95% CI: -0.27 to 0.20). The classical fail-safe numbers and Duval and Tweedie's trim and fill results can be found in Table 5 and the funnel plots can be found in Figure 4 (Appendix 5).

Because the number of included studies was at least four, publication bias was assessed for hedonic well-being and positive affect in the comparison with the active control

condition. After plotting the funnel plot (standard error against Hedges's *g*), the classical fail-safe N indicated that hedonic well-being and positive affect both miss one study. Duval and Tweedie's trim and fill did not resulted in a changed estimated effect size for hedonic well-being, whereas the estimated effect size for positive affect increased (*g*=0.14, 95% CI: -0.06 to 0.34). The classical fail-safe numbers and Duval and Tweedie's trim and fill results can be found in Table 5 and the funnel plots can be found in Figure 5 (Appendix 6). Missing studies indicates that not all results of performed studies are published (Cuijpers, 2016).

Moderator analysis

The moderator analyses were performed for eudaimonic well-being, hedonic well-being, negative affect and positive affect for the comparison with the placebo control condition and hedonic well-being and positive affect for the acts of kindness intervention compared to the active control condition, see Table 6 (Appendix 7). Only one significant moderator was found, namely duration for eudaimonic well-being (in the comparison with the placebo control condition). The influence of duration on the effect size was significant positive, in advantage of longer interventions (longer than two weeks). However, this finding has to be interpreted with care due to the small amount of included studies. The non-significant findings for intensity have to be interpreted with care due to the fact that it is unknown whether the participants who received the instruction to perform three kind acts per day actually performed three or for example five acts a day.

Table 5

Pre-post effects of the acts of kindness intervention compared to the placebo and active control condition

Outcome measures	n	Hedges' *g* (95% CI)	Z	Heterogeneity		Publication bias	
				Q-value	I^2	Fail-N	DT
Placebo CC							
Eudaimonic WB	5	0.18 (0.00 to 0.36)	1.97**	5.55*	27.92	4	0.16 (-0.01 to 0.33)
Hedonic WB	8	0.17 (0.03 to 0.32)	2.31**	9.86*	28.97	9	n.a.
Negative affect	5	-0.17 (-0.38 to 0.03)	-1.67*	6.06	33.96	2	-0.03 (-0.27 to 0.20)
Positive affect	6	0.09 (-0.10 to 0.28)	0.91*	7.57*	33.92	0	n.a.
Active CC							
Hedonic WB	5	0.14 (-0.05 to 0.32)	1.47*	4.89*	18.11	0	n.a.
Positive affect	4	0.11 (-0.12 to 0.34)	0.93*	4.97*	39.67	0	0.14 (-0.06 to 0.34)

Note. * = p > 0.05; ** = p < 0.05; CC = control condition; DT = Duval and Tweenie's trim and fill; n.a. = no adjustments; n = number of studies; WB = well-being

Table 6

Moderator analysis

Compared with	Outcome measure	Criteria	Subgroup	n	Hedges's *g* (95% CI)	I^2	Z	Subgroup differences
Placebo condition	Hedonic WB	Duration	Short	3	0.26 (0.07 to 0.44)	6.37	2.73*	Q=1.29, df=1 (p=0.257)
			Long	5	0.10 (-0.11 to 0.30)	37.02	0.94*	
		Intensity[1]	3 AoK	3	0.12 (-0.25 to 0.49)	66.09	0.64*	-
			5 AoK	2	0.10 (-0.21 to 0.41)	0	0.63*	
		Quality	Fair	3	0.18 (0.04 to 0.32)	0	2.59**	Q=0.00, df=1 (p=0.976)
			Poor	5	0.19 (-0.13 to 0.50)	57.03	1.16*	
		Targetgroup	Psy	2	0.06 (-0.67 to 0.79)	81.90	0.15*	Q=0.13, df=1 (p=0.721)
			No Psy	6	0.19 (0.07 to 0.31)	0	3.09**	
	Positive affect	Duration	Short	1	0.26 (-0.29 to 0.82)	0	0.93*	Q=0.41, df=1 (p=0.523)
			Long	5	0.07 (-0.15 to 0.29)	44.52	0.61*	
		Intensity[1]	3 AoK	3	0.12 (-0.25 to 0.49)	66.09	0.64*	-
			5 AoK	2	0.03 (-0.28 to 0.34)	1.05	0.17*	
		Quality	Fair	2	0.14 (-0.07 to 0.35)	0	1.34*	Q=0.17, df=1 (p=0.685)
			Poor	4	0.06 (-0.27 to 0.39)	54.47	0.37*	
		Targetgroup	Psy	2	0.06 (-0.67 to 0.79)	81.90	0.15*	Q=0.02, df=1 (p=0.897)
			No Psy	4	0.11 (-0.07 to 0.28)	0	1.21*	
	Eudaimonic WB	Duration	Short	2	0.03 (-0.15 to 0.20)	0	0.29*	Q=4.52, df=1 (p=0.034)
			Long	3	0.32 (0.11 to 0.52)	0	3.06**	
		Intensity[1]	3 AoK	1	0.36 (0.10 to 0.62)	0	2.74**	-
			5 AoK	2	0.31 (-0.22 to 0.84)	0	1.14*	
		Quality	Fair	5	0.18 (0.00 to 0.36)	27.92	1.97**	-
			Poor	-	-	-	-	
		Targetgroup	Psy	1	0.14 (-0.55 to 0.83)	0	0.40*	Q=0.02, df=1 (p=0.881)
			No Psy	4	0.19 (-0.02 to 0.41)	45.93	1.79*	
	Negative affect	Duration	Short	1	-0.26 (-0.81 to 0.30)	0	-0.91*	Q=0.08, df=1 (p=0.781)
			Long	4	-0.17 (-0.41 to 0.07)	49.04	-1.39*	
		Intensity[1]	3 AoK	2	-0.16 (-0.63 to 0.31)	72.84	-0.65*	-
			5 AoK	2	-0.12 (-0.43 to 0.19)	0	-0.76*	
		Quality	Fair	2	-0.14 (-0.56 to 0.28)	72.83	-0.66*	Q=0.12, df=1 (p=0.732)
			Poor	3	-0.23 (-0.48 to 0.02)	0	-1.78*	
		Targetgroup	Psy	1	-0.43 (-0.85 to -0.01)	0	-1.99**	Q=1.68, df=1 (p=0.195)
			No Psy	4	-0.12 (-0.33 to 0.09)	25.94	-1.10*	
Active condition	Hedonic WB	Duration	Short	1	0.21 (-0.30 to 0.71)	0	0.80*	Q=0.06, df=1 (p=0.807)
			Long	4	0.14 (-0.09 to 0.36)	37.19	1.20*	
		Intensity[1]	3 AoK	3	0.15 (-0.18 to 0.48)	58.00	0.92*	-
			5 AoK	-	-	-	-	-
		Quality	Fair	2	0.05 (-0.15 to 0.26)	0	0.50*	Q=0.92, df=1 (p=0.338)
			Poor	3	0.25 (-0.09 to 0.58)	38.63	1.43*	
		Targetgroup	Psy	2	0.26 (-0.29 to 0.81)	69.00	0.93*	Q=0.39, df=1 (p=0.532)
			No Psy	3	0.08 (-0.12 to 0.27)	0	0.77*	
	Positive affect	Duration	Short	-	-	-	-	-
			Long	4	0.11 (-0.12 to 0.34)	39.67	0.93*	
		Intensity[1]	3 AoK	3	0.15 (-0.18 to 0.48)	58.00	0.92*	-
			5 AoK	-	-	-	-	
		Quality	Fair	2	0.01 (-0.19 to 0.22)	0	0.12*	Q=0.68, df=1 (p=0.409)
			Poor	2	0.26 (-0.29 to 0.81)	69.00	0.93*	
		Targetgroup	Psy	2	0.26 (-0.29 to 0.81)	69.00	0.93*	Q=0.68, df=1 (p=0.409)
			No Psy	2	0.01 (-0.19 to 0.22)	0	0.12*	

Note. [1]= intensity consisted of three subgroups (the third one was "zero AoK", in case of an unknown number of acts of kindness); * = p>0.05; **= p<0.05; AoK = acts of kindness (per day); long = > 2 weeks; Psy = Psychological problems; short = ≤ 2 weeks

Discussion

Main findings

Effectiveness of the intervention

The first aim of this meta-analysis was to estimate the effectiveness of the acts of kindness intervention on mental well-being (i.e. eudaimonic and hedonic well-being), depression, stress, anxiety, negative affect and positive affect. Only eudaimonic well-being, hedonic well-being, negative affect and positive affect were included in this meta-analysis because the other outcome measures were included in less than four studies. Results demonstrated that performing kind acts significantly enhances eudaimonic and hedonic well-being in comparison to the placebo control conditions. There were no differences found between performing acts of kindness and the placebo control conditions in the effect on positive and negative affect. There were also no differences found between performing acts of kindness and the active control conditions in effect on hedonic well-being and positive affect.

Small but significant effect sizes were found for eudaimonic well-being (g=0.18) and hedonic well-being (g=0.17) compared to placebo control conditions in the difference between pre- and post-score. According to the classical fail-safe numbers and Duval and Tweedie's trim and fill, there were missing studies on the effect of the acts of kindness intervention compared to placebo control conditions for both eudaimonic and hedonic well-being indicates publication bias due to unpublished findings. Therefore, the results should be interpreted with care, however due to the small amount of included studies per outcome measure, the publication bias results also have to be interpreted with care. Hedonic well-being was also included in the meta-analysis of Curry et al. (2017). They found a small-to-medium effect size (d=0.36), which is larger than the effect size found in the current meta-analysis (g=0.17, which is d=0.17). This difference can be explained by the inclusion of related interventions (like prosocial purchase interventions) in the meta-analysis Curry et al. (2017). The difference in effect size was not calculated for both types of interventions, but all included prosocial purchase interventions had a higher effect size for hedonic well-being than the effect size found in the current meta-analysis. Another difference with the meta-analysis of Curry et al. (2017) were the included effect sizes. The current meta-analysis made the differentiation between placebo and active control conditions whereas the meta-analysis of Curry et al. (2017) did not include the effect sizes of (as in this meta-analysis defined) placebo control conditions.

The non-significant effects that were found for positive and negative affect could be explained by non-significant effects found in the studies. Non-significant differences between conditions mean that the acts of kindness intervention is not more or less effective in increasing or decreasing an outcome measure (e.g. positive affect) than the control condition.

The non-significant effects that were found for outcome measures in the comparison of the acts of kindness condition with the active control condition can be explained by the finding that the active control condition included at least one effective intervention, for example the gratitude intervention (Emmons & McCullough, 2003). A meta-analysis about the gratitude intervention showed that it is effective in increasing psychological well-being in comparison a measurement-only control (d=0.31) and alternative-activities control (d=0.17) (Davis et al., 2016). This suggest that the gratitude intervention can be effective in increasing psychological well-being. So, the non-significant effect of the acts of kindness intervention in comparison to other effective interventions indicates that the acts of kindness intervention is not more or less effective in increasing psychological well-being than other effective interventions (such as the gratitude intervention).

Moderators

The second aim of this meta-analysis was to test the possible moderating effect of the quality of the studies, intensity and duration of the intervention and type of target group (participants with or without a psychological problem). Duration was the only significant moderator found for the acts of kindness intervention compared with the placebo control condition, but only on eudaimonic well-being. Interventions with a duration of more than two weeks had a significantly larger effect on eudaimonic well-being than interventions of between ten days and two weeks. This indicates that increasing the duration of the intervention might help increasing the effectiveness on eudiamonic well-being. However, this finding has to be interpreted with caution, due to the low amount of included studies.

The non-significant moderating effect of the intensity of the intervention can be explained by the small difference between the number of acts that have to be performed (3 vs. 5) and intensity per week (varying from performing acts of kindness once a week to every day). This intensity per week is not included in the current meta-analysis, because it was not known for all studies. When future research finds that intensity (number of acts of kindness performed per day/week) has a moderating effect on the effectiveness of the acts of kindness intervention this can contribute to the optimization of the intervention. Both variation in intensity and duration made that it is impossible to speak of the acts of kindness intervention.

The non-significant moderating effect of type of target group can be explained by the finding that just over one fourth of the studies focused on participants with a psychological problem (Alden & Trew, 2013; Kerr et al., 2015; Trew & Alden, 2015). Therefore more research is needed, especially for specific psychological problems (e.g. depressions, low well-being and anxiety) in clinical samples. Although there was no significant difference between participants with psychological problems and participants without psychological problems and thus no suggestion that it can be effective specific for that target group, this conclusion is based on only three studies and there is thus space for future research. A significant difference can be expected due to the floor effect, which means that the healthy (no psychological problem) population cannot increase that much in well-being due to the fact that it is already good. This difference in the pre-intervention level of well-being therefore has to be tested in future research. When the effectiveness is proven for specific target groups the intervention can be used during the waiting period before treatment, as suggested by Kerr et al. (2015) or as an independent intervention.

Another ask for more research comes from the finding that just over half of the included studies were rated as fair (meeting four or five criteria) and none as good. The found quality scores can be an underestimation, due to the choice to rate described criteria as absent. This indicates that there is a need for (well-documented) high quality studies (with less risk of bias) in the field of the acts of kindness intervention and the use of the CONSORT statement for reporting results. Increasing the quality of studies can be done by describing the way of randomization of the participants (sequence generation) and analyzing the data of all the included participants (intention-to-treat analysis). This need for more high quality studies does play a role in the entire field of positive psychology (interventions), as Bolier et al. (2013) concluded this same need after performing their meta-analysis about positive psychology interventions in general.

Strengths and limitations of this meta-analysis

Although there were a few limitations found during the execution of this meta-analysis, this meta-analysis does have a number of strengths. Firstly, several recommendations are given that can be used to give direction to future research. This future research can contribute to the optimization of the acts of kindness for specific target groups. Secondly, the results of this meta-analysis suggest that the intervention does have a small (but significant) effect on eudaimonic and hedonic well-being when compared to control conditions in which participants performed activities that are not aimed to increase mental well-being or decrease

depression. This finding suggests that, although there is more research needed, the acts of kindness intervention does have some influence on well-being on short term. Thirdly, as counts for meta-analysis in general, the combination of studies increases the sample size and therewith the power to find effects (Walker, Hernandez, & Kattan, 2008).

However, during the execution of this meta-analysis several limitations were found. Firstly, the sample sizes of the studies were in more than 50 percent of the cases lower than 50 participants per condition. This is an important limitation because Curry et al. (2017) concluded that smaller studies have the tendency to find larger effects in their meta-analysis about the acts of kindness intervention. To increase the quality of studies, future researchers will be advised to base the sample size on a power analysis. This criteria can be found in the CONSORT statement, the guideline for reporting RCT's, which states that the determination of the sample size must be described (Schulz, Altman, & Moher, 2010). Secondly, the amount of included studies was low and therefore the moderator analysis had not much power and the overall effect of the intervention on distress components (depression, stress and anxiety) is not included in this meta-analysis. Therefore, more research is needed to find the effectiveness of the acts of kindness intervention on these distress components. Thirdly, different elements of both eudaimonic and hedonic well-being were pooled to calculate the effect of the intervention on these outcome measures. This could lead to bias, due to the fact that outcome measures of one study were pooled although they were not independent. The same applies for pooling two intervention conditions of one study. For future research it will be recommended to use questionnaires (like the MHC-SF) that included the subscales emotional, psychological and social well-being. Fourthly, no follow-up effect was included in this study, due to absence of a follow-up combined with a broad variation of follow-up duration (from two weeks up to six months). Future research is needed to test the effectiveness of the intervention over a longer period. Fifthly, the variation in intensity and duration of the acts of kindness interventions that were included in this met-analysis made that it is not possible to speak of the acts of kindness intervention, instead can be spoken about acts of kindness interventions. Future research

Implications for practice and future research

Before a PPI can be defined as a PPI, it has to meet three criteria according to the definition of Parks and Biswas-Diener (2013) that was used as basis for this meta-analysis. This means that the PPI has to be empirically proven to be effective (criteria 2) in increasing one of the levels positive psychology focuses on (criteria 1) and must have a positive outcome for the target

population (criteria 3) (Parks & Biswas-Diener, 2013). The findings of the current meta-analysis show that performing acts of kindness had a (small) positive effect on eudaimonic and hedonic well-being and meet the first two criteria to be called a PPI. Previous research and also in this current study, did focus mostly on participants without a psychological problem as stated above, so criteria 3 is met for participants without a psychological problem where it can be used as preventive intervention. This implicates for future research that there is space to focus on the effectiveness of the intervention in different populations with psychological problems. For practice, this implies that the intervention can be used to increase well-being, but it is not clear for which target groups with psychological problems it works. Therefore it is recommended to be careful with the use of the acts of kindness intervention in these groups in practice and wait for more research results. As stated in the introduction, the acts of kindness intervention is used in combination with other PPI's aimed at increasing well-being (e.g. Schotanus-Dijkstra et al., 2017). The findings of the current meta-analysis suggest that the acts of kindness intervention can be used as an independent intervention, but the role it plays in a multicomponent intervention aimed at increasing well-being is unclear. To answer this question it is recommended to compare different varieties of those (in RCT's proven to be effective) multicomponent interventions in a (fractional) factorial design to find the interventions that contribute to the effectiveness of the intervention.

Conclusion

The acts of kindness intervention seems to have a small, but significant positive effect on eudaimonic and hedonic well-being in comparison to control activities that were not aimed at increasing well-being. However not all intended outcome measures (e.g. depression) could be included, because these were included in too less articles. This indicates that the current meta-analysis was perhaps too early, in this sense the current meta-analysis can be called an explorative met-analysis. This in combination with the low quality of the studies indicates that there is room for improvement in future research.

Future research on the acts of kindness intervention is needed to fill in the gaps that were found in this meta-analysis. Firstly the effects of the intervention over a longer period (because follow-up results were not included in this meta-analysis). Secondly, the effects of the intervention on other outcome measures (for example, depression, stress and anxiety). Thirdly for whom (e.g. participants with psychological problems) the intervention works. Fourthly, the most optimal format of the intervention in terms of intensity (number of acts of kindness all in one day) and duration (which fits the idea of Layous and Lyubomirsky (2012)

that sustained practice is needed for lasting effects and the significant effect of duration as found in the current meta-analysis). And fifthly, how does the acts of kindness intervention work? In other words, on which proximal outcome measure is the intervention focused (as gratitude for the gratitude intervention)?

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Appendix 1: Quality assessment

Table 3

Quality assessment results of the articles

Study*	Sequence generation	Blinding of outcome assessment	Blinding of participants	Baseline comparability	Power analysis or sample size > 50	Intention-to-treat analysis	Overall qualify-cation**
AT (2013)	0	0	1	0	0	0	1
BB (2010)	0	1	0	0	0	0	1
CMJL (in press)	1	1	1	1	0	1	5
KOP (2015)	0	1	1	1	0	1	4
LKMCL*** (2016a)	0	1	1	1	1	0	4
LKMCL*** (2016b)	0	1	1	1	1	0	4
MCS (2010)	0	1	1	0	1	1	4
NDJLCL (2015)	0	1	0	1	1	0	3
NLCL (2016)	0	1	1	1	1	1	5
OLS (2014)	0	1	0	1	0	0	2
TA (2015)	0	1	1	0	0	0	2
Total	1	10	8	7	5	4	

Note. * = The name of the study is based on the first letter of the last names of the authors; ** = meaning of the score (6 = good, 4-5 = fair and >4 = poor); *** = 2016a is study 1 and 2016b is study 2

Appendix 2: Effect sizes per condition

Table 4

Cohen's *d* effect sizes (based on pre- and post-scores) for the intervention and control conditions

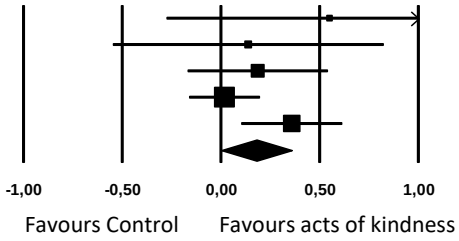
Study*	Outcome measurement	Intervention		Control conditions		
		Intervention 1	Intervention 2	Placebo	Active	Combined
AT (2013)	Positive affect	0.48		0.06	-0.06	
	Negative affect	-0.56		-0.13	-0.44	
BB (2010)	Life satisfaction	***		***	***	
CMJL (in press)	Depression	-0.57				0.13
	Autonomy	***		***	***	
	Competence	***		***	***	
KOP (2015)	Meaningfulness of own life	0.09		-0.06	0.07	
	Depression	-0.08		-0.21	-0.28	
	Anxiety	-0.61		0.16	-0.42	
	Stress	-0.38		0.01	-0.39	
LKMCL** (2016a)	Happiness	0.21		0.14		
	Life satisfaction	0.09		0.01		
	Positive affect	0.27		0.24		
	Negative affect	-0.44		-0.06		
	Eudaimonic WB	0.29		0.00		
	Autonomy	0.43		0.13		
	Competence	0.40		0.45		
	Connectedness	0.32		0.11		
LKMCL** (2016b)	Happiness	0.23	0.31		0.11	
	Life satisfaction	0.37	0.36		0.13	
	Positive affect	0.13	-0.20		-0.05	
	Negative affect	-0.49	-0.41		-0.45	
	Self-esteem	0.23	-0.11		0.16	
	Stress	-0.37	-0.09		-0.37	
	Autonomy	0.31	-0.14		0.38	
	Competence	0.28	0.26		0.33	
	Connectedness	0.10	-0.12		0.18	
MCS (2010)	Happiness	0.27		0.07		
	Self-esteem	0.18		0.16		
	Depression	-0.25		-0.09		
NDJLCL (2015)	Happiness	-0.16	0.13	-0.04		
	Life satisfaction	0.17	0.13	0.05		
	Positive affect	-0.24	-0.43	-0.25		
	Negative affect	0.14	-0.54	-0.14		
NLCL (2016)	Psychological flourishing	0.17		0.12	-0.04	
	Hedonic flourishing	0.08		0.05	-0.03	
	Eudaimonic flourishing	0.18		0.12	-0.04	
	Psychological WB	***		***	***	
	Positive affect	0.25		0.05	0.24	
	Negative affect	-0.26		-0.32	-0.32	
OLS (2014)	Positive affect	0.05		-0.22		
	Negative affect	-0.09		0.17		
TA (2015)	Positive affect	-0.24		0.08	-0.22	
	Social anxiety	-1.03		-0.35	-0.86	

Note. * = The name of the study is based on the first letter of the last names of the authors; ** = 2016a is study 1 and 2016b is study 2; *** = no sufficient information to calculate the effect size for the conditions self

Appendix 3: Meta-analysis results for the intervention – placebo control condition

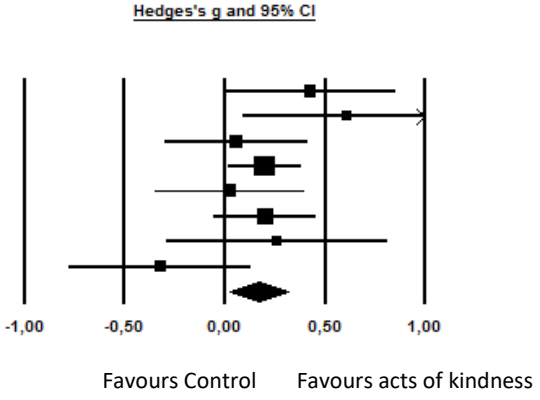
Eudaimonic well-being

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Chancellor-Margolis	EUDAIMONIC	0,550	0,422	0,178	-0,277	1,377	1,304	0,192
Kerr-O'Donovan	Meaningfulness	0,138	0,350	0,123	-0,549	0,825	0,395	0,693
Layous-Kurtz A	EUDAIMONIC	0,187	0,182	0,033	-0,170	0,543	1,027	0,304
Mongrain-Chin	Self-esteem	0,018	0,092	0,008	-0,162	0,198	0,195	0,845
Nelson-Layous	Psych. WB	0,359	0,131	0,017	0,102	0,615	2,743	0,006
		0,179	0,091	0,008	0,001	0,357	1,971	0,049



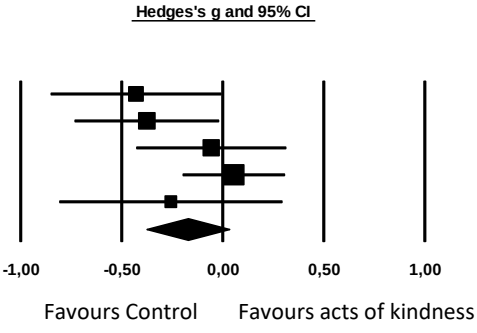
Hedonic well-being

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alden-Trew	Positive affect	0,424	0,216	0,047	0,000	0,848	1,962	0,050
Buchanan-Bardi	Life satisfaction	0,612	0,266	0,071	0,091	1,133	2,301	0,021
Layous-Kurtz A	HED. pooled	0,058	0,181	0,033	-0,298	0,413	0,318	0,751
Mongrain-Chin	Happiness	0,201	0,092	0,009	0,020	0,382	2,173	0,030
Nelson-Della Porta	HED. pooled	0,026	0,190	0,036	-0,346	0,398	0,136	0,892
Nelson-Layous	Positive affect	0,202	0,130	0,017	-0,053	0,457	1,555	0,120
Ouweneel-Le Blanc	Positive affect	0,262	0,282	0,080	-0,292	0,815	0,927	0,354
Trew-Alden	Positive affect	-0,321	0,232	0,054	-0,775	0,133	-1,384	0,166
		0,172	0,074	0,006	0,026	0,318	2,308	0,021



Negative affect

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alden-Trew	Negative affect	-0,429	0,216	0,047	-0,853	-0,005	-1,985	0,047
Layous-Kurtz A	Negative affect	-0,376	0,183	0,033	-0,734	-0,017	-2,052	0,040
Nelson-Della Porta	Negative affect	-0,057	0,190	0,036	-0,429	0,316	-0,298	0,766
Nelson-Layous	Negative affect	0,055	0,130	0,017	-0,200	0,309	0,422	0,673
Ouweneel-Le Blanc	Negative affect	-0,257	0,282	0,080	-0,810	0,297	-0,909	0,363
		-0,174	0,104	0,011	-0,379	0,031	-1,665	0,096



Positive affect

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alden-Trew	Positive affect	0,424	0,216	0,047	0,000	0,848	1,962	0,050
Layous-Kurtz A	Positive affect	0,025	0,181	0,033	-0,331	0,380	0,137	0,891
Nelson-Della Porta	Positive affect	-0,080	0,190	0,036	-0,453	0,292	-0,423	0,672
Nelson-Layous	Positive affect	0,202	0,130	0,017	-0,053	0,457	1,555	0,120
Ouweneel-Le Blanc	Positive affect	0,262	0,282	0,080	-0,292	0,815	0,927	0,354
Trew-Alden	Positive affect	-0,321	0,232	0,054	-0,775	0,133	-1,384	0,166
		0,089	0,098	0,010	-0,103	0,282	0,912	0,362

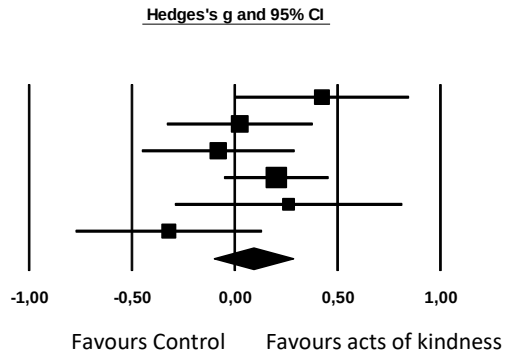
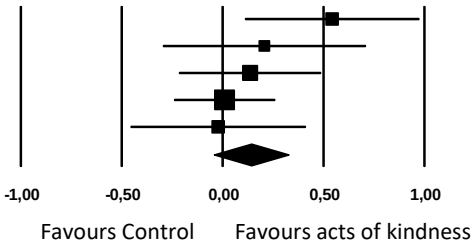


Figure 2. Pre-post-test effects of the acts of kindness intervention on eudaimonic well-being, hedonic well-being, negative affect and positive affect for the placebo control condition comparison. The boxes show effect and sample sizes (small box represents small sample size) and lines show the confidence interval (95%). The diamonds at the bottom of each figure shows the pooled effect size (breadth represents the confidence interval (95%)) (Bolier et al., 2013).

Appendix 4: Meta-analysis results for the intervention – active control condition

Hedonic well-being

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alden-Trew	Positive affect	0,543	0,222	0,049	0,108	0,977	2,449	0,014
Buchanan-Bardi	Life satisfaction	0,207	0,258	0,067	-0,298	0,713	0,803	0,422
Layous-Kurtz B	HEDONIC	0,136	0,181	0,033	-0,218	0,491	0,752	0,452
Nelson-Layous	Positive affect	0,010	0,129	0,017	-0,243	0,263	0,077	0,939
Trew-Alden	Positive affect	-0,022	0,223	0,050	-0,459	0,415	-0,098	0,922
		0,138	0,094	0,009	-0,046	0,323	1,469	0,142



Positive affect

Study name	Outcome	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Alden-Trew	Positive affect	0,543	0,222	0,049	0,108	0,977	2,449	0,014
Layous-Kurtz B	Positive affect	0,017	0,181	0,033	-0,337	0,371	0,093	0,926
Nelson-Layous	Positive affect	0,010	0,129	0,017	-0,243	0,263	0,077	0,939
Trew-Alden	Positive affect	-0,022	0,223	0,050	-0,459	0,415	-0,098	0,922
		0,109	0,118	0,014	-0,121	0,340	0,930	0,352

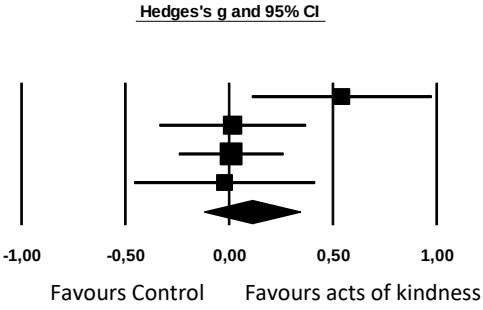
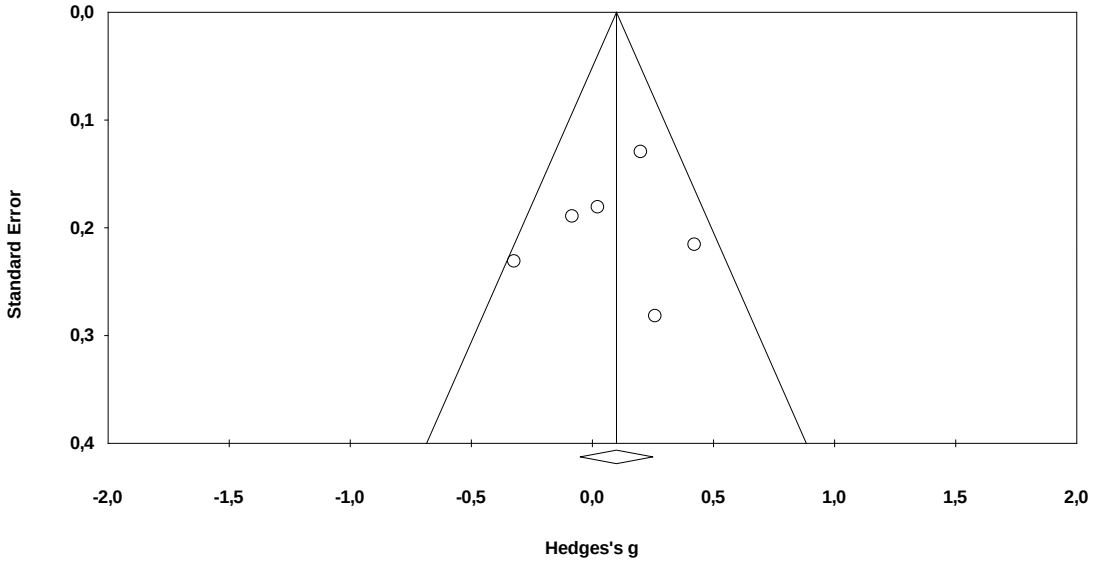


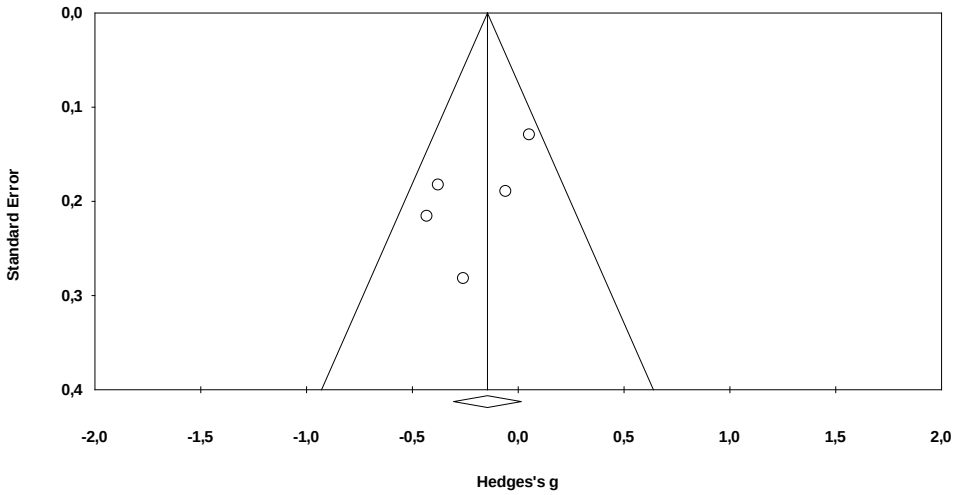
Figure 3. Pre-post-test effects of the acts of kindness intervention on hedonic well-being and positive affect for the active control condition comparison. The boxes show effect and sample sizes (small box represents small sample size) and lines show the confidence interval (95%). The diamonds at the bottom of each figure shows the pooled effect size (breadth represents the confidence interval (95%)) (Bolier et al., 2013).

Appendix 5: Publication results for the intervention – placebo control condition

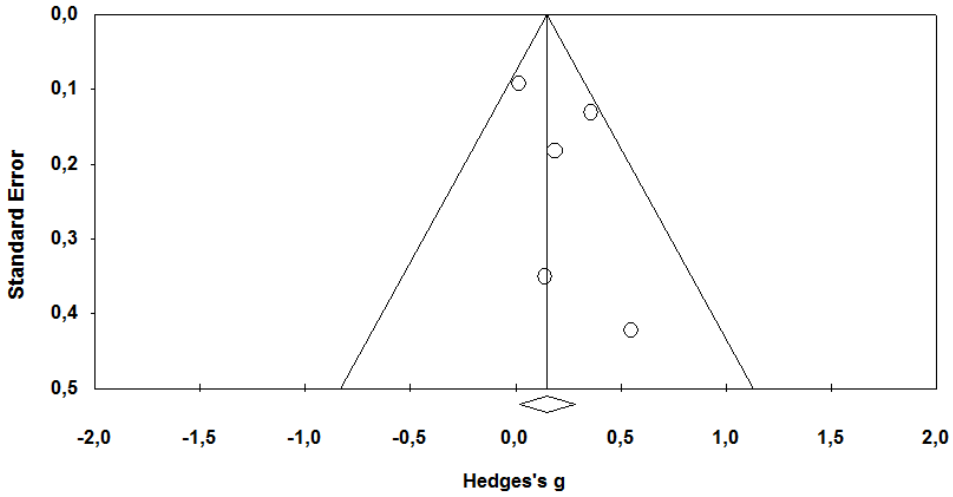
Positive affect



Negative affect



Eudaimonic well-being



Hedonic well-being

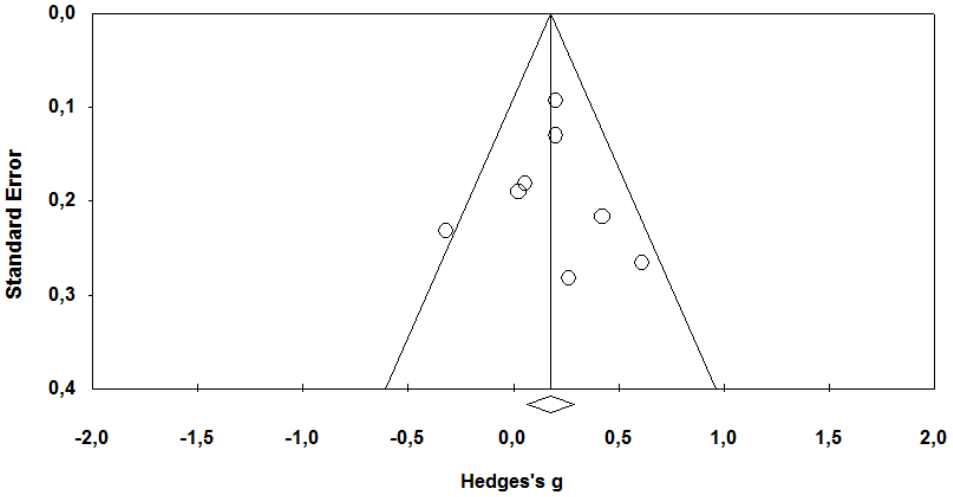
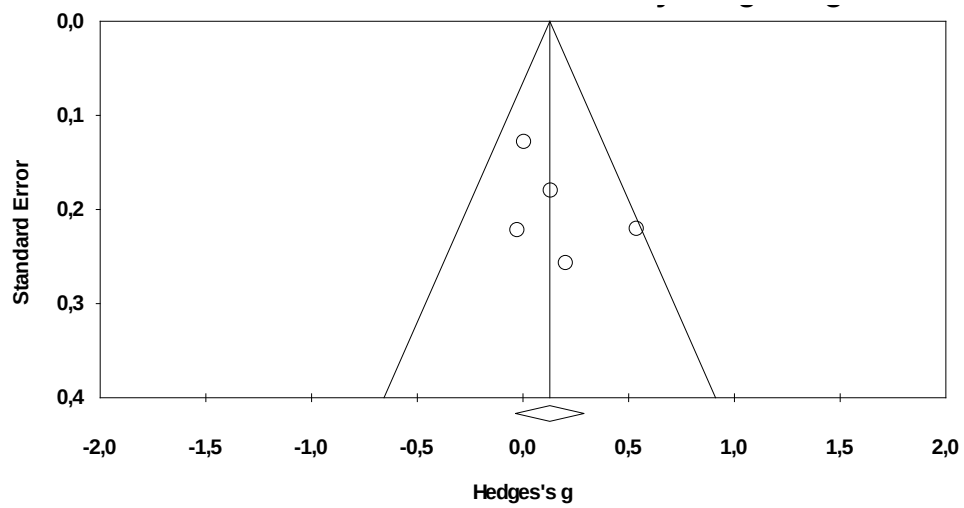


Figure 4. Funnel Plots of standard error by Hedges's *g* for positive affect, negative affect, eudaimonic well-being and hedonic well-being

Appendix 6: Publication results for the intervention – active control condition

Hedonic well-being



Positive affect

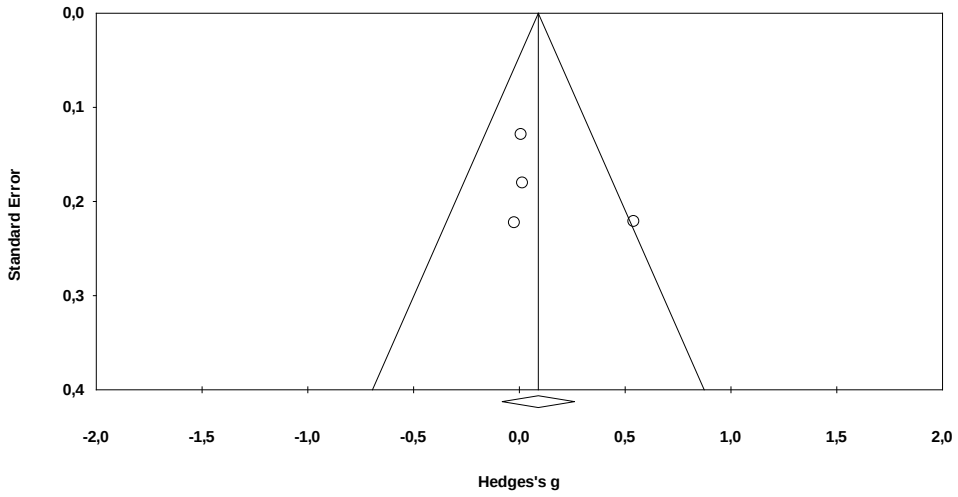


Figure 5. Funnel Plot of standard error by Hedges's *g* for hedonic well-being and positive affect