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## Gratitude and health: An updated review

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### ABSTRACT

The purpose of this review is to extend previous review findings by providing an updated overview of the literature on the connection of gratitude to human health, specifically focusing on experimental study findings, to better understand possible causation, complemented with findings from multi-wave longitudinal studies.

### ARTICLE HISTORY

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### KEYWORDS

Gratitude; health; physical health; mental health

The study of gratitude, perceived as an important source of human strength, has gained increasing attention over the past decades. Around 2010, several reviews appeared that evaluated the contribution of gratitude to mental and physical health (Emmons & Mishra, 2011; Wood, Froh, & Geraghty, 2010). While the authors of these reviews consistently concluded that gratitude links positively to positive emotions and subjective well-being, and negatively to emotional vulnerabilities and negative affect, most studies in these reviews used cross-sectional observational designs, leaving causality of relationships unclear. In addition, the effects of gratitude on physical health had until then, been left virtually unexplored. The aim of the current study is, therefore, to extend earlier review findings by providing an updated overview of the literature on the connection of gratitude to human health, specifically focusing on experimental study findings, to gain better insight in possible causation, complemented with findings from multi-wave longitudinal studies. Findings presented in this review will provide guidance to scholars and practitioners about the scientific study of gratitude and its translation into practice.

### Gratitude

Scientists conceptualize gratitude as both a state and a trait. State gratitude is an attribution-dependent or affective-cognitive state based on the ability to be empathic, resulting from both appraising a received benefit as a positive outcome as well as recognizing that this positive outcome stems from an external source. The grateful emotion promotes (upstream) reciprocity, and

prosocial behaviour (Bartlett & DeSteno, 2006; Clore, Ortony, & Foss, 1987; Lazarus & Lazarus, 1996; Nowak & Roch, 2007; Tsang, 2006; Weiner, 1985; Wood, Maltby, Stewart, & Joseph, 2008). Trait gratitude can be viewed as a wider life orientation towards noticing and being grateful for the positive in the world. Attention can be directed to the feeling of sufficiency, to the appreciation of the little things in life, and to other people in our lives (Thomas & Watkins, 2003). Individuals with a grateful perspective on life are more likely to show (pro)social behaviours (Wood et al., 2010), theorized to at least partly underly previously established associations between gratitude and health-related outcomes. The results, suggesting state and trait gratitude being beneficial for physical and mental health, have led to the development of gratitude interventions to decrease psychological symptoms and increase physical and mental well-being.

### Gratitude interventions

A variety of gratitude interventions are used to induce or increase levels of gratitude, often with the aim to reduce ill-being and improve well-being. Commonly used interventions to increase levels of gratitude are gratitude journaling, writing a gratitude letter, and the Three Good Things (TGT) exercise. Gratitude journaling consists of writing on a regular basis about things, people, and events one feels explicitly grateful for. The frequency of writing differs between studies, ranging from writing a single time to daily (DeWall, Lambert, Pond, Kashdan, & Fincham, 2012; Flinchbaugh, Moore, Chang, & May, 2012; Jackowska, Brown, Ronaldson, & Steptoe, 2016; Kerr, O'Donovan, & Pepping, 2015). The gratitude letter is part of the gratitude visit as devised by Seligman, Rashid, and Parks (2006).

Usually, the respondent addresses the letter to someone they are grateful for in life, but who they never properly thanked. After composing the letter, the content is read aloud to the intended recipient; however, in most experiments, this letter remains undelivered. The TGT exercise (Seligman, Steen, Park, & Peterson, 2005) is similar to gratitude journaling, except that the instruction is to write down three good things that happened in a specified period, ranging from once a day to once a week (Chan, 2011; Krentzman et al., 2015). Lastly, several experimental setups have been used to induce a state of gratitude in a laboratory context (Peters, Meevissen, & Hanssen, 2013; Yu, Cai, Shen, Gao, & Zhou, 2016). All these interventions aim to increase or improve state or trait gratitude.

## Health

The World Health Organization defines health since 1948 as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’. The definition has been increasingly criticized for being impracticable and counterproductive in an era where ageing with chronic illnesses has become the norm, thereby contributing to medicalization of society. Therefore, Huber et al. (2011) have proposed a new general concept of health: ‘Health as the ability to adapt and to self-manage, in the face of social, physical and emotional challenges’, and coined it positive health. This general concept represents a broader view on health as a dynamic ability to adjust to life’s challenges with resilience, and to self-manage one’s own well-being. Although the definitions differ, they both recognize that health broadly consists of a *physical* and a *mental* component.

### Physical health

Physical health refers to the well-functioning body, the processes therein, and the perception of physical fitness. External factors, the intrusion of viruses or bacteria, or malfunction from processes such as digestion or respiration can harm the body. Physiological processes such as sleep or pain can be disturbed, causing physical constraints or deterioration of subjectively perceived physical fitness.

### Mental health

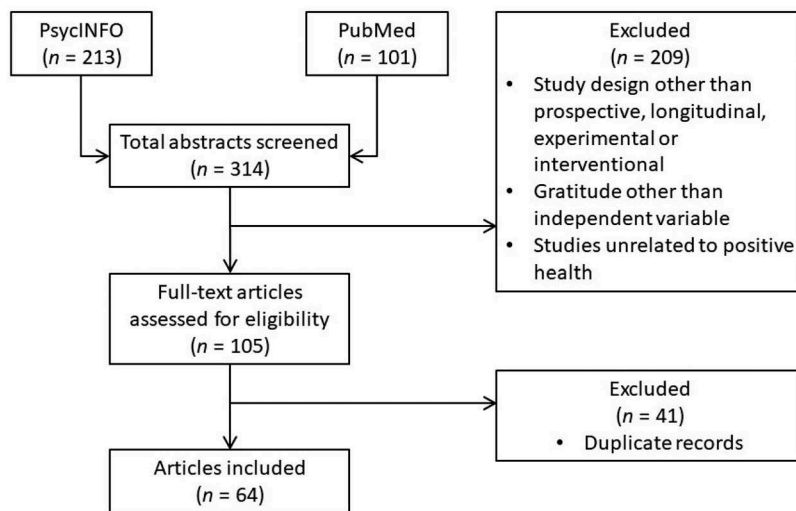
Mental health, according to the dual-continua model of Keyes (2002, 2005), is represented along two dimensions: the absence or presence of psychopathological symptoms, and the absence or presence of well-being. The first continuum speaks for itself; the individual indicates the level of psychopathological symptoms experienced, such as symptoms of depression or anxiety. The well-

being continuum encompasses emotional, psychological, and social components of well-being. Characteristics of emotional well-being are feelings of happiness joy, and contentment (Diener, 2000). Psychological well-being focuses on, for instance, the experience of autonomy, competence, and meaning in life (Ryff, 2014). Social well-being is, among others, about relationships with others, feeling accepted by others, and belonging (Keyes, 2002, 2005). The abovementioned physical and mental well-being components together form a holistic concept of human health.

This literature review will provide an updated overview of existing gratitude research related to components of the different dimensions of human health: physical health, psychopathology, emotional well-being, psychological well-being, and social well-being. The focus of this literature review will be on experimental studies with state and trait gratitude as independent variable and their association with health-related concepts, to gain insight in possible causality between gratitude and human health, complemented with findings from longitudinal studies. Such an overview can reveal gaps in current research that can guide future scientific research and support the choice of gratitude interventions in practice.

## Method

PsycINFO and PubMed databases were screened to obtain articles from the fields of psychology and medicine, using PRISMA guidelines to report on the search findings (Moher, Liberati, Tetzlaff, & Altman, 2009), see *Figure 1*. The most recent reviews on gratitude date from 2010–2011 (Emmons & Mishra, 2011; Wood et al., 2010), and the current review therefore focused on articles published from the 1st of January 2010 until the 31st of July 2018. Only articles from international, peer-reviewed academic journals were included to ensure academic quality. As our study aimed to move beyond correlational evidence, focus was on experimental studies, complemented with longitudinal studies with at least two waves of measurement. Wood et al. (2008) showed in their research that the Gratitude Questionnaire (GQ6: McCullough, Emmons, & Tsang, 2002), the subscales of the Short Gratitude, Resentment, and Appreciation Test (SGRAT: Thomas & Watkins, 2003), and the subscales of the Appreciation Scale (Fagley & Adler, 2012) all pertain to the same latent gratitude construct. We therefore followed their advice to incorporate both state and trait gratitude, to ensure inclusion of a broad range of studies. Additionally, as gratitude and appreciation are used interchangeably in the scholarly literature, we were also interested in studies examining appreciation and



**Figure 1.** Number of articles found in PsycINFO and PubMed with indicated search terms using filters year 2010–2017, academic journal articles and English language.

health. To obtain articles reporting on the results of quantitative longitudinal observational and intervention studies with gratitude as predictor of health-related outcomes, we used the following search terms for the title: ‘gratitude’, ‘grateful’, ‘thankful’, and ‘appreciation’. Search terms for the abstract were ‘experiment’, ‘intervention’, ‘prospective’, and ‘longitudinal’. Combinations of these search terms were used in sixteen (four x four) search commands. Articles fulfilling search criteria were first screened based on the information in the abstract. Articles with other designs than experimental, interventional, prospective, or longitudinal studies with gratitude as dependent variable, and studies unrelated to state or trait gratitude and/or health were excluded, leaving 64 studies eligible for review (Figure 1). If effect sizes were not reported in the original paper, they were estimated based on available data, using the method reported by Lakens (2013).

## Review

### Physical health concepts

The first component of health consists of physical outcomes. The articles found, report on bodily functions, pain, and other physical complaints, perceived physical health, and overall fitness. Our search identified nine studies reporting on the effects of experimentally induced gratitude on (i) cardiovascular physiology, (ii) biomarkers for stress and inflammation, (iii) pain perception, and (iv) sleep, and two longitudinal observational studies on the prospective effects of gratitude on (v) (perceived) physical health. Table 1 presents an overview of the included articles.

### Cardiovascular physiology

Randomized controlled trials (RCTs) on the relationship between gratitude and cardiovascular physiology by Rash, Matsuba, and Prkachin (2011), Jackowska et al. (2016), and Redwine et al. (2016) have yielded mixed results. Keeping a gratitude journal, in the study by Jackowska et al. (2016), did not beneficially affect heart rate nor systolic blood pressure compared to everyday events recall, although diastolic blood pressure revealed to drop significantly after gratitude journaling in comparison to no-treatment conditions. Redwine et al. (2016) did not find differences in heart rate variability (HRV) at rest in a sample of heart disease patients when comparing a gratitude intervention and treatment as usual group, although researchers observed increased parasympathetic HRV in the intervention group. Rash et al. (2011) did, however, report a higher degree of cardiac coherence – suggested to reflect increased physiological coordination – following gratitude contemplation compared to memorable event recall.

### Biomarkers for stress and inflammation

In a sample of patients with heart disease, Redwine et al. (2016) extracted a selection of inflammatory biomarkers from blood (CRP, TNF- $\alpha$ , IL-6, and sTNFr1), before and after an 8-week gratitude journaling intervention. Overall biomarker concentrations reduced marginally but significantly in the gratitude intervention compared to the treatment as usual group. Marginal effects of gratitude on blood-based tumour necrosis factor- $\alpha$  (TNF- $\alpha$ ), but not on other inflammatory biomarkers, were also reported in an observational prospective study in post-acute coronary syndrome patients



Table 1. Physical health: summary of articles.

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Baxter (2012)	E	4(EG) 4(ACG)	Adults with chronic back pain	50	55 (8.25)	...	Pain	Character strength and gratitude intervention	5-7 weeks	Not able to calculate	The Character strength and gratitude intervention had no effect on pain.
Digdon (2011)	E	13 (EG) 13 (ACG) 11 (ACG)	College students	22	23 (6.11)	...	Sleep quality; Pre-sleep worry; arousal	Positive events journaling (end of day)	1 week	$d = .63$ ( $p < .01$ ) $d = .60$ ( $p < .001$ )	Reduction of pre-sleep arousal, improving sleep quality and duration, no effects on bedtime thinking, planning or anxiety, and sleep onset latency.
Huffman(2015)	L	164 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	TG (GO6)	Physical activity (Accelerometer); Inflammatory biomarkers; Cardiac readmission	...	6 months	Not able to calculate $\beta = .009$ ( $p < .05$ )	No effects of baseline gratitude on post-test physical activity, rehospitalization, and marginal beneficial effect of gratitude on tumor necrosis factor- $\alpha$ (TNF- $\alpha$ ).
Jackowska (2016)	E	40 (EG) 41 (ACG) 38 (CG)	Young adults	0	26 (0.77) 27 (0.79) 26 (0.82)	...	Blood pressure; Heart rate variability; Cortisol; Sleep quality	Gratitude journal (3x a week for 2 weeks)	4 weeks	Not able to calculate	Sleep quality improved in the gratitude condition; No changes for blood pressure, heart rate or cortisol in gratitude condition.
Millstein (2016)	L	156 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	TG (GO6)	Physical health	...	2 weeks post-ACS and 6 month follow-up	$\beta = .09$ (n.s.) $\beta = .01$ (n.s.)	No association was found between gratitude and measures of physical health, adjusted for baseline values; gender, age, race, medical and social risk factors; and anxiety and depression.
Rash (2011)	E	56 (T) NR (EG) NR (ACG)	Adult sample	54	23 (3.00)	TG (GO6); ST (thinking of grateful things)	Cardiac coherence	Gratitude contemplation (twice a week)	4 weeks	$\eta^2 = .14$ ( $p < .05$ )	Cardiac coherence during the gratitude induction was significantly higher than during the memorable events induction.
Redwine (2016)	E	24 (EG) 34 (ACG)	Older patients with stage B heart failure	90	66 (7.58)	TG (GO6)	Inflammatory biomarkers; Heart rate variability	Gratitude journal (daily)	8 weeks	$\eta^2 = .21$ ( $p < .01$ ) $\eta^2 = .14$ ( $p < .05$ ) $\eta^2 = .12$ (n.s.)	Reduction of inflammatory biomarker index and increased parasympathetic heart rate variability in gratitude condition; No change in resting heart rate variability.
Schmitzer (2018)	E	33 (normal) 37 (social) 31 (prayer)	Graduate students	12	18 (0.42)	TG (GO6)	Health	Different kinds of gratitude journaling once a week for 5 weeks	6 weeks	Not able to calculate	None of the gratitude journaling versions improved reported health.

(Continued)

**Table 1. (Continued).**

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Southwell (2017)	E	75 (EG) 52 (CG)	Adults with depression and/or anxiety	12	34 (10.80)	TG (GQ6)	Sleep quality	Daily diary for at least 3 x per week for 3 weeks	9 weeks	$\eta^2 = .14$ ( $p = .015$ )	Sleep quality only increased between pretest and posttest, not posttest and follow-up or pretest and follow-up.
Yu (2016)	E	15 (T)	College students	20	21 (0.75)	...	Perceived pain intensity; Gratitude towards partner	Sharing pain induction with partner who decided or was forced to help	...	$\eta^2 = .28$ ( $p < .05$ )*	Intentional help was associated with lower perceived pain intensity.
Yu (2016)	E	27 (T)	College students	41	22 (1.5)	TG (GQ6)	Allocation of money points; Gratitude towards partner	Sharing pain induction with partner who decided or was forced to help in an fMRI scanner	...	$\eta^2 = .47$ ( $p < .001$ )*	Intentional help was associated with higher money points allocation. Several brain regions could be appointed that were involved in this reciprocity elicited by gratitude.

Note. E = experimental; T = total group, EG = experimental group; CG = control group; ACG = active control group; NR = not reported; TG = trait gratitude; SG = state gratitude; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist, ES = effect size, \* = estimation based on results in article.



(Huffman et al., 2015). Jackowska et al. (2016) did not find evidence in their RCT for changes in salivary cortisol measures as a result of keeping a gratitude diary versus both active and no-treatment control conditions.

### ***Pain perception***

In a study by Yu et al. (2016), healthy college students were exposed to a pain induction experiment, in which they interacted virtually with an anonymous partner that either intentionally (gratitude condition) or unintentionally bore part of their pain. Participants had to rate their perceived pain intensity and interpersonal closeness toward the partner, and/or express reciprocity by transferring an amount of money. Pain was perceived as less intense when receiving help was interpreted as intentional, relative to unintentional. A small pilot study with cross-over multi-baseline design by Baxter, Johnson, and Bean (2012), on the other hand, did not show any effect of a gratitude intervention on pain perception in people with chronic back pain.

### ***Sleep***

The gratitude intervention study by Jackowska et al. (2016) included assessment of sleep quality and sleep disturbance. Daily sleep quality improved to a slightly, but significantly greater extent following 2 weeks of gratitude journaling compared to no-treatment control conditions. Also, in a pre-post-follow-up trial (Southwell & Gould, 2017), sleep quality improved moderately from pre- to post-test, but not at follow-up, in the gratitude journaling intervention vs. waitlist control condition. However, no differences in changes in sleep quality nor sleep disturbances were found between the gratitude intervention and active control (everyday events recall) group: subjective sleep ratings improved equally in both groups (Jackowska et al., 2016). A randomized pilot trial by Digdon and Koble (2011) has suggested that focusing on something positive for a brief period each evening (gratitude intervention) reduces pre-sleep arousal, as well as improving sleep quality and duration, but not more so than when engaging in constructive worry or imagery distraction exercises.

### ***Physical health outcomes***

Two studies investigated prospective associations between gratitude measured 2 weeks after acute coronary syndrome (ACS), and physical health outcomes 6 months later (Huffman et al., 2015; Millstein et al., 2016). Gratitude did not predict physical health-related quality of life, physical functioning status (Millstein et al., 2016), objectively measured physical activity or rehospitalization (Huffman et al., 2015). In a study with gratitude framed as prayer, participants did not report increased health over

the course of 6 weeks (Schnitker & Richardson, 2018). Millstein et al. (2016), however, observed a positive effect of gratitude on self-reported adherence to cardiac health behaviours, the first factor indirectly linked to physical health in previous research (Lamers, Bolier, Westerhof, Smit, & Bohlmeijer, 2012; Lavelock et al., 2016), and the latter directly associated with reduced morbidity and mortality after ACS (Chow et al., 2010).

### ***In conclusion***

The growing body of prospective and experimental work on the effects of gratitude on bodily functions has so far produced inconclusive results. On the one hand, gratitude interventions appear to positively affect a number of cardiovascular and inflammatory parameters, as well as improving sleep quality. On the other hand, the effects of gratitude exercises on bodily functions do generally not distinguish from those of other recall or distraction exercises, underlining the need for further research to clarify to which specific and/or generic intervention aspects these effects can be attributed. Lastly, there is currently no convincing evidence to support a causal link between gratitude and (reduced) pain perception, and gratitude does not seem to directly predict physical health outcomes when examined prospectively.

### ***Psychopathology concepts***

Following the dual-continua model of mental well-being of Keyes (2002, 2005) the next paragraph contains articles concerning indicators of cognitive and emotional (dis)functioning. Our search yielded 25 experimental and 9 prospective observational studies on the relationship between gratitude and (i) depression, (ii) anxiety, (iii) stress, (iv) negative affect, (v) other psychopathological symptoms, and (vi) aggression. Table 2 presents an overview of included studies.

### ***Depression***

Findings from RCTs in healthy samples, across a wide age range, have suggested a variety of gratitude interventions to moderately reduce levels of depression immediately after the intervention (Cheng, Tsui, & Lam, 2015; Jackowska et al., 2016; O'Connell, O'Shea, & Gallagher, 2017b; Ramírez, Ortega, Chamorro, & Colmenero, 2014; Salces-Cubero, Ramírez-Fernández, & Ortega-Martínez, 2018; Watkins, Uher, & Pichinevskiy, 2015; Wolfe & Patterson, 2017), at approximately 1-month follow-up (Salces-Cubero et al., 2018), and at 3-months follow-up (Cheng et al., 2015; O'Connell et al., 2017b; Ramírez et al., 2014). Corroborating support for beneficial effects of gratitude interventions on depression comes from

Table 2. Psychopathology: summary of articles.

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Baxter (2012)	E	8 (T) 4(EG) 4(ACG)	Adults with chronic back pain	50	55 (8.25)	...	Anger; Sadness; Anxiety; Depression	Character strength and gratitude intervention	5-7 weeks	Not able to calculate	The Character strength and gratitude intervention decreased anger but there was no effect on sadness, anxiety, or depression.
Chan (2011)	E	63 (T)	Chinese school teachers	16	34 (6.91)	TG (GQ6)	Burnout	Weekly log of TG and Naikan questions	8 weeks	$d = .38$ ( $p < .05$ )	The intervention decreased emotional exhaustion and depersonalization in the high meaningful-life group
Cheng (2015)	E	34 (EG) 34 (ACG) 34 (CG)	Health care workers	35	NR	...	Depression; Perceived stress	Gratitude journal (daily for 4 weeks)	4 months	$d = -.49$ ( $p < .05$ ) $d = -.70$ ( $p < .01$ )	Perceived stress and depression decreased after three months at follow up but the rate of the decline became less obvious as the time progressed.
Deng (2018)	E	29 (EG) 37 (ACG) 30 (CG)	Male prisoners	100	35 (9.65)	TG (GRAT)	Aggression	Daily diaries (counting blessing) versus 5 weekly group sessions (sharing gratitude)	5 weeks	$\eta^2 = .07$ ( $p = .035$ )	Both the gratitude and blessing intervention decreased levels of aggression. The interventions did not differ
DeWall (2012)	L	200 (T)	College students	24	NR	SGT (1-item; how grateful they felt that day)	Daily physical aggression	...	25 days	$d = -.42$ ( $p < .01$ )*	Controlling for positive emotion, daily gratitude predicted lower levels of daily physical aggression.
DeWall (2012)	L	168 (T)	College students	32	NR	SG (1-item: how grateful they felt during social interaction)	Aggression in response to provocation	...	2 weeks	Before controlling for happiness $d = -1.08$ ( $p < .001$ )* After controlling not able to calculate	Controlling for happiness felt during interactions, gratitude felt during interactions was negatively related to the percentage of interactions where feelings were hurt and how much people expressed anger outwardly toward the person inflicting hurt
DeWall (2012)	E	79 (EG) 79 (ACG)	College students	33	NR	...	Behavioural aggression	Gratitude letter (1x); Provocation manipulation	...	Not able to calculate	Provocation increased aggression in the control condition, it did not increase aggression among grateful participants; Among insulted participants, grateful participants behaved less aggressively than did control participants; Among experienced praise, gratitude had no effect on aggression

(Continued)





Table 2. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
DeWall (2012)	L	202 (F)	College students	23	NR	TG (GQ6)	Aggression	...	3 weeks	$\beta = -.35$ ( $p < .001$ )	Analyses showed that higher Time 2 empathy had a significant indirect effect on the relationship between Time 1 gratitude and Time 2 physical aggression, controlling for Time 1 physical aggression, Time 1 and Time 2 positive affect, and Time 2 gratitude. Positive life-events are a mediator between gratitude and depression at 3 months but not at 6 months.
Disabato (2017)	L	797 (F)	Multicultural adults	17	39 (14.20)	TG (GQ6)	Depression	...	6 months	$d = -.70$ ( $p < .001$ )* $d = -.07$ (n.s.)*	None of the conditions showed a significant effect on perceived stress.
Flinchbaugh (2012)	E	29 (SMT) 33 (GRAT) 22 (COM)	College students	59	22 (1.50)	...	Perceived stress	Gratitude journal (weekly)	12 weeks	Not able to calculate	At follow-up the levels of anxiety and depression declined.
Jackowska (2016)	E	33 (CG) 40 (EG) 41 (ACG) 38 (WLCCG)	Young adults	0	26 (0.77) 27 (0.79) 26 (0.82)	...	Anxiety; Depression	Gratitude journal (3x a week for 2 weeks)	4 weeks	Not able to calculate	Trait gratitude is no predictor on the long run for less psychopathological symptoms, accounting for previous levels of psychopathological symptoms and subjective well-being.
Jans-Beken (2017)	L	706 (F)	Adults	31	44 (14)	TG (SGRAT)	Psychopathological symptoms	...	4 measures during 7.5 months	$\beta = -.035$ (n.s.)	The results of the program did not differ between the experimental and the control group.
Jung (2017)	E	17 (EG) 15 (CG)	Patients with schizophrenia	NR	NR	TG (GRAT)	Depression	Gratitude disposition promoting program	Twice a week for 4 weeks	$\eta^2 = .11$ (n.s.)*	The gratitude intervention was effective on psychological functioning; No effect on depression but there were decreases on anxiety and stress.
Kerr (2015)	E	16 (EG) 16 (ACG) 15 (CG)	Adults seeking psychological treatment	25	43 (11.1)	SG (GAC)	Psychological functioning; Depression, anxiety and stress	Gratitude journal (daily)	2 weeks	$\eta^2 = .37$ ( $p < .001$ ) Not able to calculate $\eta^2 = .14$ ( $p < .05$ ) $\eta^2 = .11$ ( $p < .05$ )	After the intervention the levels of negative affect, and negative experiences did not change.
Khanna (2016)	E	177 (F) 95 (EG) 82 (CG)	Highschool students	58	12 (0.67)	...	Negative experience; Negative affect	5 weekly sessions in a classroom and journal-based homework	5 weeks	Not able to calculate	Perceived stress declined over the course of six weeks.
Killen (2015)	E	88 (EG)	Elderly	26	71 (7.51)	TG (GQ6)	Perceived stress	TGT (daily for 2 weeks)	6 weeks	$R^2 = .05$ ( $p < .01$ )	

(Continued)

Table 2. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Kleiman (2013)	L	209 (T)	College students	16	21 (4.12)	TG (GQ6)	Suicidal ideation; Depressive symptoms	...	4 weeks	$d = -.44 (p < .01)^*$	High levels of grit and ideation over time, with gratitude as most important predictor. Gratitude alone nor grit alone were associated with lower suicide ideation.
Krentzman (2015)	E	11 (EG) 12 (ACG)	Adults with substance use problems	52	46 (10.9)	TG (GQ6)	Negative affect	TGT (daily for 2 weeks)	12 weeks	$d = -.99 (p < .05)^*$	The gratitude intervention decreased the level of negative affect over the course of 12 weeks.
Lies (2014)	L	310 (T)	Earthquake survivors	58	36 (10.5)	TG (GQ6)	Global distress; PTSD	...	5 and 8 months after disaster	$\beta = -.051 (n.s.)$ $\beta = .052 (n.s.)$ $\beta = .061 (n.s.)$ $\beta = .052 (n.s.)$ $\beta = -.008 (n.s.)$ $\beta = -.232 (p < .001)$ $\beta = -.207 (p < .001)$	Gratitude at five months after the disaster did not predict global distress or PTSD at five or eight months after the disaster; Gratitude eight months after the disaster predicted global distress and PTSD at eight months.
Martinez-Marrí (2010)	E	41 (EG) 34 (ACG)	College students	11	21 (1.48)	TG (GQ6); SG (GAC);	Negative affect	Gratitude journal (daily)	2 weeks	Not able to calculate	The gratitude intervention did not have an effect on negative affect.
Millstein (2016)	L	156 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.6)	TG (GQ6)	Depression; Anxiety	...	2 weeks post-ACS and 6 month follow-up	$\beta = -.10 (p < .05)$ $\beta = -.10 (p < .05)$	There seems to be a negative association between state gratitude, and depression and anxiety over the course of 6 months, both outcomes adjusted for baseline values, gender, age, race, medical and social risk factors, and anxiety and depression.
O'Connell (2017)	E	63 (EG) 68 (ACG) 61 (CG)	Mainly young adult sample	33	27 (12.63)	TG (GQ6)	Negative affect; Depression	Reflective behaviour – reflective only – control journaling	3 times a week for 3 weeks with 1 and 3 month follow-up	$\eta^2 = .07 (p < .05)$ $\eta^2 = .06 (p < .05)$	Negative affect decreased in all conditions after 1 month with larger effects in the reflective behaviour journaling but this decrease disappeared at 3 months. Depression decreased at post-test but not at 1 month.
O'Leary (2015)	E	29 (EG) 22 (ACG) 10 (ACG)	Healthy adults	0	28 (6.65)	...	Perceived stress; Depression	Gratitude journal (4x a week)	3 weeks	$\eta^2 = .08 (n.s.)$ $\eta^2 = .09 (n.s.)$	The gratitude intervention did not significantly lower levels of stress or depression.

(Continued)



Table 2. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Otto (2016)	E	34 (EG) 33 (ACG)	Women with breast cancer diagnosis	0	57 (10.20)	SG (GAC)	Fear of recurrence; Death worry	Gratitude letter (once a week for 6 weeks)	4.5 months	Not able to calculate $d = .45 (p < .05)$	The gratitude intervention did not predict changes in fear of recurrence but it was a negative predictor for death worry. This association was mediated by meaningful goal pursuit.
Ramírez (2014)	E	26 (EG) 20 (CG)	Elderly	65	71 (7.06)	...	Anxiety; Depression	Gratitude letter	9 weeks	$\eta^2 = .21 (p < .001)$ $\eta^2 = .10 (p < .05)$	The complete program reduces anxiety and depression.
Salces-Cubero (2018)	E	36 (EG) 28 (ACG1) 28 (ACG2) 32 (CG)	Elderly	40	69 (7.78)	...	Anxiety; Depression; Negative affect	One-time activity with gratitude, optimism or savouring as key variable	1 month	$\eta^2 = .43 (p < .001)$ $\eta^2 = .11 (p < .001)$	No effect was found for anxiety. For depression and negative affect both the between and within subject models showed significance.
Sirois (2017)	L	163 (AR) 144 (IBD)	2 samples of individuals with arthritis (AR) and irritable bowel disease (IBD)	8 (AR) 21 (IBD)	AR: 47 (11.50) IBD: 38 (13.00)	TG (GQ6)	Depressive symptoms;	...	6 months	$\beta = -.22 (p < .01)$ $\beta = -.14 (p < .05)$	Gratitude was negatively associated with depressive symptoms over the course of 6 months in patient with arthritis and IBD, even when adjusted for self-rated health, pain, perceived stress, social support, illness cognitions, and psychological thriving.
Southwell (2017)	E	75 (EG) 52 (CG)	Adults with depression and/or anxiety	12	34 (10.80)	TG (GQ6)	Anxiety; Depression	Daily diary for at least 3 x per week for 3 weeks	6 weeks	$\eta^2 = .26 (p < .001)$ $\eta^2 = .15 (p = .033)$ $\eta^2 = .38 (p < .01)$ $\eta^2 = .19 (p < .01)$ $\eta^2 = .04 (p = .284)$ $\eta^2 = .03 (p = .371)$ $\eta^2 = .28 (p < .001)$ $\eta^2 = .04 (p = .318)$ $\eta^2 = .21 (p < .01)$	Anxiety decreased pre- to post-test, post-test and follow-up, and pre-test and follow-up. Depression only decreased between pre-test and post-test, not post-test and follow-up or pre-test and follow-up. Stress decreased pre-test to post-test and pre-test to follow-up, not between post-test and follow-up.
Toepfer (2012)	E	219 (T) 141 (EG) 78 (CG)	Adults	14	26 (11.00)	TG (GQ6)	Depression	Gratitude letters (3 times)	4 weeks	$\eta^2 = .08 (p < .05)^*$	The intervention decreased depression.
Watkins (2015)	E	47 (EG) 42 (ACG) 40 (CG)	College students	29	NR	TG (SGRAT)	Depression	Gratitude journal (daily for one week)	6 weeks	$\eta^2 = .06 (p < .01)$	The gratitude intervention decreased depressive symptoms over the course of five weeks after the intervention.

(Continued)

Table 2. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Wolfe (2017)	E	35 (EG) 28 (ACG) 45 (CG)	Graduate students	0	20 (6.93)	...	Body satisfaction; Eating disorder; Depression; Negative affect	Gratitude listing daily for 2 weeks	2 weeks	$\eta^2 = .14$ ( $p < .001$ )* $\eta^2 = .09$ ( $p < .01$ )* $\eta^2 = .01$ (n.s.)* $\eta^2 = .08$ ( $p < .05$ )* $\eta^2 = .01$ (n.s.)* $\eta^2 = .12$ ( $p < .01$ )* $\eta^2 = .08$ ( $p < .05$ )*	The gratitude condition yielded mix findings on body satisfaction and eating disorder scales. The gratitude condition decreased depressive symptoms and negative affect.
Wong (2016)	E	58 (EG) 56 (ACG) 53 (TAU)	Young adults in psychotherapy treatment	34	22 (5.00)	...	Psychological symptoms such as depression and anxiety	Gratitude letter (3 in 3 weeks)	12 weeks	$d = .30$ ( $p < .05$ )	A combination of psychotherapy and writing gratitude letters improved the mental health over the course of 15 weeks.
Wong (2017)	E	20 (EG)	Graduate students	30	23 (3.76)	SG (GAC)	Psychological distress	Gratitude Group Program	2 months	$d = 1.19$ ( $p < .001$ ) $d = 1.37$ ( $p < .001$ )	Participating in the Gratitude Group Program reduced psychological distress in time between T1 and T2, and T2 and T3.
Yang (2018)	E	(EG1) (EG2) (AEG)	Prisoners	100	35 (9.76)	...	Negative affect	Counting blessings or Random acts or kindness for 6 weeks	6 weeks	$\eta^2 = .15$ ( $p < .001$ )*	Both the kindness and gratitude interventions decreased negative affect with similar effect.

Note. L = longitudinal; E = experimental; T = total group, EG = experimental group; CG = control group; ACG = active control group; NR = not reported; TG = trait gratitude; SG = state gratitude; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist; SGRAT = short gratitude, resentment and appreciation test; TGT = Three Good Things intervention; PTSD = post-traumatic stress disorder; ES = effect size, \* = estimation based on results in article.

a longitudinal intervention study without control group, showing small reductions in depressive symptoms (Toepfer, Cichy, & Peters, 2012). The study of Southwell and Gould (2017) showed lower levels of depression in a clinical sample after a daily gratitude diary intervention.

Not all gratitude intervention studies in healthy adults have yielded effects on psychopathology. No significant improvements in feelings of depression compared to active control and wait-list conditions were shown in a small-scale RCT study by O'Leary and Dockray (2015). No effects of gratitude letter writing on depression or sadness were found in a sample with chronic back pain (Baxter et al., 2012). A quasi-experimental study using a gratitude disposition promotion program by Jung and Han (2017) in patients with schizophrenia showed no decrease in depressive symptoms after 4 weeks.

Several prospective observational studies have consistently shown high levels of trait gratitude to be associated with lower levels of depression, over periods up to 6 months, both in clinical and non-clinical samples with small to moderate effect sizes (Disabato, Kashdan, Short, & Jarden, 2017; Millstein et al., 2016; Sirois & Wood, 2017). The negative association between trait gratitude and depressive symptoms in the study of Disabato et al. (2017) was partly explained by the experience of positive life events and meaning in life, leading the researchers to argue that gratitude as a personality strength may help to motivate individuals with depression towards approach behaviours, such as grateful acts, necessary to generate positive life events and meaning in life, such as building emotional intimacy with others.

### **Anxiety**

RCTs targeting anxiety showed similar mixed results; anxiety decreased over the course of the treatment period (Jackowska et al., 2016; Ramírez et al., 2014; Southwell & Gould, 2017; Wong, McKean Blackwell, Goodrich Mitts, Gabana, & Li, 2017) and after 3 months (Ramírez et al., 2014) in both healthy and clinical samples. On the other hand, the experimental study of Salces-Cubero et al. (2018) could not provide evidence for reduced anxiety after a gratitude training intervention in elderly. Also, in a sample of adults with chronic back pain, gratitude letter writing did not improve anxiety (Baxter et al., 2012). One prospective observational studies have consistently shown high levels of trait gratitude to be associated with lower levels of anxiety, over periods up to 6 months, in a clinical sample with small effect sizes (Millstein et al., 2016).

### **Stress**

RCTs looking into gratitude interventions reducing stress, showed to decrease stress at the end of the intervention

period (Cheng et al., 2015; Southwell & Gould, 2017) and after 3 months (Cheng et al., 2015). Similar results in lower levels of perceived stress after a gratitude intervention were found in a longitudinal study without a control group in an elderly sample (Killen & Macaskill, 2015). The small-scale RCT study by O'Leary and Dockray (2015) showed no reduced levels of stress after a gratitude journaling intervention. Similarly, a study assigning undergraduate students non-randomly to a weekly gratitude journaling intervention, a stress management intervention, a combination of the two, or a control condition, did not find any of the conditions to have a significant stress-reducing effect (Flinchbaugh et al., 2012).

### **Negative affect**

The RCTs that included negative affect, all showed a decrease of negative affect (O'Connell et al., 2017b; Salces-Cubero et al., 2018; Wolfe & Patterson, 2017; Yang, Zhao, Aidi, & Kou, 2018). A mixed-methods randomized controlled pilot among individuals in outpatient treatment for alcohol use disorder showed the Three Good Things exercise to moderately reduce negative affect compared to placebo conditions (Krentzman et al., 2015). Martínez-Martí, Avia, and Hernández-Lloreda (2010) did not observe any changes in negative affect due to a two-week gratitude journaling, any event journaling, or a hassles journaling intervention in a small group of female participants. The study by Chan (2011), although showing reduced emotional exhaustion after count-your-blessings journaling, did not reveal any changes in negative affect among participants. Similar findings, i.e. no effects of gratitude or acts of kindness on negative emotions, were found by Ouweneel, Le Blanc, and Schaufeli (2014). Two-week gratitude or kindness journaling in a small randomized study among individuals on a waiting list for psychological treatment did not reduce levels of negative affect, although levels of anxiety were marginally reduced compared to the control group (Kerr et al., 2015). Quasi-experimentally designed gratitude drawing and educational interventions in young children (Owens & Patterson, 2013) and adolescents (Khanna & Singh, 2016), respectively, did not reduce negative affectivity or negative experiences compared to control conditions. The concept of gratitude may, however, be difficult to grasp for children, especially when the children are very young.

### **Other psychopathological distress**

An RCT of WoWong et al. (2017) in a sample of Chinese prisoners showed a decrease in psychological distress directly after a social gratitude program and after one-month follow-up. Emotional exhaustion as symptoms of burnout decreased after a pre-test/post-test design study, applying a gratitude

intervention in a sample of Chinese school teachers. These decreased levels of emotional exhaustion were stronger in teachers with a high level of experiencing a meaningful life (Chan, 2011). An RCT by Wong et al. (2016) showed, in a sample of young adults seeking psychological counselling, that a combination of psychotherapy and writing gratitude letters led to a larger improvement in global mental health than psychotherapy alone or a combination of psychotherapy and expressive writing. An RCT in women with early stage breast cancer revealed that a weekly gratitude letter writing exercise for 6 weeks did not induce changes in fear of recurrence of the breast cancer, but levels of death worry marginally decreased at 3 months after treatment compared to the control condition (Otto, Szczeny, Soriano, Laurenceau, & Siegel, 2016). Kleiman, Adams, Kashdan, and Riskind (2013) showed high levels of gratitude in synergy with high levels of grit (i.e. perseverance and passion for long-term goals; Duckworth, Peterson, Matthews, & Kelly, 2007), to predict low levels of suicide ideation. Gratitude levels at 5 months after exposure to trauma, however, did not predict global distress nor PTSD symptoms at five or 8 months, according to research by Lies, Mellor, and Hong (2014) among earthquake survivors. The longitudinal study by Jans-Beken, Lataster, Peels, Lechner, and Jacob (2017) showed no prospective association between trait gratitude and symptoms of psychopathology, when taking into account previous levels of psychopathology and subjective well-being.

### **Aggression**

DeWall et al. (2012) conducted five studies with different, large, mainly female samples of undergraduate students and a variety of research designs to provide insight into the relationship between aggression and gratitude. The first daily retrospective survey study (3 times a week for a total of 25 days) showed that gratitude was negatively associated with physical aggression, independent of the level of positive emotions. A second two-week event sampling study showed that feeling grateful seemed to protect against hurt feelings and aggressive reactions due to provocation within social interaction. In the third, experimental study, participants were first asked to write an essay and a letter about five things they were grateful for or, for the active control group, about what they would like to do. The participants then received, by manipulation, either insulting or positive feedback on their essays after which the researchers asked them to compete in a reaction time task against the person who gave them feedback. If the participants won, they could inflict a blast

of white noise to the loser, which served as a measure of aggression. While the participants who wrote a letter about what they wanted to do showed significantly more aggression in the insult condition, participants who wrote a gratitude letter did not show more aggression when provoked by insult. Lastly, DeWall et al. (2012) investigated whether empathy mediates the negative association between gratitude and aggression and discovered that grateful individuals are in part less aggressive because of their higher empathy for others. Deng et al. (2018) found similar, small, effects regarding gratitude and aggression, but for both the gratitude and the blessings condition. Chinese prisoners showed decreased aggression after a group-based intervention, but the content of the intervention did not matter.

### **In conclusion**

Findings from the longitudinal observational studies included in this review are generally in line with findings from the considerable body of previous, largely cross-sectional studies, suggesting negative associations between trait gratitude and indicators of psychopathology (Wood et al., 2010). High levels of trait gratitude thus seem predictive of fewer symptoms of psychopathology in the future, and approach behaviour motivation, contributing to positive life events and meaning in life, may be important mechanisms involved (Disabato et al., 2017). Experimental studies, on the other hand, show very mixed findings regarding the effects of gratitude interventions on indicators of psychopathology. Work by DeWall et al. (2012) and Deng et al. (2018) further establishes gratitude as a social and moral emotion and being able to empathize with others may prevent grateful individuals from acting in an aggressive way (García-Sancho, Salguero, & Fernández-Berrocal, 2014).

### **Psychological well-being**

The first component of well-being refers to autonomy and personal mastery, a sense of purpose and meaning in life, and personal growth and development (Ryff, 2014). Our search yielded eight experimental, and four prospective observational studies on the relationship between gratitude and psychological well-being, tapping into the domains of (i) meaning in life, (ii) academic engagement, (iii) basic psychological needs, (iv) self-esteem, (v) optimism, (vi) humility, (vii) post-traumatic growth, (viii) resilience, and (ix) dispositional hope. Table 3 represents an overview of included studies.

### **Meaning in life**

The quasi-experimental study by Flinchbaugh et al. (2012) showed that, compared to a passive control



Table 3. Psychological well-being: summary of articles.

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Flinchbaugh (2012)	E	29 (SMT) 33 (GRAT) 22 (COM) 33 (CG)	College students	59	22 (1.50)	...	Meaning in life; Engagement	Gratitude journal (weekly)	12 weeks	$\eta^2 = .08$ ( $p = .03$ ) $\eta^2 = .07$ ( $p = .04$ )	A combination of stress management and gratitude journaling alone improved levels of meaningfulness and engagement. Optimism increased after gratitude journaling.
Jackowska (2016)	E	40 (EG) 41 (ACG) 38 (WLCG)	Young adults	0	26 (0.77) 27 (0.79) 26 (0.82)	...	Optimism	Gratitude journal (3x a week for 2 weeks)	4 weeks	Not able to calculate	No significant increase in optimism.
Kerr (2015)	E	16 (EG) 16 (ACG) 15 (CG)	Adults seeking psychological treatment	25	43 (11.10)	SG (GAC)	Optimism	Gratitude journal (daily)	2 weeks	$d = .97$ (n.s.)	
Kleiman (2013)	L	209 (T)	College students	16	21 (4.12)	TG (GQ6)	Meaning in life	...	4 weeks	$\beta = -.014$ ( $p < .05$ ) $\beta = .012$ ( $p < .05$ )	Gratitude and the synergistic effect of grit and gratitude indirectly predicted suicide ideation through changes in meaning in life
Kruse (2014)	L	25 (EG) 25 (ACG)	Undergraduate students	NR	20 (1.83)	TG (GQ6)	Humility	...	Daily online questionnaires for 2 weeks	$\gamma_{02} = .103$ , $p < .05$	Level of trait gratitude on one day predicted higher levels of humility on the next day, accounting for humility on the previous day.
Lee (2015)	L	127 (T)	College students	27	20 (1.55)	TG (Izard's Differential Emotion Scale)	Basic psychological needs	...	2 months	$R^2 = .12$ ( $p < .01$ ) $R^2 = .13$ ( $p < .01$ ) $R^2 = .09$ (n.s.)	Gratitude showed an upward spiral with relatedness and autonomy but not with competence; gratitude did not predict competence.
Ouweneel (2014)	E	25 (EG) 25 (CG)	College students	28	21 (1.93)	...	Academic engagement	Gratitude journal (daily)	5 days	$\eta^2 = .04$ (n.s.)*	Academic engagement did not improve over time.
Peters (2013)	E	26 (EG) 28 (ACG) 28 (CG)	Healthy adults	16	23 (11.75)	...	Dispositional optimism; Attributional optimism	Imagery exercises (daily)	1 week	$\eta^2 = .07$ (n.s.) Not able to calculate	The gratitude intervention did not seem to be able to increase both dispositional as well as attributional optimism.
Salces-Cubero (2018)	E	36 (EG) 28 (ACG1) 28 (ACG2) 32 (CG)	Elderly	40	69 (7.78)	...	Resilience	One-time activity with gratitude, optimism or savouring as key variable	1 month	$\eta^2 = .11$ ( $p < .001$ ) $\eta^2 = .17$ ( $p < .001$ )	Gratitude and savouring were effective both between and within subject, optimism was not. This effect disappeared after one month.

(Continued)



Table 3. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Schnitker (2018)	E	33 (normal) 37 (social) 31 (prayer)	Graduate students	12	18 (0.42)	TG (GQ6)	Dispositional hope	Different kinds of gratitude journaling once a week for 5 weeks	6 weeks	Not able to calculate	The prayer condition in participants with high effort improved dispositional hope.
Zhou (2015)	L	217 (T)	Adolescent earthquake survivors	50	14 (1.39)	TG (GQ6)	Post-traumatic growth	...	3.5, 4.5, and 5.5 year after the disaster	Not able to calculate	Gratitude 3.5 and 4.5 years after the event predicted post-traumatic growth at 4.5 and 5.5 years after the event; Gratitude 3.5 years after the event predicted post-traumatic growth at 5.5 years after the event through deliberate rumination at 4.5 years after the event.
Wong (2017)	E	20 (EG)	Graduate students	30	23 (3.76)	SG (GAC)	Meaning in life	Gratitude Group Program	2 months	$d = -2.98 (p < .01)$ $d = -2.77 (p < .01)$	Participating in the Gratitude Group Program increased the level of meaning in life in time between T1 and T2, and T2 and T3.

Note. L = longitudinal; E = experimental; T = total group, EG = experimental group; CG = control group; ACG = active control group; TG = trait gratitude; SG = state gratitude; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist; SMT = stress management techniques; GRAT = gratitude journaling; COM = combination SMT and GRAT, ES = effect size, \* = estimation based on results in article.

condition, gratitude journaling increased the level of meaningfulness in undergraduate students over the course of 12 weeks, a small effect that was amplified when adding a stress management training. The study of Otto et al. (2016) showed that a 6-week online gratitude intervention increased meaningful goal pursuit in a sample of women with breast cancer compared to the control group. Also, WoWong et al. (2017) found that meaning in life increased after a gratitude group intervention over the course of 2 months, although in a small study (N = 20) with nonrandomized, one-group pre-post-test design. In line with these findings, Kleiman et al. (2013) observed without intervening that trait gratitude and grit work synergistically in protecting against suicidal ideation through increased meaning in life.

### ***Academic engagement***

In addition to its small effects on meaning in life in the quasi-experimental study by Flinchbaugh et al. (2012), gratitude journaling increased course engagement (purpose in life) in undergraduates, and this small effect was further amplified by additionally providing stress management strategies. Ouweneel et al. (2014), however, showed no beneficial effect of a gratitude intervention on academic engagement when compared to a kindness or neutral intervention in a group of undergraduate students in their RCT study.

### ***Basic psychological needs***

A prospective study by Lee, Tong, and Sim (2015) revealed associations between gratitude and psychological need fulfilment: gratitude predicted relatedness and autonomy, although not competence, over time. In line with these findings, Kerr et al. (2015) found a gratitude intervention to improve feelings of relatedness in a clinical sample awaiting psychological treatment.

### ***Self-esteem***

A positive effect of gratitude interventions on self-esteem has been suggested by findings from an experiment by Rash et al. (2011), in which participants were randomly instructed to recall either grateful feelings for someone or something, or a memorable event twice a week for a total of 4 weeks. After 4 weeks, participants in the gratitude condition showed higher self-esteem than participants in the control condition. No increase in self-esteem was observed, however, in young children participating in the gratitude drawing intervention study by Owens and Patterson (2013).

### ***Optimism***

Three RCTs have investigated the effects of gratitude interventions on feelings of optimism. A 5-min daily imagery and writing intervention in a healthy study sample did not elicit changes in optimism (Peters et al., 2013), but gratitude journaling, on the other hand, resulted in increased optimism compared to active control and no-treatment groups in the studies by Kerr et al. (2015) and Jackowska et al. (2016).

### ***Humility***

An observational study by Kruse, Chancellor, Ruberton, and Lyubomirsky (2014), asking participants to fill in daily questionnaires during a period of 2 weeks, showed that trait gratitude at the previous measurement was weakly and positively associated with humility at the next measurement.

### ***Post-traumatic growth***

One study on post-traumatic growth in adolescent survivors of the Sichuan earthquake, Zhou and Wu (2015) observed that gratitude at 3.5 and 4.5 years after the event predicted post-traumatic growth at 4.5 and 5.5 years, and that this association was at least partly mediated by the process of deliberate rumination.

### ***Resilience***

One quasi-experimental study showed that, compared to a passive control condition, both a gratitude and a savouring intervention increased resilience with a small effect in an elderly sample over the course of 1 month, whereas an optimism intervention did not (Salces-Cubero et al., 2018).

### ***Dispositional hope***

Schnitker and Richardson (2018) conducted a study with three conditions. Participants had to write down 10 things they were grateful for over the past week. The first group had to read the list aloud to themselves, the second group had to read the list aloud to a friend or significant other, and the third group had to read the list aloud to God. The researchers framed this last condition as prayer and participants in this group showed an increase in dispositional hope, compared to the other two conditions, especially when the participants executed the exercises with high effort. However, participants were students from a private Christian university, and thus it cannot be assumed that effects will generalize to non-Christian samples.

### ***In conclusion***

Although results on gratitude and factors of psychological well-being are currently scant, fragmented, and

inconclusive, there is some evidence suggesting that gratitude, possibly in synergy with other psychological competencies, may contribute to enhanced psychological well-being. However, reported effects are small which warrants further examination of the benefit of state and trait gratitude as a predictor for psychological well-being.

### ***Emotional well-being***

The second component of mental well-being is emotional well-being, comprising components such as happiness and life satisfaction (Diener, 2000). Our search yielded 32 intervention studies, and 1 prospective observational study on the relationship between gratitude and (i) happiness, (ii) subjective well-being, (iii) positive affect, (iv) life satisfaction, (v) flourishing, and (vi) quality of life. Table 4 presents an overview of the included articles.

### ***Happiness***

Expressing gratitude in an Islamic and secular version of an intervention showed to be associated with happiness during an RCT of 16 weeks of Al-Seheel and Noor (2016), compared to the control group. Another RCT during 5 weeks in a sample of healthy adult women improved happiness after a gratitude intervention, but a mindfulness intervention seemed more effective; the control group did not improve during this period (O'Leary & Dockray, 2015). A more recent quasi-experimental study of Salces-Cubero et al. (2018) in an elderly sample, resulted in increased happiness in both the gratitude and the savouring condition, but not the optimism condition, compared to a passive control condition, for the between-subjects model and the within-subjects model over the course of a month. The pilot study of Baxter et al. (2012) showed an increase in daily happiness in a small sample of respondents with chronic back pain over the course of five to 7 weeks. The positive psychology intervention of Ramírez et al. (2014) generated an increase in happiness in elder participants at post-intervention, but levels of happiness returned to base levels after 4 months after the intervention.

### ***Subjective well-being***

Watkins et al. (2015) performed an RCT in an undergraduate student sample during 5 weeks. Subjective well-being continued to increase, also after the intervention had ended after 1 week, compared to a memory or placebo intervention. Also, in a pre-post-follow-up trial, subjective well-being improved with small to moderate effect in the gratitude journaling intervention conducted with a sample of distressed participants (Southwell & Gould, 2017).

Similarly, WoWong et al. (2017) found that subjective well-being increased after a gratitude group intervention immediately after the intervention but not at follow-up. A nonrandomized one-group pre-post-test design in Chinese prisoners showed that both a gratitude sharing intervention and a counting blessing intervention increased subjective well-being of the inmates over the course of 5 weeks (Deng et al., 2018). Yang et al. (2018) also found effects for both the experimental and active control condition: similar to the gratitude intervention, the kindness intervention increased the reported levels of subjective well-being in a sample of male prisoners with small to moderate effect. The Mobile delivery of gratitude interventions to increase subjective well-being was assessed in two small-scale pilot-RCTs by Ghandeharioun, Azaria, Taylor, and Picard (2016) with promising results: use of their 'Kind and Grateful' app led to increased practice of gratitude, increased positive emotional valence and decreased emotional arousal, and increased levels of subjective well-being compared to baseline. Layous, Nelson, Kurtz, and Lyubomirsky (2017) conducted two RCTs. In the first study, they did not find an increase in subjective well-being by any of the conditions: general gratitude, specific gratitude, optimism, joy or control. In their second study, again they did not find a direct effect of conditions on subjective well-being, but they did find that the conditions as mentioned above increased elevation, which in turn increased subjective well-being (Layous et al., 2017). One prospective study by Jans-Beken et al. (2017) showed a small positive association between trait gratitude and levels of subjective well-being, when accounting for previous levels of psychopathology and subjective well-being.

### ***Positive affect***

Writing gratitude letters increased positive affect with every letter written during a period of 3 weeks (Toepfer et al., 2012). Positive affect increased in an RCT with a gratitude and active control intervention, and a control group (Ouweneel et al., 2014; Wolfe & Patterson, 2017). However, positive affect decreased to baseline level 2 weeks after the intervention while participants from the kindness intervention group reported higher positive affect at that point of time (Ouweneel et al., 2014). In an RCT by Otto et al. (2016), participants diagnosed with breast cancer showed a stable level of positive affect during the study period of 4,5 months, in contrast to the control group who showed a decline of positive affect during the same period. A similar finding is reported by O'Connell et al. (2017b); positive affect stayed fairly the same in the study but affect balance improved after both a reflective interpersonal gratitude journaling (fostering gratitude) intervention and a reflective behavioural interpersonal gratitude



Table 4. Emotional well-being: summary of articles.

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Al-Seheel (2016)	E	20 (EG) 19 (ACG) 21 (CG)	Undergraduate students	15	22 (1.22)	...	Happiness	Gratitude journal (daily for 2 weeks) + gratitude letter	17 days	$\eta^2 = .28$ ( $p < .05$ )	The participants in the Islamic condition showed a higher increase in happiness but there was no significant differences between the different conditions.
Baxter (2012)	E	8 (T) 4(EG) 4(ACG)	Adults with chronic back pain	50	55 (8.25)	...	Daily happiness	Character strength and gratitude intervention	5-7 weeks	Not able to calculate	The Character strength and gratitude intervention increased daily happiness.
Carson (2010)	E	9(T)	Service users attending a community mental health team	NR	NR	TG (GO6)	Being thankful; Life satisfaction; Environmental mastery; Social feelings	Two 2 hour workshop with daily dairies	1 month	Not able to calculate	After the intervention participants reported being thankful for more things, increased life satisfaction, environmental mastery, and social feelings.
Chan (2010)	E	96(T)	Chinese school teachers	18	33 (7.57)	TG (GO6)	Life satisfaction; Positive affect; SG (GAC)	Weekly log of TGT and Naikan questions	8 weeks	$d = -.513$ ( $p < .001$ ) $d = -.486$ ( $p < .01$ ) $d = -.390$ ( $p < .05$ )	The intervention increased life satisfaction in the low-trait gratitude group, and positive affect
Chan (2011)	E	63(T)	Chinese school teachers	16	34 (6.91)	TG (GO6)	Life satisfaction	Weekly log of TGT and Naikan questions	8 weeks	$d = -.54$ ( $p < .01$ )	The intervention increased life satisfaction in the high meaningful-life group
Deng (2018)	E	29 (EG) 37 (ACG) 30 (CG)	Male prisoners	100	35 (9.65)	TG (GRAT)	Subjective well-being	5 daily diary (counting blessing) versus 5 weekly group sessions (sharing gratitude)	5 weeks	$\eta^2 = .11$ ( $p = .005$ )	Both the gratitude and blessing intervention increased levels of SWB. The interventions did not differ
Flinchbaugh (2012)	E	29 (SMT) 33 (GRAT) 22 (COM) 33 (CG)	College students	59	22 (1.50)	...	Life satisfaction	Gratitude journal (weekly)	12 weeks	Not able to calculate	None of the interventions were able to increase levels of life satisfaction.

(Continued)

Table 4. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Ghandeharioun (2016)	E	27 (T)	Young adults	48	NR	TG (GO6)	Thankful behaviour	Kind and grateful app use	5 weeks	Not able to calculate	Thankful behaviour increased. Psychological well-being and trait gratitude increased during the 5 weeks. The best moment for expressing gratitude is after social interaction, physical activity and location change
Işık (2017)	E	11 (EG) 10 (CG)	First year college students	33	18 (2.47)	TG (GO6)	Life satisfaction; Positive affect	3 week daily reflective gratitude journaling	3 weeks	Not able to calculate	Both life satisfaction and positive affect increased, using Wilcoxon Signed Rank Tests
Jackowska (2016)	E	40 (EG) 41 (ACG) 38 (WLCCG)	Young adults	0	26 (0.77) 27 (0.79) 26 (0.82)	...	Flourishing	Gratitude journal (3x a week for 2 weeks)	4 weeks	Not able to calculate	The intervention did not increase levels of flourishing.
Jans-Beken (2017)	L	706 (T)	Adults	31	44 (14)	TG (SGRAT)	Subjective well-being	...	4 measures during 7.5 months	$\beta = .088$ ( $p < .001$ )	Trait gratitude is a predictor on the long run for increased well-being, accounting for previous levels of psychopathological symptoms and subjective well-being.
Jung (2017)	E	17 (EG) 15 (CG)	Patients with schizophrenia	NR	NR	TG (GRAT)	Life satisfaction	Gratitude disposition promoting program	Twice a week for 4 weeks	$\eta^2 = .25$ ( $p < .01$ )*	The results of the program differed between the experimental and the control group; the experimental group reported higher life satisfaction than the control group.

(Continued)



Table 4. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Khanna (2016)	E	177 (T) 95 (EG) 82 (CG)	Highschool students	58	12 (0.67)	...	Positive mental health; Positive experience; Life satisfaction; Social-cognitive perceptions of gratitude; Positive affect; SG (GAC)	5 weekly sessions in a classroom and journal-based homework	5 weeks	$\eta^2 = .01 - .10$ ( $p < .05$ )	After the intervention the levels of psychological well-being, positive mental health total score, social-cognitive perception of gratitude, positive affect, positive and balanced experiences, state gratitude, and life satisfaction increased but disappeared after controlling for scores on Time 1
Killen (2015)	E	88 (EG)	Elderly	26	71 (7.51)	TG (GQ6)	Flourishing; Emotional balance	TGT (daily for 2 weeks)	6 weeks	$\eta^2 = .10$ ( $p < .001$ ) $\eta^2 = .04$ (n.s.)	Flourishing increased across time, emotional balance did not.
Layous (2017)	E	45 (general gratitude) 47 (optimism) 47 (joy) 46 (ACG)	Graduate students	30	20 (2.92)	...	Subjective well-being	Random act of kindness once a week for 3 weeks	6 weeks		There were no changes over time in subjective well-being (T1-T2 and T2-T3) and there were no group differences (T1-T2 and T2-T3)
Layous (2017)		34 (EG1) 34 (EG2) 36 (EG3) 35 (ACG)	Graduate students	24	20 (3.10)	...	Subjective well-being	Activity once a week for 7 weeks	3 months		Across conditions, well-being did not increase over time and no differences between groups were detected.
O'Connell (2017a)	E	63 (EG) 68 (ACG) 61 (CG)	Mainly young adult sample	33	27 (12.63)	TG (GQ6)	Affect balance; Life satisfaction; Positive affect	Reflective behaviour – reflective only – control journaling	3 times a week for 3 weeks with 1 and 3 month follow-up	$\eta^2 = .06$ ( $p < .05$ )	Reflective behaviour improved affect balance at post-test. There were no differences in life satisfaction and positive affect in the different condition.

(Continued)

Table 4. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
O'Connell (2017b)	E	29 (EG1) 29 (EG2) 30 (ACG)	Student population	42	24 (7.79)	TG (GO6)	Life satisfaction	Gratitude journaling 4 days in 2 weeks	8 weeks	$\eta^2 = .09$ ( $p < .01$ )	Life satisfaction was higher in participants in the traditional gratitude journaling condition compared to the control group. There was no effect found for the interpersonal gratitude journaling condition.
O'Leary (2015)	E	29 (EG) 22 (ACG) 10 (ACG)	Healthy adults	0	28 (6.65)	...	Happiness	Gratitude journal (4x a week)	3 weeks	$\eta^2 = .07$ (n.s.)	No significant increase in levels of happiness after the intervention.
Otto (2016)	E	34 (EG) 33 (ACG)	Women with breast cancer diagnosis	0	57 (10.20)	SG (GAC)	Positive affect	Gratitude letter (once a week for 6 weeks)	4.5 month	Not able to calculate	The slope of the gratitude intervention remained stable whereas the slope of the control condition declined significantly. The gratitude intervention prevented positive affect from declining over the course of 4.5 month.
Ouweneel (2014)	E	25 (EG) 25 (CG)	College students	28	21 (1.93)	...	Academic engagement	Gratitude journal (daily)	5 days	$\eta^2 = .04$ (n.s.)*	Academic engagement did not improve over time.
Owens (2013)	E	22 (EG) 23 (ACG) 17 (ACG)	Children	48	7 (1.73)	...	Positive affect; Life satisfaction	Drawing (once a week)	4 to 6 weeks	Not able to calculate $\eta^2 = .06$ (n.s.)*	None of the drawing interventions increased positive affect or life satisfaction.
Peters (2013)	E	26 (EG) 28 (ACG) 28 (CG)	Healthy adults	16	23 (11.75)	...	Life satisfaction	Imagery exercises (daily)	1 week	$\eta^2 = .018$ ( $p < .05$ )*	The gratitude intervention was able to increase levels of life satisfaction.
Proyer (2013)	E	39 (EG) 44 (ACG) 53 (CG)	Healthy adults	41	41 (13.08)	...	Life satisfaction	Gratitude letter and 4 other interventions	NR	$\eta^2 = .08$ ( $p < .05$ )*	The program was able to increase levels of life satisfaction.

(Continued)





Table 4. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Rash (2011)	E	56 (T) NR (EG) NR (ACG)	Adult community sample	54	23 (3.00)	TG (GQ6);	Life satisfaction	Gratitude journal (twice a week)	4 weeks	$\eta^2 = .10$ ( $p < .05$ ) $d = .63$ ( $p < .05$ )*	The gratitude intervention increased the levels of life satisfaction; Trait gratitude moderated the association between the intervention and life satisfaction.
Ramírez (2014)	E	26 (EG) 20 (CG)	Elderly	65	71 (7.06)	...	Positive memories; Life satisfaction; Happiness	Gratitude letter	9 weeks	$\eta^2 = .15$ ( $p < .001$ ) $\eta^2 = .10$ ( $p < .05$ ) $\eta^2 = .09$ ( $p < .05$ )	The program was able to increase levels of positive memories, life satisfaction, and happiness.
Salces-Cubero (2018)	E	36 (EG) 28 (ACG1) 28 (ACG2) 32 (CG)	Elderly	40	69 (7.78)	...	Happiness; Positive affect; Life satisfaction	One-time activity with gratitude, optimism or savouring as key variable	1 month	$\eta^2 = .10$ ( $p < .001$ ) $\eta^2 = .09$ ( $p < .001$ ) $\eta^2 = .22$ ( $p < .001$ ) $\eta^2 = .32$ ( $p < .001$ ) $\eta^2 = .25$ ( $p < .001$ ) $\eta^2 = .23$ ( $p < .001$ )	Gratitude and savouring increased happiness, positive affect, and life satisfaction, in both between and within subject models, optimism was not. This effect remained the same after one month.
Schnitker (2018)	E	33 (normal) 37 (social) 31 (prayer)	Graduate students	12	18 (0.42)	TG (GQ6)	Life satisfaction	Different kinds of gratitude journaling once a week for 5 weeks	6 weeks	Not able to calculate	The prayer condition in participants with high effort improved life satisfaction.
Southwell (2017)	E	75 (EG) 52 (CG)	Adults with depression and/or anxiety	12	34 (10.80)	TG (GQ6)	Subjective well-being	Daily diary for at least 3 x per week for 3 weeks	6 weeks	$\eta^2 = .27$ ( $p < .001$ ) $\eta^2 = .03$ ( $p = .004$ )	Subjective well-being increased pre- to post-test and pre-test and follow-up.
Toepfer(2012)	E	219 (T) 141 (EG) 78 (CG)	Adults	14	26 (11.00)	TG (GQ6)	Life satisfaction; Happiness	Gratitude letters (3 times)	4 weeks	$\eta^2 = .24$ ( $p < .001$ )* $\eta^2 = .06$ ( $p < .01$ )*	The intervention increased life satisfaction and happiness.
Watkins (2015)	E	47 (EG) 42 (ACG) 40 (CG)	College students	29	NR	TG (SGRAT)	Subjective well-being	Gratitude journal (daily for one week)	6 weeks	$\eta^2 = .054$ ( $p < .05$ )	A significant rise of subjective well-being was not apparent at post-test and 1 week follow-up but it was on the 5 week follow-up.
Wolfe (2017)	E	35 (EG) 28 (ACG) 45 (CG)	Graduate students	0	20 (6.93)	...	Positive affect	Gratitude listing daily for 2 weeks	2 weeks	$\eta^2 = .06$ ( $p < .05$ )*	The gratitude condition improved positive affect

(Continued)

Table 4. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Wong (2017)	E	20 (EG)	Graduate students	30	23 (3.76)	SG (GAC)	Subjective well-being	Gratitude Group Program	2 months	$d = -2.92$ ( $p < .01$ ) $d = -1.51$ ( <i>n.s.</i> )	Participating in the Gratitude Group Program increased the level of subjective well-being in time between T1 and T2, but not between T2 and T3.
Yang (2018)	E	(EG1) (EG2) (AEG)	Prisoners	100	35 (9.76)	...	Subjective well-being; Positive affect; Life satisfaction; Subjective vitality	Counting blessings or Random acts or kindness for 6 weeks	6 weeks	$\eta^2 = .14$ ( $p < .001$ )* $\eta^2 = .29$ ( $p < .001$ )* $\eta^2 = .26$ ( $p < .001$ )* $\eta^2 = .08$ ( $p < .001$ )*	Both the kindness and gratitude interventions increased all dependent variables. Kindness scores better with life satisfaction and vitality, for positive affect and well-being both interventions were similarly effective.

Note. L = longitudinal; E = experimental; T = total group; EG = experimental group; CG = control group; ACG = active control group; NR = not reported; TG = trait gratitude; SG = state gratitude; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist; SGRAT = short gratitude, resentment, and appreciation test; SMT = stress management techniques; GRAT = gratitude journaling; COM = combination SMT and GRAT; TGT = Three Good Things intervention, ES = effect size, \* = estimation based on results in article.

journaling (fostering gratitude and expression of gratitude) intervention, compared to the control group. The study of Işık and Ergüner-Tekinalp (2017) showed that keeping a gratitude journal for 3 weeks, compared to a passive control condition, increased the level of positive affect in first-year college students. A quasi-experimental study of Salces-Cubero et al. (2018) in an elderly sample, resulted in increased positive affect in both the gratitude and the savouring condition, not the optimism condition, for the between-subjects model and the within-subjects model over the course of a month. Yang et al. (2018) also found results for both the experimental and active control condition. Just like the gratitude intervention, the kindness intervention increased the reported levels of positive affect in a sample of male prisoners with small to moderate effect. Another quasi-experimental design in a sample of middle school students showed higher positive affect after the Froh's 5-week Gratitude Curriculum compared to a control group (Khanna & Singh, 2016). The only study that did not show increased positive affect was in a sample of elementary school students; positive affect did not increase after a drawing intervention (Owens & Patterson, 2013).

### **Life satisfaction**

Positive psychology interventions, which target gratitude among others, showed to increase levels of life satisfaction in undergraduate student, adults and elderly (Flinchbaugh et al., 2012; Proyer, Ruch, & Buschor, 2013; Ramírez et al., 2014). Stand-alone gratitude interventions such as journaling, gratitude letters, and Froh's Gratitude Curriculum showed to increase in reported life satisfaction. (Carson, Muir, Clark, Wakely, & Chander, 2010; Chan, 2011; Işık & Ergüner-Tekinalp, 2017; Khanna & Singh, 2016; Salces-Cubero et al., 2018; Schnitker & Richardson, 2018; Toepfer et al., 2012). Rash et al. (2011) observed that trait gratitude moderated the effects of a gratitude intervention on satisfaction with life, such that those with low trait gratitude benefited from the intervention but those high in trait gratitude not; a finding that was previously reported by Chan (2011). Yang et al. (2018) also found effects for both the experimental and active control condition. Similar to the gratitude intervention, the kindness intervention increased the reported levels of life satisfaction in a sample of male prisoners with small to moderate effect. However, not all studies yielded positive effect between gratitude and life satisfaction. Peters et al. (2013) observed no improvement of life satisfaction following a one-week gratitude intervention in adults. After a journaling intervention, life satisfaction stayed about the same in a sample of both healthy

students and adults (O'Connell et al., 2017b). Results from another RCT (O'Connell, O'Shea, and Gallagher (2017a) showed that a traditional gratitude intervention was effective in increasing life satisfaction over the course of 8 week in a sample of students, compared to the control group. The effect, however, was quite small, and no differences were found in this study for the interpersonal gratitude intervention compared to the control group and the traditional gratitude intervention. In the drawing study with children by Owens and Patterson (2013), just as with positive affect, life satisfaction did not increase.

### **Flourishing**

Flourishing was included in a study by Killen and Macaskill (2015). They used the Three Good Things intervention in a sample of sub-clinical elderly and showed that flourishing increased during and after the 2-week intervention, up to 45 days after baseline measure. However, the gratitude journaling intervention of Jackowska et al. (2016) was ineffective on levels of flourishing.

### **Quality of life**

Jung and Han (2017) developed a gratitude disposition promotion program that is intended for chronic schizophrenic patients. The program consists of several stages, associated to different components of trait gratitude: improvement of sensitivity to external stimuli, understanding of gratitude, expression of gratitude, and empathy related to gratitude. Except that the program was able to indeed increase trait gratitude, it also showed to improve reported quality of life within this sample.

### **In conclusion**

Taken together, although not all studies have yielded positive results, the vast majority of research shows measures of emotional well-being to increase with small to moderate positive effects in response to a variety of gratitude interventions administered in a variety of populations, or to maintain at a certain level and prevent emotion well-being from declining.

### **Social well-being**

The third component of well-being is social well-being which embodies social and societal participation, consisting of social skills, social contacts and meaningful relationships, and societal commitments and a purposeful employment (Keyes, 1998). Our search identified 19 experimental, and 7 prospective studies investigating the relationship between gratitude and social and societal

Table 5. Social well-being: summary of articles.

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Algoe (2016)	E	24 couples (EG) 23 couples (ACG)	Couples in a marriage, engaged, or exclusively dating	50	29 (7.50)	...	Relationship satisfaction; Satisfaction with life; Positive emotions; Negative emotions; Daily ability to adapt; Daily relationship evaluation; Daily life satisfaction	4-6 random signaled conversations about the things the partner did and one is grateful for	4 weeks	Not able to calculate	When adjusting for the partner's responsiveness the gratitude intervention seemed to be able to increase positive emotions and the ability to adapt, not the other outcome measures. The authors think this might be because the couples scored very high on measures of life satisfaction at the start of the study.
Caleon (2017)	E	46 (EG) 57 (CG)	College students	48	13 (NR) 15 (NR)	TG (GO6)	Relatedness with parents, teachers, and peers	4 different activities in school	2 weeks	$\eta^2 = .04$ ( $p = .03$ )	The students who participated in the intervention class only reported improved relatedness with parents and peers, not with teachers.
Cho (2012)	E	183 (T) NR (low power) NR (high power)	College students	55	20 (NR)	...	Denigration	Notes with or without a gratitude expression	...	$\eta^2 = .07$ (n.s.)*	High-power individuals whose competence was threatened denigrated their subordinates. This pattern disappeared when the subordinate expressed gratitude. Among low-power participants, there were no main effects of competence and gratitude expression, nor an interaction between competence and gratitude expression.
Cho (2012)	E	123 (T) NR (low power) NR (high power)	College students	56	20 (NR)	...	Denigration	Notes with or without a gratitude expression	...	Not able to calculate	Gratitude expression ameliorates aggressive tendencies of threatened individuals with high-power by increased feelings of social worth in the eyes of one's subordinates.
Converse (2012)	E	42 pairs of strangers NR (ongoing) NR (completed)	Adults	NR	NR	SG (1 item asking for gratitude for helper)	Instrumentality of help	Trivia quiz with helpline	...		Contestants in the ongoing-game condition were more appreciative for the helpline than those in the completed game condition who even received more assistance.

(Continued)



Table 5. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Converse (2012)	E	40 (T) NR (active) NR (completed)	College students working in active participation	43	NR	SG (1 item asking for appreciation of help)	Instrumentality of help	...	3 months	$d = 1.03 (p < .01)$	Appreciation was related to the current level of instrumentality; Beneficiaries' appreciation of earlier help was more a function of their current reliance on their prior helpers than a function of their satisfaction with the preceding semester's grade.
Converse (2012)	E	114 (T)	College students	NR	NR	SG (1 item asking form appreciation of help)	Success of the goal	...	...	$d = 0.53 (p < .05)$	If assistance leads to success, appreciation will decrease when new goals take priority.
Diebel (2016)	E	49 (EG) 51 (ACG)	Primary school children	51	9 (NR)	SG (adapted GQ6)	Belonging at school	Gratitude diary (5x a week for 4 weeks)	4 weeks	$\eta^2 = .23 (p < .001)$	The gratitude diary was able to increase the sense of belonging at school in primary school children.
Froh (2010)	L	700 (T)	Middle school students	48	12 (0.89)	SG (GAC)	Social integration	...	6 months	$d = .23 (p < .01)^*$	Gratitude predicts social integration through prosocial behaviour.
Grant (2010)	E	35 (EG) 34 (CG)	College students	36	22 (3.55)	...	Prosocial behavior	E-mails with or without a gratitude expression	...	Not able to calculate	Gratitude expressions increase prosocial behavior through enabling helpers to feel more socially valued, rather than through enabling helpers to feel more efficacious or through positive or negative affect
Grant (2010)	E	29 (EG) 28 (CG)	College students	49	23 (3.47)	...	Prosocial behavior	E-mails with or without a gratitude expression	...	Not able to calculate	Social worth, but not self-efficacy, positive affect, negative affect, or empathy, mediated the effect of an expression of gratitude from one beneficiary on prosocial behavior directed toward a different beneficiary.
Grant (2010)	E	20 (EG) 21 (CG)	Fundraisers	24	NR	...	Prosocial behavior	Expression of gratitude from director	2 weeks	Not able to calculate	Expressing gratitude increased the prosocial behavior. Strengthened the fundraisers' feelings of social worth, not by enhancing their feelings of self-efficacy
Grant (2010)	E	79 (T) NR (EG) NR (CG)	College students	32	NR	...	Prosocial behavior	Expression of gratitude directly	...	Not able to calculate	Social worth predicted higher prosocial behavior in the gratitude expression condition.

(Continued)

**Table 5. (Continued).**

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Gordon (2012)	L	78 (T)	College students	17	21 (2.51)	RG (AIR)	Daily measures of appreciation, responsiveness, and relationship satisfaction	...	2 weeks	Not able to calculate	Individuals who felt more appreciated by their partners reported being more appreciative of them, and these appreciative feelings were associated with greater responsiveness to a partner's needs.
Gordon (2012)	L	99 (T)	College students	16	20 (2.00)	RG (AIR)	Relationship commitment; Daily measures of appreciation and relationship commitment	...	1 week and follow-up at 9 months	Not able to calculate	Individuals became more appreciative of their partners when they felt appreciated by them. In turn, individuals who were more appreciative of their partners were more likely to take the risky step of maintaining their commitment to their relationships over time: Appreciation influences not just how people think and act in their relationship, but also whether they actually remain in their relationships over time.

(Continued)



Table 5. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Gordon (2012)	E	49 couples (T)	Young adults	50	24 (6.70)	RG (AIR)	Relationship satisfaction	6 conversations where partners take turn; Observation	...	Not able to calculate	Appreciation is associated with observer ratings of responsiveness and commitment as partners interact in the laboratory, all the findings remained significant after controlling for relationship satisfaction; Individuals felt more appreciated by partners who were seen by observers as being committed and responsive to their partners' needs. These behavioral displays were one way in which appreciation was communicated between partners. When one partner felt appreciative and engaged in maintenance behaviors that transmitted his or her appreciation, the other partner felt more appreciated. Feelings of appreciation seem to create an upward cycle whereby appreciation promotes relationship maintenance and relationship appreciation.

(Continued)



**Table 5. (Continued).**

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Joel (2013)	E	216 (T) NR (EG) NR (ACG) NR (CG)	Adults in a romantic relationship	40	30 (12.00)	RG (3 items for feeling grateful for partner)	Relationship commitment	Recalling partner's investment, own investment or no recall	...	Not able to calculate	Individuals who recalled their romantic partner's past investments felt more committed to their relationship, relative to those who recalled their own investments or to those in the no-recall control condition; Two mediators were found of this association. When individuals thought about their romantic partner's investments into the relationship, they experienced greater feelings of trust, which in turn predicted stronger feelings of commitment. Recalling the romantic partner's investments elicited feelings of gratitude, which in turn increased individual's own commitment to the relationship.
Joel (2013)	L	36(T)	College students	16	20 (2.00)	RG (1 item for feeling grateful for partner)	Relationship commitment	Daily diary (1 week)	9 months	Not able to calculate	Perceiving a partner as being highly investing in a relationship promotes commitment. Individuals who perceived their partners more investing across 7 days experienced increased commitment to their relationship 9 months later; This increase in commitment was due to individuals feeling more grateful for partners whom they perceived as more investing.

(Continued)



Table 5. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Joel (2013)	L	69 couples (T)	Adults	50	NR	RG (AIR)	Relationship commitment	Daily diary (2 weeks)	3 months	Not able to calculate	The more frequently individuals invested into the relationship over the course of 2 weeks, the greater the increase in commitment over a 3-month period of time. Own investment frequency did not significantly predict commitment to the relationship 3 months later; Individuals who thought that their partners invested a great deal into their relationships over 2 weeks felt more grateful toward their partner 3 months later, which in turn lead to increased commitment to the relationship.
Kubacka (2011)	L	195 couples (T)	Newly weds	50	Men 32 (4.86) Women 29 (4.28)	RG (adapted GQ6)	Partner responsiveness; Relationship maintenance; Relationship satisfaction	...	2 years and 9 months after the wedding	Not able to calculate	Gratitude is a signal for perceived partner responsiveness and a motivator for relationship maintenance behaviors; There are both interpersonal and intrapersonal effects; The dyadic model held at three time points separated by intervals of about 1 year. After 4 years into marriage not only does the experience of gratitude motivate the self to maintain the relationship but also these relationship maintenance behaviors are noticed by the partner who perceives the self to be responsive to his or her needs, and in turn experiences gratitude.
Lambert (2011)	L	179 (T)	College students	21	NR	GB (3-item measure of behavior)	Comfort of voicing relationship concerns	...	3.5 months	$\beta = .18 (p < .01)$	Expressing gratitude predicts comfort with relationship concerns on the long run.

(Continued)

Table 5. (Continued).

First author (year)	Study design	N (condition)	Type participant	% Male	Mean Age (SD)	Gratitude measure(s)	Dependent variable(s)	Intervention	Time frame	ES	Summary of findings
Lambert (2011)	E	71 (EG) 78 (ACG) 76 (CG)	College students	11	20 (9.50)	...	Comfort of voicing relationship concerns	Gratitude letter (once)	...	$d = .39$ ( $p < .05$ )	Experimentally manipulated expression of gratitude increased participants' comfort in voicing relationship concerns.
Lambert (2011)	E	18 (EG) 17 (ACG) 20 (ACG) 19 (ACG)	College students	20	19 (1.25)	...	Comfort of voicing relationship concerns	Expressing gratitude	3 weeks	$d = .62$ ( $p < .05$ )	Expressing gratitude predicts comfort with relationship concerns on the long run and this association is mediated by the positive perception of the partner.
Ng (2017)	E	107 (EG) 105(ACG)	College students	33	21 (1.86)	SG (GAC)	Conformity	Writing about gratitude before rating colors on a sheet with correct or bogus answers from fake participants.	...	$d = .33$ ( $p < .05$ )	The participants in the gratitude condition were more likely to show conformity than the participants in the neutral condition, adjusted for positive affect.
Ng (2017)	E	111 (gratitude) 110 (joy) 110 (neutral)	Adults	76	31 (8.40)	SG (GAC)	Conformity	Writing about gratitude before choosing between 2 products incl. their market shares.	...	$\eta^2 = .02$ ( $p < .05$ )	The participants in the gratitude condition were more likely to show conformity than the participants in the joy and neutral condition, adjusted for positive affect.
Williams (2015)	E	30 (EG) 40 (CG)	College students	23	19 (1.50)	...	Affiliation with unknown peer	Receiving feedback with or without gratitude	1 week	Not able to calculate	The observed increase in affiliation directed toward grateful individuals is mediated by higher perceptions of interpersonal warmth resulting from the expression of gratitude.

Note. L = longitudinal; E = experimental; T = total group, EG = experimental group; CG = control group; ACG = active control group; NR = not reported; RG = relational gratitude; SG = state; GB = gratitude behaviour; GQ6 = Gratitude Adjectives Checklist; AIR = Appreciation In Relationships, ES = effect size, \* = estimation based on results in article.

participation on the topics of (i) relationships and (ii) prosocial behaviour. Table 5 presents an overview of included studies.

### **Relationships**

Prospective observational as well as RCT work by Lambert and Fincham (2011) has shown gratitude to predict comfort with voicing future relationship concerns in close relationships, an association mediated by a positive perception of the partner (Lambert & Fincham, 2011). Feeling appreciated, furthermore, elicits appreciating behaviour, relationship maintenance behaviour, and responsiveness to the partner as demonstrated both by prospective observational as well as experimental studies (Algoe & Zhaoyang, 2016; Gordon, Impett, Kogan, Oveis, & Keltner, 2012; Kubacka, Finkenauer, Rusbult, & Keijsers, 2011). Observational studies by Joel, Gordon, Impett, MacDonald, and Keltner (2013) have shown, furthermore, that the perception of the partner's investment in the relationship increases feelings of gratitude which in turn increase relationship commitment over time. The randomized experimental studies by Cho and Fast (2012) suggest that, in relationships involving a hierarchical imbalance, such as in workplace contexts, expressing gratitude by a subordinate can ameliorate the tendency to denigrate the competency of a subordinate by a supervisor, because of an increased sense of social worth for the subordinate and a decreased perceived threat to the own competency. Showing gratitude may improve subordinate-supervisor relationships, although ongoing gratitude expression from a subordinate to a supervisor may signal inferiority, thereby maintaining any existing hierarchical imbalance (Cho & Fast, 2012). Caleon et al. (2017) investigated relatedness of students towards parents, teachers, and peers. After a socially oriented gratitude intervention, students in the experimental (vs. waitlist control) group reported increased relatedness towards parents and peers who were more close to them, but not towards teachers. Regarding the formation of new relationships, experimental work by Williams and Bartlett (2015) suggests that expressing gratitude facilitates affiliation between unknown peers, and the perception of interpersonal warmth of the expresser plays a pivotal role in forming new relationships. Lastly, Diebel, Woodcock, Cooper, and Brignell (2016), in a school-based gratitude diary intervention study with random group assignment, found primary school children in the gratitude intervention vs. neutral events group to show an improved sense of belonging ('psychological

membership'), with boys benefiting more from the intervention than girls.

### **Prosocial behaviour**

A series of experiments performed by Grant and Gino (2010), in which a (manipulated) written expression of gratitude motivated beneficiaries to assist both the benefactor as well as a third person, have demonstrated that gratitude can spark 'upstream reciprocity', i.e. returning kindness not only to the benefactors but also to other parties (Nowak & Roch, 2007). Upstream reciprocity was also observed in the prospective observational study by Froh, Bono, and Emmons (2010): gratitude predicted social integration, an effect that was mediated by prosocial behaviour and life satisfaction. Moreover, gratitude and social integration were found to serially enhance each other in an upward spiral. Ng et al. (2017) have linked gratitude to social conformity based on their finding that experimentally induced gratitude in college students and adults raised the likelihood of showing private conformity in a colour judgment task and a material consumption task. Highly grateful individuals showed more social conformity even when they were making their choices privately; they chose the wrong answer because they knew others chose this answer before them (J.W. Ng et al., 2017). Converse and Fishbach (2012) experimentally dissected the time course of gratitude in response to prosocial behaviour. Whereas individuals who receive help from a benefactor in completing a task, appreciate the assistance more and feel more indebted during the task than after the task is completed or after the benefactor is deemed no longer instrumental, benefactors expect to be more appreciated after the task is finished. Thus, 'helpers are more appreciated while they are useful', but do not intuit this effect of task completion (Converse & Fishbach, 2012).

### **In conclusion**

The majority of the reviewed studies, both prospective and experimental, suggest that gratitude plays a role in maintaining healthy relationships, as well as in facilitating the formation of new relationships. Experimental and observational work suggests that gratitude increases prosocial behaviour, not just towards the benefactor but also towards others. This may set in motion an upward spiral towards positive social behaviour, reflected by improved relationship related emotions, thoughts, and behaviours beneficial for all partners involved. However, the findings from Cho and Fast (2012) suggest that within relationships with an hierarchical imbalance, gratitude, especially when expressed naively or excessively, may detrimentally

impact social relationships by stimulating, rather than discouraging, feelings of superiority or subordination.

## General discussion

With this updated review, we aimed to summarize the current research regarding state and trait gratitude associated with human health. Insight in the associations between gratitude and both physical and mental health is essential to understand the role of gratitude in human health and to develop and employ interventions that target those domains in which gratitude can be expected to contribute to the enhancement of an individual's health.

Based on our review of the literature, we concluded that (i) there is currently little convincing evidence for unique beneficial effects of gratitude on physical health and bodily functions; (ii) having a grateful disposition is positively linked to the absence of psychopathology, but gratitude interventions are not unequivocally established as universally effective for decreasing psychopathological symptoms; (iii) although a sense of gratitude seems closely tied to the concept of psychological well-being, the literature on the impact of gratitude (interventions) on psychological well-being remains scant, fragmented, and inconclusive; (iv) gratitude is positively associated with emotional well-being, and gratitude interventions hold potential for moderately increasing aspects thereof; and (v) gratitude appears to facilitate social well-being.

The pattern of observations suggests gratitude (interventions) to moderately benefit factors of mental well-being (emotional well-being, social well-being, and – to a lesser extent – psychological well-being), but not necessarily reduce symptoms of psychopathology. These findings align with recent prospective observational work from Jans-Beken et al. (2017), demonstrating trait gratitude to predict the presence of future subjective well-being but not the absence of psychopathology. Moreover, a series of meta-analyses recently conducted by Dickens (2017), suggest that gratitude interventions can benefit individual subjective well-being, happiness, life satisfaction, and positive affect, but their effects on depression, stress and negative affect are equivocal. According to Keyes' two-continua model (Keyes, 2002, 2005), mental well-being and psychopathology are two related but distinct dimensions of complete mental health (Lamers, Westerhof, Glas, & Bohlmeijer, 2015), i.e. the presence of mental well-being does not necessarily imply the absence of psychopathology and vice versa. Findings from our review thus suggest gratitude (interventions) to most likely affect the mental well-being rather than psychopathology dimension of mental

health. However, small to moderate mediating associations were established for gratitude and meaning in life on depressive symptoms (Disabato et al., 2017), the synergy of gratitude and grit, and meaning in life on suicide ideation (Kleiman et al., 2013), gratitude and empathy on aggression (DeWall et al., 2012), and gratitude and deliberate rumination on post-traumatic growth (Zhou & Wu, 2015). Given the interrelatedness of both continua of mental health (Lamers et al., 2015), cultivating a sense of gratitude may thus indirectly decrease psychopathology through increasing levels of mental well-being. In any case, gratitude shows complex connections with the presence of mental well-being and absence of psychopathology, that should be taken into consideration when studying the dynamics of gratitude and mental health (Jans-Beken et al., 2017), which is important because mental health and physical health are reciprocally interconnected ((Ohrnberger, Fichera, & Sutton, 2017)).

Mental well-being in the two-continua model is composed of three factors: emotional well-being, psychological well-being, and social well-being. The current findings identified the emotional well-being and social well-being as most susceptible to the potential beneficial effects of state and trait gratitude and gratitude-based interventions, in line with the broaden-and-build (Fredrickson, 2001) and the find-remind-and-bind theory (Algoe, 2012). A considerable amount of evidence suggests interventions such as gratitude journaling, carried out over a considerable period of time, to beneficially affect emotional well-being parameters, although with small to moderate effects, and uncertainty about long-term sustainability. The finding that gratitude appears to play an important role in forming and maintaining healthy relationships contrasts with the observation that virtually all gratitude intervention protocols are directed at the individual rather than interpersonal level of experience. Protocols to promote the effects of gratitude within relationships are scarce, but show promising results (Algoe & Zhaoyang, 2016; Joel et al., 2013; Kubacka et al., 2011), and could represent a starting point for developing and testing standardized intervention protocols for couples, teams, institutions, and even larger communities, ideally setting in motion an upward spiral of positive social behaviour. However, future research should not only aim at the benefits of gratitude within social interactions, as pointed out by Lavelock et al. (2016), but should also direct attention to the hindrance or harm gratitude may have or cause in relationships. Manipulation or exploitation may occur in relationships between individuals high in trait gratitude. Because of intense feelings of gratitude for benefits received in the past, they may feel

obliged to stay in a relationship or may have difficulties establishing boundaries, with possible negative effects on well-being. Other known key relationship variables such as assertiveness – or a lack thereof (Van Tongeren, Davis, & Hook, 2014) – may relate to the expression of gratitude and therefore deserve attention in future research. In addition, future studies should further elucidate the effects of gender, kinship distance, and relational familiarity on gratitude experience and expression in social relationships.

Cultivating the grateful trait may help to build resilience for mental health problems through an increased mental well-being. Partial support for this notion comes from a number of studies reporting improvements in mental well-being in response to gratitude interventions (Chan, 2011; Cheng et al., 2015; Jackowska et al., 2016; Krentzman et al., 2015; Otto et al., 2016; Ramírez et al., 2014; Toepfer et al., 2012; Watkins et al., 2015; Wong et al., 2016). However, an almost equal amount of studies reported no effects of gratitude interventions on stress, depression and anxiety (Baxter et al., 2012; Chan, 2011; Flinchbaugh et al., 2012; Kerr et al., 2015; Khanna & Singh, 2016; Martínez-Martí et al., 2010; O'Leary & Dockray, 2015; Otto et al., 2016; Owens & Patterson, 2013). Although methodological inconsistencies – addressed in the next paragraph – may partly underlie the mixed results between gratitude and mental well-being, they cannot fully explain the heterogeneity in findings. Indeed, research suggests that positive psychology interventions are not always suitable, in particular for individuals with mental health issues, and the effectiveness of an intervention is dependable on psycho-contextual factors such as stress and adversity (Lies et al., 2014; Parks & Biswas-Diener, 2013), as well as patient characteristics (Sergeant & Mongrain, 2011; Sin, Della Porta, & Lyubomirsky, 2011). Nonetheless, cultivating a sense of gratitude has been suggested to aid in preventing mental problems following adversity (Lies et al., 2014; Parks & Biswas-Diener, 2013).

The current literature review provides limited convincing evidence for beneficial effects of gratitude on physical health, in line with findings from a recent meta-analysis, reporting no substantive effects of gratitude interventions on physical health, sleep, and exercise (Dickens, 2017). Given the observation that gratitude interventions positively affect subjective well-being, and the well-substantiated notion that 'happy people live longer' (i.e. high mental well-being is linked to better health and longevity; Diener & Chan, 2011), there is a possibility that gratitude interventions may

indirectly and positively impact physical health through their effects on mental well-being.

### **Methodological limitations of included studies**

Our review of the literature identified a number of concerns regarding methodological aspects of the studies that were analysed. First, a substantial amount of studies employed small samples, making them susceptible to Type-II error (Rosner, 2010). With respect to the findings on gratitude and mental well-being, smaller scale studies have more often yielded negative results than experiments performed on a larger scale, suggesting statistical power issues may at least partly underlie inconsistency of findings, although power calculations are rarely reported. Future studies are therefore advised to perform adequate a priori power analysis to ensure their sample size is large enough to detect a practical difference when one truly exists. Conversely, some studies have likely yielded *false positives* (Type-I error) due to a lack of correction for multiple testing. The likelihood of false-positive results increases as a function of the number of comparisons, and future studies are advised to undertake necessary adjustments to maintain a significance level of 5% in the context of multiple testing (Simas, Maestri, & Normando, 2014). A third methodological shortcoming of several studies included in this review is a lack of attention to confounders of the associations under investigation. For instance, not attending to physical activity or exercise and the use of cardiac medication in the study of the effects of gratitude on bodily functions may have yielded imprecise results. Furthermore, as shown by Jans-Beken et al. (2017), gratitude is not uniformly distributed across demographic groups but associated with age, gender, education level, and employment status, and the effects of gratitude (interventions) on mental health may be in part reducible to these demographic factors. In the majority of the studies, there was an overrepresentation of female participants that may have influenced findings, given that women tend to have higher trait gratitude and derive greater benefits from gratitude interventions than men (Kaczmarek et al., 2015; Kashdan, Mishra, Breen, & Froh, 2009; Krause, 2006; Sommers & Kosmitzki, 1988), whereas on the other hand they are more likely to suffer from depression and anxiety (Rosenfield & Mouzon, 2013). The relationship between positive traits – such as gratitude – and well- and ill-being may in addition vary as a function of age (Shallcross, Ford, Floerke, & Mauss, 2013). Future studies are therefore advised to carefully attend to possible confounding variables, through study design and sample selection, and/or by statistically correcting for their influence on the effects under investigation. Fourth, several intervention studies compared an



experimental 'gratitude' group to a 'no-treatment' control group, making it impossible to ascertain to which extent any observed effect was attributable to intervention-specific characteristics rather than to generic characteristics common to all interventions. Indeed, several studies that included an 'active control' group – e.g. everyday events recall, positive events recall, constructive worry, mindfulness, and imagery distraction – often reported similar effects of this condition compared to those of the gratitude condition, suggestive of generic rather than specific pathways towards mental health. Fifth, selective dropout, i.e. a higher likelihood of resilient individuals to complete demanding longitudinal assessments, and a higher likelihood of individuals experiencing beneficial effects of gratitude interventions to complete these interventions, may have biased findings towards positive results (Digdon & Koble, 2011; Redwine et al., 2016). Sixth, most research used the GQ6 to assess trait gratitude, but this questionnaire shows problematic internal consistency in specific populations (Chen, Chen, Kee, & Tsai, 2009; Lies et al., 2014; Zeng, Ling, Huebner, He, & Lei, 2017), possibly explained by cultural or demographic differences between study samples that should be addressed in future studies.

### ***Gratitude interventions: some considerations***

A variety of interventions have been used to enhance gratitude with the aim of improving human health aspects. Substantial differences in gratitude exercises, however, seriously hamper comparison between intervention studies, and a detailed overview of procedures is not always reported. Even studies using the same exercise, have delivered different instructions to participants, possibly leading to differences in interpretation, and consequently different results. In addition, support and monitoring during the intervention period appears to be provided in some but not all studies, likely affecting compliance and effectiveness (Sin et al., 2011). Apart from differences in content and delivery, we observed differences in intervention duration, a factor previously shown to moderate effectiveness of positive psychology interventions in general (Sin & Lyubomirsky, 2009), which was supported by the results from studies included in the current review – i.e. studies employing longer intervention periods were more likely to report effects of gratitude exercises on mental health outcomes than studies spanning shorter periods. Moreover, continued practice following gratitude intervention periods is rarely instructed nor assessed, and an important task for future studies is to investigate whether the beneficial effects of gratitude interventions can be sustained over longer time periods.

The reported overlap in effects of gratitude journaling and other journaling interventions on bodily functioning (Jackowska et al., 2016; Rash et al., 2011), psychopathology (Jackowska et al., 2016; Kerr et al., 2015; Watkins et al., 2015), psychological well-being (Kerr et al., 2015), and emotional well-being (Peters et al., 2013; Rash et al., 2011; Watkins et al., 2015), suggests shared or generic mechanisms through which different journaling interventions may similarly activate mental health (see also: Dickens, 2017). Journaling has been claimed to be in general beneficial for personal growth, intuition, problem-solving, stress reduction, and reflection (Hiemstra, 2001), and future studies should be designed in such a way that generic and specific intervention effects can be teased apart, to more accurately map the working mechanisms involved.

Although clinical vs non-clinical individuals generally tend to respond to gratitude interventions with a larger increase in mental well-being (Sin & Lyubomirsky, 2009), caution is warranted when exposing clinical samples to gratitude-based interventions with the aim of improving psychopathological symptoms, as these interventions do not necessarily benefit everyone, and may even be deleterious for some (Sin et al., 2011). However, gratitude interventions may be valuable in primary prevention as a tool to foster resilience (Lies et al., 2014; Parks & Biswas-Diener, 2013), as well as improving aspects of mental well-being in patients in clinical remission (Sin et al., 2011). Moreover, as suggested by the findings from Otto et al. (2016) and O'Connell et al. (2017b), in times of adversity, gratitude interventions may not be able to boost positive affect above baseline levels, but may help to prevent positive affect from declining, underlining the importance of attention to contextual psychological factors. Lastly, individuals culturally predisposed to avoid attracting attention have, for instance, been reported to experience strong discomfort when being requested to express feelings of gratitude (Parks & Biswas-Diener, 2013), possibly causing the intervention to backfire. It is, thus, important to further study and explain heterogeneity in effects of gratitude interventions on mental health across study samples and, specifically, across individuals, and a model that can help to do so is the person-activity fit model from Lyubomirsky and Layous (2013), which represents a first attempt at mapping intrinsic motivation for engaging in positive psychological interventions.

Important for the efficacy of interventions in general and that of gratitude interventions in particular is the intention to engage in interventions on a daily or weekly basis. Research shows that individuals with



strong intentions to change their quality of life or well-being are more likely to engage in a gratitude intervention, i.e. self-selection bias. When an individual intends to engage in a gratitude intervention, giving instructional support hampers the desirability to actually engage in it (Kaczmarek et al., 2014). Another factor that may influence gratitude intervention engagement is intervention content: gratitude letters versus gratitude journaling. Both interventions are perceived as useful and socially acceptable, but the writing of gratitude letters intervention is perceived as less effective for enhancing mental well-being than gratitude journaling, and this decreases relative initiation and completion rates for this intervention. Gratitude journaling is a longer lasting intervention with a possibly more long-term impact on mental well-being, whereas writing gratitude letters as an intervention is a more social intervention with a more intense but possibly also more short-lived impact (Kaczmarek et al., 2015).

Practical significance of gratitude interventions is limited by their, on average, small to moderate effects (Davis et al., 2016; Dickens, 2017). Nonetheless, even interventions showing small effect sizes may in theory have serious impact when presented to many individuals, and adherence is high (Huppert, 2009). Technological developments open avenues for large-scale delivery of low-threshold gratitude interventions, such as the Kind and Grateful app (Ghandeharioun et al., 2016). Furthermore, although weakly to moderately effective on their own, gratitude exercises can be embedded in larger multi-intervention programs, e.g. in combination with stress reduction exercises (Flinchbaugh et al., 2012), or exercises targeting also other positive psychological constructs such as forgiveness (Ramírez et al., 2014). The use of such a 'shotgun approach' (Sin & Lyubomirsky, 2009), combining different (positive) intervention elements into a larger, comprehensive program, has previously been suggested to increase chances of establishing effects on indicators of mental well-being (Ramírez et al., 2014), together with attention to person-activity fit (Lyubomirsky & Layous, 2013; Parks & Biswas-Diener, 2013), tailoring (Schueller, 2011), and interactive support (Cuijpers, Donker, van Straten, Li, & Andersson, 2010).

## Conclusion

The current review focused on experimental study findings, complemented with findings from multi-wave longitudinal studies, to provide a better understanding of the possible causal relationships between gratitude and human health. The reviewed studies emphasize that gratitude is beneficially, although modestly, linked

to social well-being, emotional well-being and to a lesser extent psychological well-being. Studies focusing on physical health and psychopathology do not consistently point to a unique role of gratitude in these domains. Although our review paints a clear picture of the current standing in gratitude research and shows the gaps in knowledge regarding the role of gratitude in human health, it does not necessarily provide a comprehensive and cumulative overview of the recent research on gratitude, due to search methods, and a specific focus on post-2010 experimental and prospective observational reports. New research is needed to shed more light on the modest but beneficial value of gratitude for human health. This review provides scholars, practitioners, and policy makers with an overview of the current knowledge of the contribution of gratitude to human health to support practice, and uncover gaps therein to help guide future scientific research.

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## References

- Algoe, S. B. (2012). Find, remind, and bind: The functions of gratitude in everyday relationships. *Social and Personality Psychology Compass*, 6(6), 455–469.
- Algoe, S. B., & Zhaoyang, R. (2016). Positive psychology in context: Effects of expressing gratitude in ongoing relationships depend on perceptions of enactor responsiveness. *The Journal of Positive Psychology*, 11(4), 399–415.
- Al-Seheel, A. Y., & Noor, N. M. (2016). Effects of an Islamic-based gratitude strategy on Muslim students' level of happiness. *Mental Health, Religion & Culture*, 19(7), 686–703.
- Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior helping when it costs you. *Psychological Science*, 17(4), 319–325.
- Baxter, H. J., Johnson, M. H., & Bean, D. (2012). Efficacy of a character strengths and gratitude intervention for people with chronic back pain. *Australian Journal of Rehabilitation Counselling*, 18(2), 135–147.
- Caleon, I. S., King, R. B., Tan, J. P.-L., Low, M., Tan, C. S., & Liem, G. A. (2017). Nurturing grateful and connected twenty-first century learners: Development and evaluation

- of a socially oriented gratitude intervention. *Asia Pacific Journal of Education*, 37(4), 567–581.
- Carson, J., Muir, M., Clark, S., Wakely, E., & Chander, A. (2010). Piloting a gratitude intervention in a community mental health team. *Groupwork: an Interdisciplinary Journal for Working with Groups*, 20(3), 73–87.
- Chan, D. W. (2011). Burnout and life satisfaction: does gratitude intervention make a difference among Chinese school teachers in Hong Kong? *Educational Psychology*, 31(7), 809–823.
- Chen, L. H., Chen, M. Y., Kee, Y. H., & Tsai, Y. M. (2009). Validation of the Gratitude Questionnaire (GQ-6) in Taiwanese Undergraduate Students. *Journal of Happiness Studies*, 10(6), 655–664.
- Cheng, S.-T., Tsui, P. K., & Lam, J. H. M. (2015). Improving mental health in health care practitioners: Randomized controlled trial of a gratitude intervention. *Journal of Consulting and Clinical Psychology*, 83(1), 177–186.
- Cho, Y., & Fast, N. J. (2012). Power, defensive denigration, and the assuaging effect of gratitude expression. *Journal of Experimental Social Psychology*, 48(3), 778–782.
- Chow, C. K., Jolly, S., Rao-Melacini, P., Fox, K. A., Anand, S. S., & Yusuf, S. (2010). Association of diet, exercise, and smoking modification with risk of early cardiovascular events after acute coronary syndromes. *Circulation*, 121(6), 750–758.
- Clore, G. L., Ortony, A., & Foss, M. A. (1987). The psychological foundations of the affective lexicon. *Journal of Personality and Social Psychology*, 53(4), 751.
- Converse, B. A., & Fishbach, A. (2012). Instrumentality boosts appreciation: Helpers are more appreciated while they are useful. *Psychological Science*, 23(6), 560–566.
- Cuijpers, P., Donker, T., van Straten, A., Li, J., & Andersson, G. (2010). Is guided self-help as effective as face-to-face psychotherapy for depression and anxiety disorders? A systematic review and meta-analysis of comparative outcome studies. *Psychological Medicine*, 40(12), 1943–1957.
- Davis, D. E., Choe, E., Meyers, J., Wade, N., Varjas, K., Gifford, A., ... Worthington, E. L., Jr. (2016). Thankful for the Little things: A meta-analysis of gratitude interventions. *Journal of Counseling Psychology*, 63(1), 20–31.
- Deng, Y., Xiang, R., Zhu, Y., Li, Y., Yu, S., & Liu, X. (2018). Counting blessings and sharing gratitude in a chinese prisoner sample: Effects of gratitude-based interventions on subjective well-being and aggression. *The Journal of Positive Psychology*. doi:10.1080/17439760.2018.1460687
- DeWall, C. N., Lambert, N. M., Pond, R. S., Jr., Kashdan, T. B., & Fincham, F. D. (2012). A grateful heart is a nonviolent heart: Cross-sectional, experience sampling, longitudinal, and experimental evidence. *Social Psychological and Personality Science*, 3(2), 232–240.
- Dickens, L. R. (2017). Using gratitude to promote positive change: A series of meta-analyses investigating the effectiveness of gratitude interventions. *Basic and Applied Social Psychology*, 39(4), 193–208. doi:10.1080/01973533.2017.1323638
- Diebel, T., Woodcock, C., Cooper, C., & Brignell, C. (2016). Establishing the effectiveness of a gratitude diary intervention on children's sense of school belonging. *Educational and Child Psychology*, 33(2), 117–129.
- Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist*, 55(1), 34.
- Diener, E., & Chan, M. Y. (2011). Happy people live longer: Subjective well-being contributes to health and longevity. *Applied Psychology: Health and Well-Being*, 3(1), 1–43.
- Digdon, N., & Koble, A. (2011). Effects of constructive worry, imagery distraction, and gratitude interventions on sleep quality: A pilot trial. *Applied Psychology: Health and Well-Being*, 3(2), 193–206.
- Disabato, D. J., Kashdan, T. B., Short, J. L., & Jarden, A. (2017). What predicts positive life events that influence the course of depression? A longitudinal examination of gratitude and meaning in life. *Cognitive Therapy and Research*. doi:10.1007/s10608-016-9785-x
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92(6), 1087.
- Emmons, R. A., & Mishra, A. (2011). Why gratitude enhances well-being: What we know, what we need to know. In K. M. Sheldon, T. B. Kashdan, & M. F. Steger (Eds.), *Designing positive psychology: Taking stock and moving forward* (pp. 248–262). Oxford: Oxford University Press.
- Fagley, N. S., & Adler, M. G. (2012). Appreciation: A spiritual path to finding value and meaning in the workplace. *Journal of Management, Spirituality & Religion*, 9(2), 167–187.
- Flinchbaugh, C. L., Moore, E. W. G., Chang, Y. K., & May, D. R. (2012). Student well-being interventions: The effects of stress management techniques and gratitude journaling in the management education classroom. *Journal of Management Education*, 36(2), 191–219.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, 56(3), 218–226.
- Froh, J., Bono, G., & Emmons, R. (2010). Being grateful is beyond good manners: Gratitude and motivation to contribute to society among early adolescents. *Motivation and Emotion*, 34(2), 144–157.
- García-Sancho, E., Salguero, J., & Fernández-Berrocal, P. (2014). Relationship between emotional intelligence and aggression: A systematic review. *Aggression and Violent Behavior*, 19(5), 584–591.
- Ghandeharioun, A., Azaria, A., Taylor, S., & Picard, R. W. (2016). "Kind and Grateful": A context-sensitive smartphone app utilizing inspirational content to promote gratitude. *Journal of Psychological Well-Being*, 6, 9.
- Gordon, A. M., Impett, E. A., Kogan, A., Oveis, C., & Keltner, D. (2012). To have and to hold: Gratitude promotes relationship maintenance in intimate bonds. *Journal of Personality and Social Psychology*, 103(2), 257–274.
- Grant, A. M., & Gino, F. (2010). A little thanks goes a long way: Explaining why gratitude expressions motivate prosocial behavior. *Journal of Personality and Social Psychology*, 98(6), 946.
- Hiemstra, R. (2001). Uses and benefits of journal writing. *New Directions for Adult and Continuing Education*, 2001(90), 19–26.
- Huber, M., Knottnerus, J. A., Green, L., Horst, H. V. D., Jadad, A. R., Kromhout, D., ... Smid, H. (2011). How should we define health? *BMJ*, 343. doi:10.1136/bmj.d4163
- Huffman, J. C., Beale, E. E., Celano, C. M., Beach, S. R., Belcher, A. M., Moore, S. V., ... Januzzi, J. L. (2015). Effects of optimism and gratitude on physical activity, biomarkers, and readmissions after an acute coronary syndrome: The

- gratitude research in acute coronary events study. *Circulation: Cardiovascular Quality and Outcomes*. doi:10.1161/circoutcomes.115.002184
- Huppert, F. A. (2009). Psychological well-being: Evidence regarding its causes and consequences†. *Applied Psychology: Health and Well-Being*, 1(2), 137–164.
- İşik, Ş., & Ergüner-Tekinalp, B. (2017). The effects of gratitude journaling on Turkish first year college students' college adjustment, life satisfaction and positive affect. *International Journal for the Advancement of Counselling*, 39(2), 164–175.
- Jackowska, M., Brown, J., Ronaldson, A., & Steptoe, A. (2016). The impact of a brief gratitude intervention on subjective well-being, biology and sleep. *Journal of Health Psychology*. doi:10.1177/1359105315572455
- Jans-Beken, L. G. P. J., Lataster, J., Peels, D., Lechner, L., & Jacob, N. (2017). Gratitude, psychopathology and subjective well-being: results from a 7.5-month prospective general population study. *Journal of Happiness Studies*, 1–17. doi:10.1007/s10902-017-9893-7
- Joel, S., Gordon, A. M., Impett, E. A., MacDonald, G., & Keltner, D. (2013). The things you do for me: Perceptions of a romantic partner's investments promote gratitude and commitment. *Personality and Social Psychology Bulletin*, 39(10), 1333–1345.
- Jung, M., & Han, K. (2017). Effectiveness of gratitude disposition promotion program on depression and quality of life of chronic schizophrenic patients. *Indian Journal of Psychiatry*, 59(2), 189–195.
- Kaczmarek, L. D., Goodman, F. R., Drażkowski, D., Kashdan, T. B., Połatyńska, K., & Komorek, J. (2014). Instructional support decreases desirability and initiation of a gratitude intervention. *Personality and Individual Differences*, 64, 89–93.
- Kaczmarek, L. D., Kashdan, T. B., Drażkowski, D., Enko, J., Kosakowski, M., Szäefer, A., & Bujacz, A. (2015). Why do people prefer gratitude journaling over gratitude letters? The influence of individual differences in motivation and personality on web-based interventions. *Personality and Individual Differences*, 75, 1–6.
- Kashdan, T. B., Mishra, A., Breen, W. E., & Froh, J. J. (2009). Gender differences in gratitude: Examining appraisals, narratives, the willingness to express emotions, and changes in psychological needs. *Journal of Personality*, 77(3), 691–730.
- Kerr, S. L., O'Donovan, A., & Pepping, C. A. (2015). Can gratitude and kindness interventions enhance well-being in a clinical sample? *Journal of Happiness Studies*, 16(1), 17–36.
- Keyes, C. L. (1998). Social well-being. *Social Psychology Quarterly*, 61(2), 121–140.
- Keyes, C. L. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43(2), 207–222.
- Keyes, C. L. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73(3), 539–548.
- Khanna, P., & Singh, K. (2016). Effect of gratitude educational intervention on well-being indicators among North Indian adolescents. *Contemporary School Psychology*, 20(4), 305–314.
- Killen, A., & Macaskill, A. (2015). Using a gratitude intervention to enhance well-being in older adults. *Journal of Happiness Studies*, 16(4), 947–964.
- Kleiman, E. M., Adams, L. M., Kashdan, T. B., & Riskind, J. H. (2013). Gratitude and grit indirectly reduce risk of suicidal ideations by enhancing meaning in life: Evidence for a mediated moderation model. *Journal of Research in Personality*, 47(5), 539–546.
- Krause, N. (2006). Gratitude toward God, stress, and health in late life. *Research on Aging*, 28(2), 163–183.
- Krentzman, A. R., Mannella, K. A., Hassett, A. L., Barnett, N. P., Cranford, J. A., Brower, K. J., ... Meyer, P. S. (2015). Feasibility, acceptability, and impact of a web-based gratitude exercise among individuals in outpatient treatment for alcohol use disorder. *The Journal of Positive Psychology*, 10(6), 477–488.
- Kruse, E., Chancellor, J., Ruberton, P. M., & Lyubomirsky, S. (2014). An upward spiral between gratitude and humility. *Social Psychological and Personality Science*, 5(7), 805–814.
- Kubacka, K. E., Finkenauer, C., Rusbult, C. E., & Keijsers, L. (2011). Maintaining close relationships: Gratitude as a motivator and a detector of maintenance behavior. *Personality and Social Psychology Bulletin*, 37(10), 1362–1375.
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863.
- Lambert, N. M., & Fincham, F. D. (2011). Expressing gratitude to a partner leads to more relationship maintenance behavior. *Emotion*, 11(1), 52–60.
- Lamers, S. M., Bolier, L., Westerhof, G. J., Smit, F., & Bohlmeijer, E. T. (2012). The impact of emotional well-being on long-term recovery and survival in physical illness: a meta-analysis. *Journal of Behavioral Medicine*, 35(5), 538–547.
- Lamers, S. M., Westerhof, G. J., Glas, C. A., & Bohlmeijer, E. T. (2015). The bidirectional relation between positive mental health and psychopathology in a longitudinal representative panel study. *The Journal of Positive Psychology*, 10(6), 553–560.
- Lavelock, C. R., Griffin, B. J., Worthington, E. L., Jr, Benotsch, E. G., Lin, Y., Greer, C. L., ... Davis, D. E. (2016). A qualitative review and integrative model of gratitude and physical health. *Journal of Psychology & Theology*, 44(1).
- Layous, K., Nelson, S. K., Kurtz, J. L., & Lyubomirsky, S. (2017). What triggers prosocial effort? A positive feedback loop between positive activities, kindness, and well-being. *The Journal of Positive Psychology*, 12(4), 385–398.
- Lazarus, R. S., & Lazarus, B. N. (1996). *Passion and reason: Making sense of our emotions*. New York, NY: Oxford University Press.
- Lee, L.-N., Tong, E. M. W., & Sim, D. (2015). The dual upward spirals of gratitude and basic psychological needs. *Motivation Science*, 1(2), 87–97.
- Lies, J., Mellor, D., & Hong, R. Y. (2014). Gratitude and personal functioning among earthquake survivors in Indonesia. *The Journal of Positive Psychology*, 9(4), 295–305.
- Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science*, 22(1), 57–62.
- Martínez-Martí, M. L., Avia, M. D., & Hernández-Lloreda, M. J. (2010). The effects of counting blessings on subjective well-being: a gratitude intervention in a Spanish sample. *The Spanish Journal of Psychology*, 13(02), 886–896.
- McCullough, M. E., Emmons, R., & Tsang, J. A. (2002). The grateful disposition: A conceptual and empirical

- topography. *Journal of Personality & Social Psychology*, 82(1), 112–127.
- Millstein, R. A., Celano, C. M., Beale, E. E., Beach, S. R., Suarez, L., Belcher, A. M., ... Huffman, J. C. (2016). The effects of optimism and gratitude on adherence, functioning and mental health following an acute coronary syndrome. *General Hospital Psychiatry*, 43, 17–22.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ*, 339.
- Ng, J. W., Tong, E. M., Sim, D. L., Teo, S. W., Loy, X., & Giesbrecht, T. (2017). Gratitude facilitates private conformity: A test of the social alignment hypothesis. *Emotion*, 17(2), 379–387.
- Nowak, M. A., & Roch, S. (2007). Upstream reciprocity and the evolution of gratitude. *Proceedings of the Royal Society B: Biological Sciences*, 274(1610), 605–610.
- O'Connell, B. H., O'Shea, D., & Gallagher, S. (2017a). Examining psychosocial pathways underlying gratitude interventions: A randomized controlled trial. *Journal of Happiness Studies*. doi:10.1007/s10902-017-9931-5
- O'Connell, B. H., O'Shea, D., & Gallagher, S. (2017b). Feeling thanks and saying thanks: A randomized controlled trial examining if and how socially oriented gratitude journals work. *Journal of Clinical Psychology*, 73(10), 1280–1300.
- O'Leary, K., & Dockray, S. (2015). The effects of two novel gratitude and mindfulness interventions on well-being. *The Journal of Alternative and Complementary Medicine*, 21(4), 243–245.
- Ohrnberger, J., Fichera, E., & Sutton, M. (2017). The relationship between physical and mental health: A mediation analysis. *Social Science & Medicine*, 195, 42–49.
- Otto, A. K., Szczeny, E. C., Soriano, E. C., Laurenceau, J.-P., & Siegel, S. D. (2016). Effects of a randomized gratitude intervention on death-related fear of recurrence in breast cancer survivors. *Health Psychology*, 35(12), 1320–1328.
- Ouweneel, E., Le Blanc, P. M., & Schaufeli, W. B. (2014). On being grateful and kind: results of two randomized controlled trials on study-related emotions and academic engagement. *The Journal of Psychology*, 148(1), 37–60.
- Owens, R. L., & Patterson, M. M. (2013). Positive psychological interventions for children: A comparison of gratitude and best possible selves approaches. *The Journal of Genetic Psychology: Research and Theory on Human Development*, 174(4), 403–428.
- Parks, A. C., & Biswas-Diener, R. (2013). Positive interventions: Past, present and future. In T. Kashdan & J. Ciarrochi (Eds.), *Mindfulness, acceptance, and positive psychology: The seven foundations of well-being* (pp. 140–165). Oakland: New Harbinger Publications.
- Peters, M., Meevissen, Y. M., & Hanssen, M. M. (2013). Specificity of the best possible self intervention for increasing optimism: Comparison with a gratitude intervention. *terapia psicológica*, 31(1), 93–100.
- Proyer, R. T., Ruch, W., & Buschor, C. (2013). Testing strengths-based interventions: A preliminary study on the effectiveness of a program targeting curiosity, gratitude, hope, humor, and zest for enhancing life satisfaction. *Journal of Happiness Studies*, 14(1), 275–292.
- Ramírez, E., Ortega, A. R., Chamorro, A., & Colmenero, J. M. (2014). A program of positive intervention in the elderly: Memories, gratitude and forgiveness. *Aging & Mental Health*, 18(4), 463–470.
- Rash, J. A., Matsuba, M. K., & Prkachin, K. M. (2011). Gratitude and well-being: Who benefits the most from a gratitude intervention? *Applied Psychology: Health and Well-Being*, 3(3), 350–369.
- Redwine, L., Henry, B. L., Pung, M. A., Wilson, K., Greenberg, B., Maisel, A., & Mills, P. J. (2016). A pilot randomized study of a gratitude journaling intervention on HRV and inflammatory biomarkers in Stage B heart failure patients. *Psychosomatic Medicine*, 78(6), 667.
- Rosenfield, S., & Mouzon, D. (2013). Gender and mental health. In C. S. Aneshensel, J. C. Phelan, & A. Bierman (Eds.), *Handbook of the sociology of mental health* (pp. 277–296). Dordrecht: Springer.
- Rosner, B. (2010). *Fundamentals of biostatistics*. Boston, MA: Cengage Learning.
- Ryff, C. D. (2014). Psychological well-being revisited: advances in the science and practice of eudaimonia. *Psychotherapy and Psychosomatics*, 83(1), 10–28.
- Salces-Cubero, I. M., Ramírez-Fernández, E., & Ortega-Martínez, A. R. (2018). Strengths in older adults: Differential effect of savoring, gratitude and optimism on well-being. *Aging & Mental Health*. doi:10.1080/13607863.2018.1471585
- Schnitker, S. A., & Richardson, K. L. (2018). Framing gratitude journaling as prayer amplifies its hedonic and eudaimonic well-being, but not health, benefits. *The Journal of Positive Psychology*. doi:10.1080/17439760.2018.1460690
- Schueller, S. (2011). Creating a recommendation framework for positive psychology exercises: The Netflix model of positive psychology.
- Seligman, M., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American Psychologist*, 61(8), 774–788.
- Seligman, M., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: empirical validation of interventions. *American Psychologist*, 60(5), 410.
- Sergeant, S., & Mongrain, M. (2011). Are positive psychology exercises helpful for people with depressive personality styles? *The Journal of Positive Psychology*, 6(4), 260–272.
- Shallcross, A. J., Ford, B. Q., Floerke, V. A., & Mauss, I. B. (2013). Getting better with age: the relationship between age, acceptance, and negative affect. *Journal of Personality and Social Psychology*, 104(4), 734.
- Simas, R., Maestri, F., & Normando, D. (2014). Controlling false positive rates in research and its clinical implications. *Dental Press Journal of Orthodontics*, 19(3), 24–25.
- Sin, N. L., Della Porta, M. D., & Lyubomirsky, S. (2011). Tailoring positive psychology interventions to treat depressed individuals. In S. I. Donaldson, M. Csikszentmihalyi, & J. Nakamura (Eds.), *Applied positive psychology: Improving everyday life, health, schools, work, and society* (pp. 79–96). New York: Routledge.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology*, 65(5), 467–487.
- Sirois, F. M., & Wood, A. M. (2017). Gratitude uniquely predicts lower depression in chronic illness populations: A longitudinal study of inflammatory bowel disease and arthritis. *Health Psychology*. doi:10.1037/hea0000436



- Sommers, S., & Kosmitzki, C. (1988). Emotion and social context: An American-German comparison. *British Journal of Social Psychology, 27*(1), 35–49.
- Southwell, S., & Gould, E. (2017). A randomised wait list-controlled pre-post-follow-up trial of a gratitude diary with a distressed sample. *The Journal of Positive Psychology, 12*(6), 579–593.
- Thomas, M., & Watkins, P. (2003). *Measuring the grateful trait: development of revised GRAT*. Paper presented at the Annual Convention of the Western Psychological Association, Vancouver.
- Toepfer, S. M., Cichy, K., & Peters, P. (2012). Letters of gratitude: Further evidence for author benefits. *Journal of Happiness Studies, 13*(1), 187–201.
- Tsang, J.-A. (2006). Gratitude and prosocial behaviour: An experimental test of gratitude. *Cognition & Emotion, 20*(1), 138–148.
- Van Tongeren, D. R., Davis, D. E., & Hook, J. N. (2014). Social benefits of humility: Initiating and maintaining romantic relationships. *The Journal of Positive Psychology, 9*(4), 313–321.
- Watkins, P., Uher, J., & Pichinevskiy, S. (2015). Grateful recounting enhances subjective well-being: The importance of grateful processing. *The Journal of Positive Psychology, 10*(2), 91–98.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*(4), 548–573.
- Williams, L. A., & Bartlett, M. Y. (2015). Warm thanks: Gratitude expression facilitates social affiliation in new relationships via perceived warmth. *Emotion, 15*(1), 1–5.
- Wolfe, W. L., & Patterson, K. (2017). Comparison of a gratitude-based and cognitive restructuring intervention for body dissatisfaction and dysfunctional eating behavior in college women. *Eating Disorders, 25*(4), 1–15.
- Wong, Y. J., McKean Blackwell, N., Goodrich Mitts, N., Gabana, N. T., & Li, Y. (2017). Giving thanks together: A preliminary evaluation of the gratitude group program. *Practice Innovations, 2*(4), 243–257.
- Wong, Y. J., Owen, J., Gabana, N. T., Brown, J. W., McInnis, S., Toth, P., & Gilman, L. (2016). Does gratitude writing improve the mental health of psychotherapy clients? Evidence from a randomized controlled trial. *Psychotherapy Research: Journal of the Society for Psychotherapy Research, 1*–11. doi:10.1080/10503307.2016.1169332
- Wood, A. M., Froh, J. J., & Geraghty, A. W. A. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review, 30*(7), 890–905.
- Wood, A. M., Maltby, J., Stewart, N., & Joseph, S. (2008). Conceptualizing gratitude and appreciation as a unitary personality trait. *Personality and Individual Differences, 44* (3), 621–632.
- Yang, Y., Zhao, H., Aidi, M., & Kou, Y. (2018). Three good deeds and three blessings: The kindness and gratitude interventions with chinese prisoners. *Criminal Behaviour and Mental Health. doi:10.1002/cbm.2085*
- Yu, H., Cai, Q., Shen, B., Gao, X., & Zhou, X. (2016). Neural substrates and social consequences of interpersonal gratitude: Intention matters. *Emotion. doi:10.1037/emo0000258*
- Zeng, Y., Ling, Y., Huebner, E. S., He, Y., & Lei, X. (2017). The psychometric properties of the 5-item Gratitude Questionnaire (GQ-5) in Chinese adolescents. *Journal of Psychiatric and Mental Health Nursing. n/a-n/a. doi: 10.1111/jpm.12372.*
- Zhou, X., & Wu, X. (2015). Longitudinal relationships between gratitude, deliberate rumination, and posttraumatic growth in adolescents following the wenchuan earthquake in china. *Scandinavian Journal of Psychology, 56*(5), 567–572.