



# **Appreciating Gratitude**

New Perspectives on the  
Gratitude-Mental Health Connection

**Lilian Jans-Beken**



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# Appreciating Gratitude

## New Perspectives on the Gratitude-Mental Health Connection

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# CHAPTER 1

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## General Introduction



Gratitude is highly valued in Muslim, Christian, Jewish, Buddhist, and Hindu religion and spiritual thinking, because it is thought to be essential for a life living well. Besides religious or spiritual thought, also philosophers and writers have dealt with gratitude since the beginning of times, considering it a moral obligation to feel and express gratitude in response to received benefits. Gratitude has been called *not only the greatest of the virtues, but the parent of all others* by the Roman philosopher Cicero (106 BC - 43 BC). The famous political economist Adam Smith, in his book *The Theory of Moral Sentiments* (1759/2010), called gratitude the sentiment that immediately and directly prompts us to rewarding behaviour, which appears to be the proper and approved aim of gratitude. The sociologist Georg Simmel called gratitude the *moral memory of mankind*, in his book *Soziologie* (1908), referring to the possible origin of gratitude by strengthening bonds between humans to mutually help each other out. Doris Day (1924 -) said *gratitude is riches, complaint is poverty* and Oprah Winfrey (1954 -) said *no gesture is too small when done with gratitude*. All these quotes and statements refer to the valuable contribution of gratitude for humans as an individual, for their reciprocal relationships and for society.

Psychologist are relative newcomers to the debate on virtues and character strengths such as gratitude. One of the first scientific articles of gratitude was by Tesser, Gatewood, and Driver (1968) who looked empirically into the determinants of gratitude in a psychological economic way. Around the turn of the century, positive psychology became on the rise and gratitude started to receive more attention in scientific research as part of the virtues and positive emotions. In 2000 only 3 articles were published regarding gratitude, in 2016 there were 57 articles on gratitude (PsycINFO). The growing body of research links gratitude positively to mental health, and forwards gratitude as possible intervention target with the aim of improving mental well-being (Wood, Froh, & Geraghty, 2010). However, although a number of experimental and prospective observational studies have suggested a causal relationship between gratitude and mental health (Baxter, Johnson, & Bean, 2012; Jackowska, Brown, Ronaldson, & Steptoe, 2016; Killen & Macaskill, 2015), the majority of findings is based on cross-sectional research (Datu & Mateo, 2015; Kong, Ding, & Zhao, 2015; Vieselmeyer, Holguin, & Mezulis, 2017), hampering interpretations regarding possible cause and effect. Moreover, little is known, yet, about gratitude's long-term impact on mental health, and even less about its role in everyday life. The work presented in this dissertation therefore aims to further our understanding of the presumed role of gratitude in mental health, using a combination of a thorough review of the recent literature on experimental and prospective research regarding gratitude and positive health (Chapter 2), the translation and validation of two questionnaires measuring gratitude (Chapter 3), a prospective observational study of gratitude and its association with well-being and psychopathology over time

(Chapter 4), and an ecologically valid experience sampling study to investigate gratitude's link to daily life well-being (Chapter 5).

### **Gratitude: definitions and conceptualizations**

Gratitude can be conceptualized within the hierarchical levels of affect proposed by Rosenberg (1998). The framework distinguishes three levels that transcend the biological, psychological, cognitive, behavioural, and interpersonal domains. The first level is that of *affective traits*, which are stable predispositions that set the threshold for the occurrence towards particular emotional states, and prevent trait-incongruent emotions. An affective trait influences consciousness but is not likely to be experienced consciously. The second level is that of *moods*, in which affect is more transient and might fluctuate over the course of days. Just as affective traits, moods influence consciousness, but it is likely that they are also experienced consciously. Moods are primarily twofold with a negative and a positive emotional valence (Colombetti, 2005; Watson & Tellegen, 1985). The third level is that of *emotions or states*, which are intense and acute, usually briefly occurring psychophysiological changes in one's mental and physical state. Emotions arise from a swift and automatic assessment of the situation and can facilitate an efficient response that is usually beneficial for the individual. Emotions are very consciously experienced as they ask for our attention to an environmental challenge (Rosenberg, 1998). Within the framework of Rosenberg, gratitude can be conceptualized on two of the three levels; gratitude as a trait and gratitude as a state. Although gratitude has a mainly positive emotional valence and may be part of a positive mood (Colombetti, 2005; Watson & Tellegen, 1985), it is not considered to be a separate mood.

Trait gratitude has been defined by several scientists over the course of years. McCullough, Emmons, and Tsang (2002) defined trait gratitude as "a generalized tendency to recognize and respond with grateful emotion to the roles of other people's benevolence in the positive experiences and outcomes that one obtains" (McCullough et al., 2002, p. 112). Wood et al. (2010) proposed that trait gratitude can be viewed as a wider life orientation towards noticing and being grateful for the positive in the world, thus not necessarily involving the role of others therein. Paying attention with gratitude to anything in the world and not just a beneficiary makes the individual more likely to show more personal, social, and prosocial behaviour (Wood et al., 2010). Thomas and Watkins (2003) described three characteristic habits of individuals with a grateful trait. They suggested that grateful individuals tend to (i) experience a feeling of sufficiency, (ii) have an eye for the little things in life, and (iii) consciously appreciate other people in their lives (Thomas & Watkins, 2003). Overall, trait gratitude is viewed as a general tendency to recognize small to large benefits, to experience sufficiency, and to acknowledge anything in the world, both human and non-

human, with grateful emotion and expression of this emotion which promotes personal well-being and the well-being of others.

An important manifestation of trait gratitude is thought to be the experience and expression of 'grateful emotion', also labelled state gratitude. State gratitude has been conceptualized from different perspectives over the years. Clore, Ortony, and Foss (1987) distinguish between cognitive, affective, physical, and external classes of emotions, and state gratitude can be seen as an emotion with both a cognitive and an affective focus because of the conscious acknowledgment of a benefit and the feeling evoked by this (Clore et al., 1987). Lazarus and Lazarus (1996), in their categorization of emotions, considered state gratitude an empathic emotion, alongside e.g. compassion. State gratitude depends on being able to empathize with others and therefore this emotion is important for social interaction in our daily lives (Lazarus & Lazarus, 1996). Several experiments showed that after eliciting state gratitude, participants were more prone to not only helping their beneficiaries but also others beyond them (Bartlett & DeSteno, 2006; Tsang, 2006). Wood, Maltby, Stewart, Linley, and Joseph (2008) included this prosocial aspect of state gratitude in their social-cognitive model of state gratitude. Their experiments showed that the cognitive appraisal of a benefit was associated with a prosocial situation and state gratitude (Wood, Maltby, et al., 2008). In conclusion, state gratitude is a complex emotion with a cognitive, affective, and social component.

### **Gratitude: origins and functions**

Gratitude, as one of the cognitive, social and empathic affects, may have evolved because of survival benefits. Darwin (1889), in *The Descent of Man*, already pointed to the importance of survival of sympathy with a clear reference to gratitude;

... for we are led by the hope of receiving good in return to perform acts of sympathetic kindness to others [emphasis added]; and sympathy is much strengthened by habit. In however complex a manner this feeling may have originated, as it is one of high importance to all those animals which aid and defend one another, it will have been increased through natural selection; for those communities, which included the greatest number of the most sympathetic members, would flourish best, and rear the greatest, number of offspring (Darwin, 1889, p. 107).

However, the focus on Darwin's *survival of the fittest* became the main stream evolution theory with the emphasis on the value of negative emotions. These emotions have the tendency to narrow our attention to facilitate direct action towards a threat that might harm our existence. Fredrickson (2001) provided a renewed evolutionary view on positive emotions because they, too, have evolved to ensure our existence, just like negative emotions have. If positive emotions were superfluous or redundant for survival, this would

imply that they would have disappeared as part of human experience, which is not the case. The work of Fredrickson suggests that positive emotions, such as gratitude, tend to broaden our attention to facilitate exploration, relationships and skills development, which in turn helps to build resources that are useful when adversity strikes. This theoretical perspective – called the broaden-and-build theory – provides a framework that helps to understand why gratitude is part of human experience (i.e., its origins) and its connections to facets of mental health (i.e., its function). McCullough, Emmons, Kilpatrick, and Larson (2001) suggest that gratitude can be explained as a moral affect as it guides (pro)social behaviour that is considered good or appropriate in the interaction between individuals where gratitude functions as a moral barometer, a moral motivator, and a moral reinforcer. Gratitude as a moral barometer points to the emotional response of recognizing that one received a benefit which emphasizes the cognitive and empathic aspects of state gratitude. A moral motivator ensures that the receiver of a benefit acts in a prosocial manner and makes sure that immoral behaviour, such as ungratefulness, is inhibited. Gratitude as a moral reinforcer strengthens prosocial behaviour in benefactors when gratitude is expressed (McCullough et al., 2001). This prosocial behaviour not only focuses on the previous beneficiary but also on other people, also called upstream reciprocity (Froh, Bono, & Emmons, 2010; Nowak & Roch, 2007). The function of gratitude in relationships is further explained by the find-remind-and-bind theory (Algoe, 2012; Algoe, Haidt, & Gable, 2008), which posits that feeling grateful alters the way we look at a benefactor, which can lead to a new relationship. Someone that is helpful to us, might be an opportunity to connect with as a valuable partner for the future. Feeling grateful in an existing relationship reminds us of the quality of the relationship and this is helpful in binding our valuable partner to us for a longer period of time (Algoe, 2012; Algoe et al., 2008). However, whereas these general theories mostly point to the social origins and functions of gratitude, they provide little explanation for the supposed health benefits of gratitude in the absence of a benevolent source.

Wood et al. (2010) has proposed four distinct hypothetical mechanisms to underlie gratitude's supposed benefits for mental health, of which two specific and two general: (a) the schematic hypothesis, (b) the coping hypothesis, (c) the positive affect hypothesis, and (d) the broaden-and-build hypothesis. The schematic hypothesis poses that characteristic cognitive schemas of individuals influence the interpretation of the costs of the benefit to the benefactor, the value of the benefit to the beneficiary, and the altruistic intention with which the benefit is provided (Weiner, 1985; Wood, Maltby, et al., 2008). If the interpretation is accurate, state gratitude can arise and might be able to enhance feelings of well-being; if the interpretation is inaccurate and not in line with reality, this might be a signal of psychopathology (Bosmans, Braet, & Van Vlierberghe, 2010). In that case, gratitude will not be felt and there is no benefit for well-being. The second proposed specific underlying

mechanism is the coping hypothesis. Trait gratitude is associated with instrumental and emotional social coping, in line with the schematic hypothesis; individuals that are more accurate in interpreting benefits, might be more likely to turn to others for benefits when in need of help. Also, individuals high in trait gratitude, approach and deal with difficulties more actively, and are less inclined to avoid problems and engage in maladaptive behaviour. Using these adaptive coping strategies may reduce stress levels which in turn is associated with better mental health (Ed Diener & Chan, 2011; Wood, Joseph, & Linley, 2007). The third possible and more general underlying mechanism is formulated in the positive affect hypothesis which posits that gratitude, as part of the positive emotions, might protect against poor mental health as well as enhancing life satisfaction. Nonetheless, this hypothesis might be more complex than at first sight because gratitude shows predictive associations with measures of well-being above and beyond positive and negative affect (McCullough et al., 2002; Wood, Joseph, & Maltby, 2008, 2009), suggesting that grateful individuals are not just more satisfied with life because of their affective valence (Wood et al., 2010). The last proposed general underlying mechanism is based on the already mentioned broaden-and-build theory; positive emotions evolved for a certain purpose in the survival of humans. Fredrickson (2001) explains that gratitude might have evolved because it serves, among others, social bonding in quiet and safe times and these social ties may be resourceful when times of stress arrive. This is in line with the schematic hypothesis and the coping hypothesis because grateful schemas can make individuals more prone to recognize and acknowledge benefits received, making them more likely to turn to others for emotional or instrumental support when difficulties arise (Wood et al., 2010). Also, a connection between the positive affect hypothesis and the broaden-and-build hypothesis can be made; gratitude as a positive affect may evoke a broadened view on the surroundings and supports the elaborated momentary thought-action repertoire (Fredrickson, 1998). The mechanisms linking gratitude to mental health, as proposed by Wood et al. (2010) all forward the broaden-and-build theory as a candidate perspective from which trait and state gratitude's relation to mental health can be studied, explained and understood; this theory is used as the theoretical framework in chapter 5.

## Measuring gratitude

To study trait and state gratitude in psychological research, reliable and valid measures are necessary. Trait gratitude is frequently assessed through self-report questionnaires. In international research the Gratitude Questionnaire (GQ6: McCullough et al., 2002) is the most widely used measure to assess trait gratitude based on one underlying component. The scale with six items taps into four facets of trait gratitude: (a) intensity, (b) frequency, (c) span, and (d) density. Intensity refers to the level of intense feelings of state



gratitude an individual would feel after receiving a benefit. An individual with a disposition towards gratitude would feel more intense state gratitude compared to an individual less disposed towards gratitude. A grateful individual is also thought to report more frequent feelings of state gratitude during the day, elicited by small events, compared to a less grateful individual. The second facet is related to the third facet, span; a dispositional grateful individual recognizes more events as benefits than a non-dispositional grateful individual. The last facet is density, and concerns the number of persons to whom one feels grateful for. An individual high in trait gratitude might list more people he is grateful for than an individual low in trait gratitude.

Another, less used, measure to assess trait gratitude is the Short Gratitude, Resentment, and Appreciation Test (SGRAT: Thomas & Watkins, 2003). This measure assesses trait gratitude with one general component (overall score) or three subscales: (a) sense of abundance, (b) appreciation for simple pleasures, (c) social appreciation. The first characteristic, sense of abundance, is the opposite of materialism. In a survey conducted by Diessner and Lewis (2007), a strong negative association between the grateful disposition and materialism was found. Being grateful for what one has and being satisfied with the life one lives, unlikely co-occurs with wanting to have more. The second characteristic of a grateful individual is the tendency to appreciate simple pleasures, i.e. pleasures in life that are readily available to most people. Individuals who appreciate simple pleasures are suggested to be more prone to experience grateful feelings because they will experience these subjective benefits more frequently in their daily lives. Even though this characteristic has great face-validity, research to support this characteristic does not seem to be available. Future research needs to demonstrate that individuals with a high grateful trait tend to appreciate simple pleasures. The third characteristic is the tendency to appreciate the contributions of others to their well-being and to express this gratitude. Gratitude is an important part of social interaction, which is based on the determinants of being able to recognize that one has received a benefit, and acknowledging this benefit to others which leads to reinforcement of this social behaviour in the future (McCullough et al., 2001).

The validity and reliability of the English versions of the GQ6 and SGRAT have been demonstrated to be good (DeWall, Lambert, Pond, Kashdan, & Fincham, 2012; Diessner & Lewis, 2007; Huffman et al., 2015; McCullough et al., 2002; Thomas & Watkins, 2003; Zhou & Wu, 2015). However, because of the intention to conduct research in Dutch speaking participants, there was a need for Dutch translations, and validation of these questionnaires. Therefore, the English versions of the GQ6 and SGRAT were translated and back translated, and presented to a Dutch sample of the general adult population to validate the translated versions (Chapter 3).



State gratitude has been assessed using the Gratitude Adjective Checklist (GAC: McCullough et al., 2002). This measure asks participants to rate their feelings on the adjectives *grateful*, *thankful*, and *appreciative* and when these three items are combined into a scale, its reliability is very good (McCullough et al., 2002). Other studies (DeWall et al., 2012; Kerr, O'Donovan, & Pepping, 2015) have employed a single-item measure, asking participants to rate on a Likert scale to which extent they felt grateful within a certain time frame (e.g., the past day). Such a question appears to have face validity: you know state gratitude when you feel it, and scores on this measure have shown to correlate positively with well-being and negatively with aggression (DeWall et al., 2012; Kerr et al., 2015). However, measuring state gratitude at only one point at the end of the day or week, does not provide a full picture of momentary emotional experience, and retrospective bias might occur when asking about an emotion after a considerable amount of time.

To overcome these issues regarding the assessment of state gratitude, the Experience Sampling Method (ESM) can be used. ESM is a high-resolution structured diary technique to assess subjects in their day-to-day environment. This research method has been validated for the use of studying the immediate effects of stressors on emotion, mood, thoughts, current context, behaviour, and appraisal of the current situation (Delespaul, 1995; Hektner, Schmidt, & Csikszentmihalyi, 2007; Jacobs et al., 2005; Myin-Germeys et al., 2009). During the day, over a period of 5-7 days, participants are prompted a number of times a day to fill in a short questionnaire. Earlier studies used beeping wrist bands and paper dairies – data were entered manually into databases. Nowadays researchers can deploy apps for smartphones which makes filling in the questionnaires much easier for participants and collected data are digitally supplied to the researcher. The main strength of ESM is the ecological validity of this data collection method because it taps into the momentary mood states of individuals which vary during the day and week. This data collection method prevents retrospective bias that might occur with questionnaires that are filled in at the end of the day or week. ESM makes assessment of affect less vulnerable to biases such as (a) the personal heuristic effect, (b) the recency effect, (c) the salience effect, and (d) the mood-congruent memory effect, errors inherent to retrospective data collection (Trull, 2009). In chapter 5, the results of an ESM study into the reciprocity between state gratitude and positive affect in daily life are presented.

## **Psychopathology and well-being**

Psychopathology has been the focus of psychology for years and science has made great advances in knowledge and treatment of psychopathology phenotypes and their symptoms. Worldwide, the burden of psychopathology continues to grow with severe impact on overall health and major consequences in the social and economic domains (World

Health Organization, 2017). With the aid of science, programs are in place to prevent psychopathology, and several therapies have been developed and improved to treat individuals suffering from psychopathology. Inclusion of psychosocial factors in treating and managing psychopathology is recognized and several sources are designated as beneficial for the treatment and management of psychopathology, such as social support and personal strengths (World Health Organization, 2017).

The focus on personal strengths is relatively new, and has coincided with an increased attention for individual well-being, spread out over the domains of emotional, psychological, and social experience (Keyes, 2002). Emotional well-being, derived from hedonism, involves feelings such as happiness, joy, satisfaction, and interest in life. Research shows that emotional well-being is a multifactorial concept consisting of general satisfaction with life, the presence of positive affect, and the absence of negative affect (E. Diener, 2009; Keltner & Haidt, 1999; Keyes, Shmotkin, & Ryff, 2002; Panksepp, 2001; Seligman, 2011). Psychological well-being, derived from eudaimonism (Ryff, 2014), involves realizing one's own potentials and becoming a better person across the lifespan, and consists of six elements: self-acceptance, positive relations, environmental mastery, personal growth, autonomy, and purpose in life (Ryff & Keyes, 1995). Emotional and psychological well-being are strongly linked to optimal *individual* functioning, but individuals are embedded in a *social* structure which is also an important part of well-being. Social well-being consists of five domains according to Keyes (1998): social coherence, social actualization, social integration, social contribution, social acceptance. Together, emotional, psychological, and social well-being comprise well-being of which research shows it is related yet distinct from psychopathology (Keyes, 2005; Westerhof & Keyes, 2010).

Since psychopathology and well-being represent related yet distinct dimensions, a dual-continua model of mental health was proposed (Keyes, 2005), spanning two axes that represent psychopathology and well-being. Research shows that these two axes are relatively independent from each other within individuals; the presence of psychopathology is only weakly associated to the absence of well-being and vice versa (Bohlmeijer, Ten Klooster, De Kleine, Westerhof, & Lamers, 2016; Lamers, Westerhof, Glas, & Bohlmeijer, 2015; Westerhof & Bohlmeijer, 2010). The dual-continua model indicates that despite the presence of psychopathology, an individual may also experience well-being, and the model therefore suggests that a one-sided focus on psychopathology or well-being is unable to paint a clear picture of mental health. Incorporating both axes in research is important to capture the complexity of their separate influence and their interaction on mental health.

Well-being is embedded in the broader concept of positive health. Positive health is a new general concept of health and defined as "health as the ability to adapt and to self-manage, in the face of social, physical and emotional challenges" (Huber et al., 2011). This

definition tries to capture a broader view of health and well-being than the previous definition of the World Health Organization. Positive health consists of six pillars considered to be important for the overall health of individuals: bodily functions, mental well-being, meaningfulness, quality of life, social and societal participation, and daily functioning (Huber et al., 2016). Four of the six pillars of positive health are related to the dual-continua model. The pillar mental well-being refers to the psychopathological phenotypes that might be absent or present such as negative affect, anxiety, or depression. The pillar meaningfulness refers to the psychological well-being, consisting of, for instance, having a purpose in life, optimism, and engagement. The pillar quality of life refers to emotional well-being and this includes for example life satisfaction, happiness, and positive affect. The pillar social and societal participation refers to social well-being where relationship satisfaction, social integration, and prosocial behaviour are some of the important concepts. The work in this thesis aims to improve our understanding of gratitude's relation to positive (mental) health. To do so, a thorough review of the literature was conducted, specifically targeted at prospective and experimental research on gratitude and positive health (Chapter 2), as well as a 7.5-month prospective study looking into the associations between trait gratitude (assessed with the measure described in Chapter 3), well-being, and psychopathology (Chapter 4), and an ESM study to tap into gratitude's link to daily life well-being, building on broaden-and-build theory (Chapter 5).

### Overview of this dissertation

The main goal of this dissertation is to present new perspectives on the role of trait and state gratitude in well-being and psychopathology, with the aim to provide directions for future research and the practical application thereof. In chapter 2, results are presented of a literature review study regarding gratitude's link to the pillars of positive health, according to recent experimental and prospective observational research, in order to comprehend the current state of affairs regarding state and trait gratitude's presumed health benefits. Next, in order to enable the study of trait gratitude in the Netherlands and Belgium, the most common instruments to assess trait gratitude in English speaking populations (i.e. the GQ6 and SGRAT) were translated and validated in a sample of adults of the general Dutch speaking population, of which the results are presented in chapter 3. These instruments were then used to zoom in further on trait gratitude's link to the dual-continua axes of psychopathology and well-being, researched using a prospective study spanning 7.5 months, in an adult sample of the general Dutch speaking population (Chapter 4). In chapter 5, findings are presented from an Experience Sampling study among Dutch adults, that aimed to investigate whether state gratitude and positive affect engage in upward spirals at the momentary micro-level of daily life, and whether these connect to macro-level well-being and psychopathology

phenotypes. Lastly, in chapter 6, the main findings of our studies are summarized, their implications are discussed, and directions for future research are suggested.

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## CHAPTER 2

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### Gratitude and Positive Health: An Integrative Review

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Lechner, L., & Lataster, J. (Under Review). Gratitude and Positive Health: An  
Integrative Review.

## Abstract

The purpose is to provide an updated overview of the literature on the connection of gratitude to human health, specifically focusing on experimental study findings and multi-wave longitudinal studies, to better understand possible causation. Findings are integrated into the relatively new conceptual framework of 'positive health', and turns attention to the identification of health assets above and beyond a conventional disease-oriented approach. The reviewed studies emphasize that gratitude is beneficially, although modestly, linked to the social and quality of life pillars of positive health. However, although scarce, studies focusing on other pillars do not consistently point to a unique role of gratitude in bodily functioning, psychopathology, meaning in life, and daily functioning. New research is needed to shed more light on the beneficial value of gratitude for positive health. This review can support scholars, practitioners, and policy makers to design further research, apply findings in practice, and develop new policies.

## Introduction

Since the uprise of positive psychology at the beginning of this century, the study of gratitude, conceived as a virtue and important source of human strength, has gained increasing attention. Around 2010, several review studies 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 is positively linked to positive emotions and subjective well-being, and negatively to emotional vulnerabilities and negative affect, the majority of studies available for review employed 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, first, 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, complemented with findings from multi-wave longitudinal studies, to better understand possible causation. Second, we aim to integrate findings from these studies into the relatively new, holistic conceptual framework of 'positive health' (Huber et al., 2011) that puts emphasis on the ability to adapt to, and self-manage social, physical and emotional challenges, and thereby turns attention to the identification of health assets above and beyond a conventional disease-oriented approach. The concept of positive health is increasingly embraced by health professionals, as it may hold important implications for preventive medicine, health promotion, and public health. We aim to provide scholars, practitioners and policy makers with an overview of the current knowledge of the contribution of gratitude to positive health, and reveal gaps therein to help guide future scientific research and practice.

## Gratitude

Gratitude can be conceptualized 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, and this emotion promotes reciprocity and prosocial behaviour (Bartlett & DeSteno, 2006; Clore, Ortony, & Foss, 1987; Lazarus & Lazarus, 1996; 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.

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). The letter is usually addressed to someone the respondent is grateful for in life, but who is never properly thanked. After composing the letter, the content is read out loud 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 (virtual) experimental setups have been used to induce a state of gratitude in a laboratory context (Fox, Kaplan, Damasio, & Damasio, 2015; Kini, Wong, McInnis, Gabana, & Brown, 2016; Peters, Meevissen, & Hanssen, 2013; Yu, Cai, Shen, Gao, & Zhou, 2016).

### **Positive health**

The current World Health Organization definition of health dates to 1948, and defines health 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 of health and well-being. Health is not a static condition but a dynamic ability to adjust to life's challenges with resilience, and to self-manage one's own well-being. Qualitative research among patients, citizens, healthcare providers, and public health actors has identified six pillars of positive health that are considered important: bodily functions, mental well-being, meaningfulness, quality of life, social and societal participation, and daily functioning (Huber et al., 2016). Previous review studies on the significance of gratitude have generally focused on its benefits for mental or



physical health. We aim, however, to integrate findings from the current gratitude literature into the new and broader domain of positive health, consisting of six pillars related to overall health, to identify target domains of positive health for which interventions can be (further) developed and deployed.

## 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 1<sup>st</sup> of January 2010 until the 31<sup>st</sup> of June 2017. Only articles from international, peer-reviewed academic journals were included to ensure academic quality. As our study aimed to move beyond correlational evidence, only experimental and longitudinal studies with at least two waves of measurement in our review were included. 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: Watkins, Woodward, Stone, & Kolts, 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 health. To obtain articles reporting on the results of quantitative longitudinal observational and intervention studies with gratitude as predictor of positive health related outcomes, we used the following search terms for the title: “gratitude”, “grateful”, “thankful”, and “appreciation”. Search terms for the abstract were “prospective”, “longitudinal”, “experiment”, and “intervention”. 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 prospective, longitudinal, experimental, or interventional, studies with gratitude as dependent variable, and studies unrelated to state or trait gratitude and/or positive health were excluded, leaving 57 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).

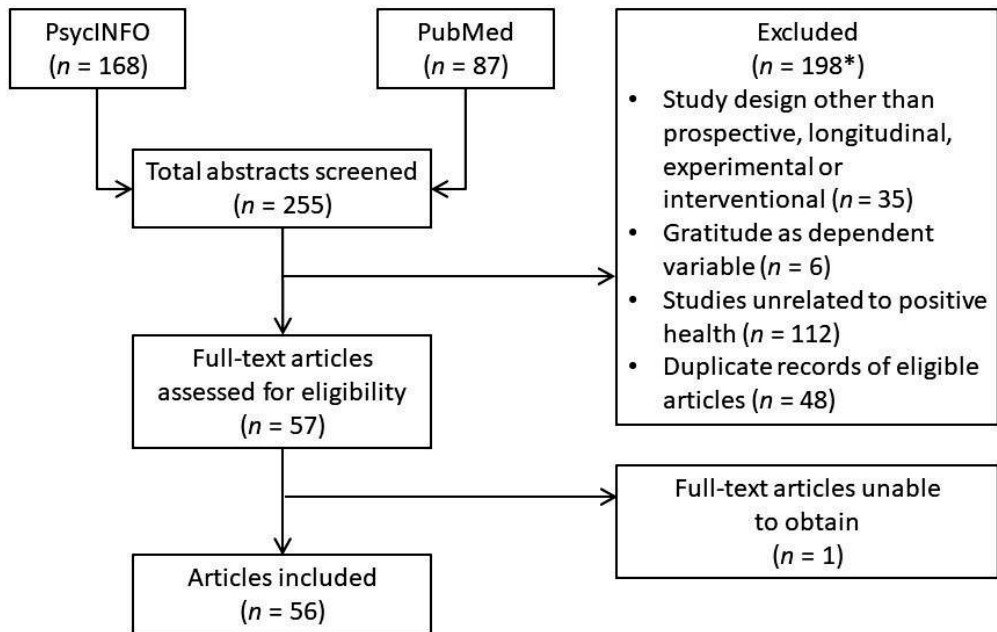


Figure 1. Number of articles found in PsycINFO and PubMed with indicated search terms using filters year 2010-2017, academic journal articles and English language; \* = including non-eligible duplicates. A list of excluded articles can be found at <https://osf.io/mzvzbz/>

## Review

### Pillar 1: Bodily Functions

The first pillar of positive health is that of bodily functions, encompassing medical diagnoses, pain, and other physical complaints, perceived physical health, and overall fitness and energy levels. 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, (iv) sleep, and (v) neural activity, and two longitudinal observational studies on the prospective effects of gratitude on (vi) (perceived) physical health. An overview is presented in *Table 1*.

**Cardiovascular physiology.** Randomized controlled trials (RCT's) 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 was 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 increased parasympathetic HRV was observed 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, see above) 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 tumor 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 (Huffman et al., 2015). Jackowska et al. (2016) did not find evidence in their RCT study 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 were asked 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 ( $n=8$ ) 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, see above) included assessment of sleep quality and sleep disturbance. Daily sleep quality improved to a slightly, but significantly greater extent following two weeks of gratitude journaling compared to no-treatment control conditions. 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. 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.

**Neural activity.** Fox et al. (2015) conducted a functional magnetic resonance imaging (fMRI) study in healthy psychology students. Compared to a baseline rest condition, ratings of gratitude elicited by a mental imagery task, correlated with brain activity in the anterior cingulate and medial prefrontal cortex. The same brain regions were linked to gratitude expression in an fMRI experiment by Kini et al. (2016), performed in a sample of patients suffering from depression and/or anxiety. Prior to the experiment, patients received psychotherapy with or without an additional instruction to write gratitude letters. After three months, both groups completed a “Pay It Forward” task in the scanner, expressing gratitude in the form of monetary gifts. Between-groups analyses showed greater neural modulation by gratitude in the perigenual anterior cingulate cortex of participants in the gratitude intervention condition, a region previously linked to empathy, theory of mind, and moral cognition. Involvement of the (ventro)medial prefrontal and cingulate cortex in the neural processing of gratitude was further confirmed in an fMRI experiment conducted by Yu et al. (2016). More specifically, ventromedial prefrontal cortex activation was related to expressions of reciprocity, while activity of the posterior cingulate cortex was related to self-reported gratitude. Additionally, Yu et al.’s intentional vs. unintentional help paradigm induced neural activation in the septum / hypothalamus, an area previously associated with affiliative affect and social bonding.

**Physical health.** Two studies investigated prospective associations between gratitude measured two weeks after acute coronary syndrome (ACS), and physical health outcomes six 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). Millstein et al. (2016), however, observed a positive effect of gratitude on mental health and 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.** Although previous correlational work has linked gratitude to various physical health benefits (Emmons & McCullough, 2003; Hill, Allemand, & Roberts, 2013; Kurtz & Lyubomirsky, 2008; McCullough et al., 2002; Sheldon & Lyubomirsky, 2006), the growing but still scant 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. Likewise, there is currently no strong 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, although it may do so indirectly through its effects on mental health and health behaviours. Lastly, gratitude appears to be neurally wired in brain regions involved in social bonding and moral decision making, in line with the idea of gratitude as a social and moral emotion with affective and cognitive components (McCullough, Emmons, Kilpatrick, & Larson, 2001).

## **Pillar 2: Mental Well-being**

Mental well-being is the second pillar of positive health and concerns indicators of cognitive and emotional (dis)functioning. Our search yielded twenty-three experimental and nine prospective observational studies on the relationship between gratitude and mental well-being, covering domains of (i) psychopathology, (ii) aggression, and (iii) self-esteem. An overview of included studies is presented in *Table 2*.

**Psychopathology.** Findings from five randomized controlled trials (RCT) in healthy adult samples, across a wide age range, have suggested a variety of gratitude interventions to moderately reduce levels of perceived stress, depressive symptoms, anxiety, body dissatisfaction and dysfunction eating behaviour directly after the intervention (Cheng, Tsui, & Lam, 2015; Jackowska et al., 2016; O'Connell, O'Shea, & Gallagher, 2017; Ramírez, Ortega, Chamorro, & Colmenero, 2014; Watkins, Uher, & Pichinevskiy, 2015; Wolfe & Patterson, 2017) and at three months follow-up (Cheng et al., 2015; O'Connell et al., 2017; Ramírez et al., 2014), in comparison to both active control and no-treatment conditions. Corroborating support for beneficial effects of gratitude interventions on psychopathology in healthy adults comes from non-randomized controlled studies, and longitudinal intervention studies without control group, showing small reductions in depressive symptoms (Toepfer, Cichy, & Peters, 2012), levels of perceived stress (Killen & Macaskill, 2015), and emotional exhaustion (Chan, 2011) over the course of gratitude intervention periods.

Not all gratitude intervention studies in healthy adults have yielded effects on psychopathology, however. No significant improvements in feelings of neither stress nor depression compared to active control and wait-list conditions were shown in a small-scale RCT study by O'Leary and Dockray (2015). Also, 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. 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). The study by Chan (2011, see above), 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 Ouwenel, Le Blanc, and Schaufeli (2014). Quasi-experimentally designed gratitude drawing and educational interventions in young children (Owens & Patterson, 2013) and adolescents (Khanna & Singh, 2016), respectively, were not shown to 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.

Gratitude intervention studies in clinical samples have yielded equally mixed results. An RCT by Wong et al. (2016) showed, in a large sample seeking psychological counselling, that a combination of psychotherapy and writing gratitude letters led to a larger improvement in global mental health than only psychotherapy or a combination of psychotherapy and expressive writing. A mixed method 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).

On the other hand, no effects of gratitude letter writing on sadness, anxiety, or depression were found in a sample with chronic back pain (Baxter et al., 2012, see above). 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). 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 four weeks. Lastly, an RCT in women with early stage breast cancer revealed that a weekly gratitude letter writing exercise for six weeks did not induce changes in fear of recurrence of the breast cancer, but levels of death worry marginally decreased at three months after treatment compared to the control condition (Otto, Szczesny, Soriano, Laurenceau, & Siegel, 2016).

A number of prospective observational studies have consistently shown high levels of trait gratitude to be associated with lower levels of depression and anxiety, over periods up to six months, both in clinical and non-clinical samples. Effect sizes were small to moderate (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, 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, such as building emotional intimacy with others. 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. Gratitude levels at five months after exposure to trauma, however, did not predict global distress nor PTSD symptoms at five or eight months, according to research by Lies, Mellor, and Hong (2014) among earthquake survivors. The longitudinal study by Jans-Beken, Lataster, Peels, Lechner, and Jacobs (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 (three times a week for a total of twenty-five 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 about what they would like to do. The participants then received, by manipulation, either insulting or positive feedback on their essays after which they were asked 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.

**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 four weeks. After four 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, see above).

**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 increased meaning in life and approach behaviour motivation 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, as discussed in more detail in the *General discussion*. Work by DeWall et al. (2012) 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). Lastly, gratitude may add to self-acceptance and can improve an individual's self-concept, although research on the topic is currently scant.

### **Pillar 3: Meaningfulness**

The third pillar of positive health refers to existential and spiritual aspects of human experience, having a sense of purpose in life and finding meaning in adversity. Our search yielded four experimental, and three prospective observational studies on the relationship between gratitude and meaningfulness, tapping into the domains of (i) meaning in life, (ii) academic engagement, (iii) optimism, (iv) humility, and (v) post-traumatic growth. An overview of studies is presented in *Table 3*.

**Meaning in life.** The quasi-experimental study by Flinchbaugh et al. (2012) showed that gratitude journaling increased the level of meaningfulness in undergraduate students over the course of twelve weeks, a small effect that was amplified when adding a stress management training. In line with these findings, Kleiman et al. (2013) observed without intervening that trait gratitude and grit work synergistically in protecting against suicidal thoughts 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 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.

**Optimism.** Three RCT's 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 two 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.

**In conclusion.** Although results on gratitude and factors of meaningfulness are currently scant and inconclusive, there is some evidence suggesting that gratitude, possibly in synergy with other psychological competencies, may contribute to enhanced meaning in life. However, reported effects are small, possibly because gratitude is thought to represent a subordinate component of meaningfulness (McDonald, Wong, & Gingras, 2012). Although further examination is warranted, Zhou and Wu (2015) have proposed that individuals with high vs. low levels of trait gratitude may construct traumatic events more positively, possibly contributing to post-traumatic growth.

#### **Pillar 4: Quality of life**

The fourth pillar of positive health is quality of life, comprising components of happiness and life satisfaction. Our search yielded twenty-four intervention studies, and two prospective observational studies covering domains of (i) subjective well-being and (ii) basic psychological needs. An overview of findings is presented in *Table 4*.

**Subjective well-being.** Happiness, positive affect, life satisfaction, and flourishing are closely related components of subjective well-being, and have all been repeatedly shown to improve following interventions such as TGT, gratitude letters, and the gratitude visit over the course of three to eight weeks in adolescent, adult, and elderly study samples in both RCT's (Al-Seheel & Noor, 2016; Baxter et al., 2012; O'Leary & Dockray, 2015; Otto et al., 2016; Ouweneel et al., 2014; Proyer, Ruch, & Buschor, 2013; Ramírez et al., 2014; Rash et al., 2011; Watkins et al., 2015; Wolfe & Patterson, 2017) and quasi-experimental or intervention studies without a control group (Carson, Muir, Clark, Wakely, & Chander, 2010; Chan, 2010, 2011; Jung & Han, 2017; Flinchbaugh et al., 2012; Khanna & Singh, 2016; Killen & Macaskill, 2015; Toepfer et al., 2012), with most studies reporting small to moderate effects. Mobile delivery of gratitude interventions to increase subjective well-being was assessed in two small-scale pilot-RCT's 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.

However, not all gratitude intervention studies have yielded positive results regarding improved subjective well-being. Peters et al. (2013) observed no improvement of life satisfaction following a one-week gratitude intervention in adults, and gratitude journaling was ineffective on levels of flourishing (Jackowska et al., 2016). Although affect balance improved after a journaling intervention, life satisfaction and positive affect stayed fairly the same in the study of O'Connell et al. (2017). Life satisfaction and positive affect did not change in response to a gratitude drawing intervention in young children (Owens & Patterson, 2013), and an educational gratitude intervention in adolescents (Khanna & Singh, 2016) had no effect on psychological well-being, positive mental health, and emotional and social well-being. 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 (2010). 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.

**Basic psychological needs.** A prospective study by Lee, Tong, and Sim (2015) revealed reciprocal relations between gratitude and psychological need fulfilment: gratitude predicted relatedness and autonomy, although not competence, over time, and all three psychological needs predicted gratitude. 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.

**In conclusion.** Taken together, although not all studies have yielded positive results, the vast majority of research shows measures of subjective well-being to increase with small to moderate positive effects in response to a variety of gratitude interventions administered in a variety of populations. Basic psychological needs have shown to consistently predict health-related behaviour (J.Y. Ng et al., 2012), and based on the findings reviewed here, it is interesting to investigate whether gratitude interacts with need satisfaction in an upward spiral towards positive health.

## **Pillar 5: Social and Societal Participation**

The fifth pillar of positive health embodies social and societal participation, consisting of social skills, social contacts and meaningful relationships, and societal commitments and a purposeful employment. Our search identified eighteen experimental, and seven prospective studies investigating the relationship between gratitude and social and societal participation on the topics of (i) relationships and (ii) prosocial behaviour. An overview of study findings is presented in *Table 5*.



**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). 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. J.W. 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 behavior. 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.

### **Pillar 6: Daily Functioning**

The sixth and last pillar of positive health is called daily functioning and it encompasses basic and instrumental activities of daily living (ADL). Basic ADL consists of self-care tasks such as bathing and dressing; instrumental ADL includes aspects of living independently, work capacity, and engaging in health behaviour and/or holding intentions to do so. Our search yielded only one prospective observational study on the effects of gratitude on adherence to medical recommendations (see *Table 6*).

**Adherence.** Millstein et al. (2016) found that gratitude at two weeks post acute coronary syndrome was associated with higher diet and medication adherence as well as with increased physical activity and decreased stress 6 months later. Effects were small but significant, and independent of negative emotional states.

**In conclusion.** Our search identified only one study on the relationship between gratitude and ADL, underlining the need for further research on the topic. For instance, it could be worthwhile to investigate whether gratitude contributes to ADL-recovery following hospitalization for medical illness, as has been previously shown to be the case for optimism, positive emotions, self-efficacy, personality factors, and coping style (Balck, Lippmann, Jeszenszky, Günther, & Kirschner, 2016; Elmståhl, Sommer, & Hagberg, 1996; Hellström, Lindmark, Wahlberg, & Fugl-Meyer, 2003; Seale, Berges, Ottenbacher, & Ostir, 2010).

## General discussion

With this integrative review, we aimed to summarize the current research regarding state and trait gratitude associated with the six pillars of positive health (i.e., bodily functions, mental well-being, meaning in life, quality of life, social and societal participation, and daily functioning; Huber et al., 2011; Huber et al., 2016). Insight in the associations between gratitude and the separate pillars of positive health is essential to understand the role of gratitude in positive 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 positive 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, although generic intervention features may influence physical parameters; (ii) having a grateful disposition is positively linked to mental well-being, but gratitude interventions are not unequivocally established as universally effective for improving mental well-being; (iii) although a sense of gratitude seems closely tied to the concept of meaningfulness, the literature on the impact of gratitude (interventions) on meaning in life remains scant and inconclusive; (iv) gratitude is positively associated with quality of life, and gratitude interventions hold potential for moderately increasing aspects thereof; (v) gratitude generally appears to facilitate social and societal participation; (vi) there is altogether not enough literature on gratitude and daily functioning to come to any firm conclusion.

The pattern of observations suggests gratitude (interventions) to moderately benefit factors of subjective well-being (quality of life, social and societal participation, and – to a lesser extent – meaningfulness), 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 (2002, 2005), subjective well-being and psychopathology are two related but distinct dimensions of complete mental health (Lamers, Westerhof, Glas, & Bohlmeijer, 2015), i.e. the presence of subjective 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 subjective 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 dimensions of complete mental health (Lamers et al., 2015), cultivating a sense of gratitude may thus indirectly decrease psychopathology through increasing levels of subjective well-being. In any case, gratitude shows complex connections with the presence of subjective well-being and absence of psychopathology, that should be taken into consideration when studying the dynamics of gratitude and positive mental health (Jans-Beken et al., 2017).

Subjective well-being in the two-continua model is composed of three factors: emotional well-being, psychological well-being, and social well-being, corresponding to the positive health pillars of quality of life, meaningfulness, and social and societal participation, respectively. The current findings identified the positive health pillars of quality of life and social and societal participation as most susceptible to the potential beneficial effects of state and trait gratitude and gratitude based interventions, in line with broaden-and-build (Fredrickson, 2001) and 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 quality of life 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.

Having a sense of gratitude or appreciation of life is considered an important source of meaningfulness (Westerhof, Bohlmeijer, & Valenkamp, 2004), and ties closely to feelings of life contentment, fulfilment, and satisfaction that are central to a sense of purpose in life (Reker & Peacock, 1981). However, despite the presumed contribution of gratitude to life meaning, the impact of gratitude (interventions) on meaningfulness is only scarcely investigated, perhaps because gratitude is conceptually embedded *within* and therefore difficult to draw apart from the construct of meaningfulness (McDonald et al., 2012).

Prospective observational studies included in this review point towards a (partially) mediating role of meaning in life in the positive relationship between trait gratitude and mental well-being, postulating gratitude as a resilience factor for psychopathology that operates partly through a meaningful, positive interpretation of the world (Kleiman et al., 2013; Zhou & Wu, 2015). Gratitude interventions are not necessarily expected to have a direct effect on optimism, given gratitude relates mostly to the past and present, whereas optimism turns focus to the future (Peters et al., 2013). Trait gratitude and humility, on the other hand, may be more alike, given their association with low self-focus, and may enhance each other reciprocally (Kruse et al., 2014). Although future prospective observational and RCT-based investigations are needed to further clarify (reciprocal) associations between gratitude, meaningfulness, and (mental) well-being, cultivating the grateful trait may help to build resilience for mental health problems through an increased sense of meaning in life.

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, 2010; 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 bodily functions, 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 subjective 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 subjective well-being.

Research regarding gratitude and basic and functional activities of daily living (ADL) is practically non-existent. Other research, however, has related ADL to inter-individual differences in other traits linked to psychological resilience, such as optimism, positive affectivity, personality, coping style, and self-efficacy. A prospective study in patients with a total hip replacement showed that the level of optimism before surgery predicted better functionality in the lower limbs at three and six months after surgery (Balck et al., 2016). In a longitudinal study, individuals who suffered a stroke and reported increased positive emotions three months after the event, also reported increased functionality compared to individuals with equal or decreased levels of positive emotions (Seale et al., 2010). Another study in post-stroke individuals found that both extraversion and an active coping style were associated with better functionality (Elmståhl et al., 1996). Higher experienced levels of fall-related efficacy in stroke patients were found to be related to functional independence (Hellström et al., 2003). Considering these findings, it could be interesting to explore whether levels of trait gratitude and gratitude interventions add to ADL recovery after an event that seriously disrupts functionality.

### **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

(see e.g. 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. Similarly, the effects of gratitude on quality of life may be confounded by the presence of stress, physical illness and symptoms of psychopathology, but not all studies have taken these dynamics into account. 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 positive 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 (e.g. 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, 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 positive 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 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 positive 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 positive 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), mental wellbeing (Jackowska et al., 2016; Kerr et al., 2015; Watkins et al., 2015), meaningfulness (Kerr et al., 2015; Peters et al., 2013), and quality of life (Rash et al., 2011; Watkins et al., 2015), suggests shared or generic mechanisms through which different journaling interventions may similarly activate positive 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 depressed vs. non-depressed individuals generally tend to respond to gratitude interventions with a larger increase in subjective well-being (Sin & Lyubomirsky, 2009), caution is warranted when exposing clinical samples to gratitude based interventions with the aim of improving clinical 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 subjective well-being in patients in clinical remission (Sin et al., 2011). Moreover, as suggested by the findings from Otto et al. (2016), 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 & Bieswar-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, Goodman, 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 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 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), i.e. combining different (positive) intervention elements into a larger, comprehensive program, has previously been suggested to increase chances of establishing effects on indicators of 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 positive health – conceptualized as multi-dimensional construct that is finding its way to health care practice. The reviewed studies emphasize that gratitude is beneficially, although modestly, linked to the social and quality of life pillars of positive health. However, although scarce, studies focusing on other pillars do not consistently point to a unique role of gratitude in bodily functioning, psychopathology, meaning in life, and daily functioning. Although our integrative review paints a clear picture of the current standing in gratitude research and shows the gaps in knowledge regarding the role of gratitude in positive 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 positive health. This review can support scholars, practitioners, and policy makers to design further research, apply findings in practice, and develop new policies.

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Table 1  
*Bodily functions: 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 <sup>1</sup>	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.
Fox (2015)	E	23 (T)	Young adults	48	21 (2.21)	SG (rating of grateful feeling)	Neural correlates	Taking the perspective of Holocaust sufferers	...	Not able to calculate	Ratings of gratitude correlated with brain activity in the anterior cingulate and medial prefrontal cortex.
Huffman (2015)	L	164 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	TG (GQ6)	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.
Kini (2016)	E	22 (EG) 21 (ACG)	Clinical sample	26	23 (2.50)	TG (GQ6); SG (GAC)	Neural correlates	Gratitude letter (3 times); Pay it forward task	3 weeks	Not able to calculate	Greater neural modulation in the perigenual anterior cingulate cortex in the gratitude condition.
Millstein (2016)	L	156 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	TG (GQ6)	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 (GQ6); 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	90	66 (7.58)	TG (GQ6)	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

Yu (2016)	E	15 (†)	B heart failure College students	20	21 (0.75)	...	Perceived pain intensity; Gratitude towards partner	Sharing pain induction with partner who decided or was forced to help	...	$\eta^2 = .28$ ( $p < .05$ ) <sup>2</sup>	rate variability in gratitude condition; No change in resting heart rate variability. Intentional help was associated with lower perceived pain intensity.
Yu (2016)	E	27 (†)	College students	41	22 (1.50)	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	...	$\eta^2 = .47$ ( $p < .001$ ) <sup>2</sup>	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; EG = experimental group; CG = control group; ACG = active control group; T = total group; NR = not reported; TG = trait gratitude; SG = state gratitude; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist, ES = effect size, n.s. = not statistically significant; 1 = see 'Summary of findings' for interpretation; 2 = estimation based on results in article.

Table 2  
Mental 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 <sup>1</sup>	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 (2010)	E	96(T)	Chinese school teachers	18	33 (7.57)	TG (GQ6)	Negative affect	Weekly log of TGT and Naikan questions	8 weeks	$d = .10$ (n.s.) $d = -.11$ (n.s.)	The intervention did not have an effect on negative affect.
Chan (2011)	E	63(T)	Chinese school teachers	16	34 (6.91)	TG (GQ6)	Burnout	Weekly log of TGT and Naikan questions	8 weeks	$d = .38$ ( $p < .05$ )	The intervention decreased emotional exhaustion 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.
DeWall (2012)	L	200 (T)	College students	24	NR	SGT (1-item: how grateful they felt that day)	Daily physical aggression	...	25 days	$d = -.42$ ( $p < .01$ ) <sup>2</sup>	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: $d = -1.08$ ( $p < .001$ ) <sup>2</sup> With correction 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 participants who experienced praise, gratitude had no effect on aggression.
DeWall (2012)	L	202 (T)	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

Disabato (2017)	L	797 (T)	Multicultural adults	17	39 (14.20)	TG (GO6)	Depression	...	6 months	$d = -.70 (p < .001)^2$ $d = -.07 (n.s.)^2$	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. None of the conditions showed a significant effect on perceived stress.
Flinchbaugh (2012)	E	29 (SMT) 33 (GRAT) 22 (COM) 33 (CG) 40 (EG) 41 (ACG) 38 (WLCG)	College students	59	22 (1.50)	...	Perceived stress	Gratitude journal (weekly)	12 weeks	Not able to calculate	
Jackowska (2016)	E		Young adults	0	26 (0.77) 27 (0.79) 26 (0.82) 44 (14)	...	Anxiety; Depression	Gratitude journal (3x a week for 2 weeks)	4 weeks	Not able to calculate	At follow-up the levels of anxiety and depression declined.
Jans-Beken (2017)	L	706 (T)	Adults	31		TG (SGRAT)	Psychopathological symptoms	...	4 measures during 7.5 months	$\beta = -.04 (n.s.)$	Trait gratitude is no predictor on the long run for less psychopathological symptoms, 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)	Depression	Gratitude disposition promoting program	Twice a week for 4 weeks	$\eta^2 = .11 (n.s.)^2$	The results of the program did not differ between the experimental and the control group.
Kerr (2015)	E	16 (EG) 16 (ACG) 15 (CG)	Adults seeking psychological treatment	25	43 (11.10)	SG (GAC)	Psychological functioning; Depression, anxiety and stress	Gratitude journal (daily)	2 weeks	$\eta^2 = .37 (p < .001)$ Not able to calculate $\eta^2 = .14 (p < .05)$ $\eta^2 = .11 (p < .05)$	The gratitude intervention was effective on psychological functioning; No effect on depression but there were decreases on anxiety and stress.
Khanna (2016)	E	177 (T) 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	After the intervention the levels of negative affect, and negative experiences did not change.
Killen (2015)	E	88 (EG)	Elderly	26	71 (7.51)	TG (GO6)	Perceived stress	TGT (daily for 2 weeks)	6 weeks	$R^2 = .05 (p < .01)$	Perceived stress declined over the course of six weeks.
Kleinman (2013)	L	209 (T)	College students	16	21 (4.12)	TG (GO6)	Suicidal ideation; Depressive symptoms	...	4 weeks	$d = -.44 (p < .01)^2$	High levels of grit and gratitude reduce suicide 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 (10.90)	TG (GO6)	Negative affect	TGT (daily for 2 weeks)	12 weeks	$d = -.99 (p < .05)^2$	The gratitude intervention decreased the level of negative affect over the course of 12 weeks.
Lies (2014)	L	310 (T)	Earthquake survivors	58	36 (10.50)	TG (GO6)	Global distress; PTSD	...	5 and 8 months after disaster	$\beta = -.05 (n.s.)$ $\beta = .05 (n.s.)$ $\beta = .06 (n.s.)$ $\beta = .05 (n.s.)$ $\beta = -.01 (n.s.)$	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



Martinez-Martí (2010)	E	41 (EG) 34 (ACG) 30 (ACG) 156 (T)	College students	11	21 (1.48)	TG (GQ6); SG (GAC);	Negative affect	Gratitude journal (daily)	2 weeks	$\beta = -.23$ ( $p < .001$ ) $\beta = -.21$ ( $p < .001$ ) Not able to calculate	predicted global distress and PTSD at eight months. The gratitude intervention did not have an effect on negative affect.
Millstein (2016)	L		Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	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. 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'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	$\eta^2 = .07$ ( $p < .05$ ) $\eta^2 = .06$ ( $p < .05$ )	
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.
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.
Owens (2013)	E	22 (EG) 23 (ACG) 17 (ACG)	Children	48	7 (1.73)	...	Negative affect; Self-esteem	Drawing (once a week)	4 to 6 weeks	Not able to calculate	None of the drawing interventions decreased negative affect in the children or increased self-esteem.
Ramirez (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.
Rash (2011)	E	56 (T) NR (EG) NR (ACG)	Adult community sample	54	23 (3.00)	TG (GQ6);	Self-esteem	Gratitude journal (twice a week)	4 weeks	$\eta^2 = .10$ ( $p < .05$ )	Gratitude was positively associated with self-esteem.
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.

Toepfer (2012)	E	219 (T) 141 (EG)	14	26 (11.00)	TG (GQ6)	Depression	Gratitude letters (3 times)	4 weeks	$\eta^2 = .08$ ( $p < .05$ ) <sup>2</sup>	The intervention decreased depression.
Watkins (2015)	E	78 (CG) 47 (EG) 42 (ACG) 40 (CG)	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.
Wolfe (2017)	E	35 (EG) 28 (ACG) 45 (CG)	0	20 (6.93)	...	Body satisfaction; Eating disorder; Depression; Negative affect	Gratitude listing daily for 2 weeks	2 weeks	$\eta^2 = .14$ ( $p < .001$ ) <sup>2</sup> $\eta^2 = .09$ ( $p < .01$ ) <sup>2</sup> $\eta^2 = .01$ (n.s.) <sup>2</sup> $\eta^2 = .08$ ( $p < .05$ ) <sup>2</sup> $\eta^2 = .01$ (n.s.) <sup>2</sup> $\eta^2 = .12$ ( $p < .01$ ) <sup>2</sup> $\eta^2 = .08$ ( $p < .05$ ) <sup>2</sup>	The gratitude condition yielded mixed 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)	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.

Note. L = longitudinal observational; E = experimental; EG = experimental group; CG = control group; ACG = active control group; T = total 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, n.s. = not statistically significant; 1 = see 'Summary of findings' for interpretation; 2 = estimation based on results in article.

Table 3  
Meaningfulness: 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 <sup>1</sup>	Summary of findings
Flinchbaugh (2012)	E	29 (SMT) 33 (GRAT) 22 (COM)	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 and gratitude journaling alone improved levels of meaningfulness and engagement. Optimism increased after gratitude journaling.
Jackowska (2016)	E	33 (CG) 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	
Kerr (2015)	E	16 (EG) 16 (ACG)	Adults seeking psychological treatment	25	43 (11.10)	SG (GAC)	Optimism	Gratitude journal (daily)	2 weeks	$d = .97$ (n.s.)	No significant increase in optimism.
Kleiman (2013)	L	15 (CG) 209 (T)	College students	16	21 (4.12)	TG (GO6)	Meaning in life	...	4 weeks	$\beta = -.01$ ( $p < .05$ ) $\beta = .01$ ( $p < .05$ )	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 (GO6)	Humility		Daily online questionnaires for 2 weeks	$\gamma_{ac} = .10$ , $p < .05$	Level of trait gratitude on one day predicted higher levels of humility on the next day, accounting for humility on the previous day.
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.) <sup>2</sup>	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.
Zhou (2015)	L	217 (T)	Adolescent earthquake survivors	50	14 (1.39)	TG (GO6)	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.

Note. L = longitudinal observational; E = experimental; EG = experimental group; CG = control group; ACG = active control group; T = total group; NR = not reported; 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, n.s. = not statistically significant; 1 = see 'Summary of findings' for interpretation; 2 = estimation based on results in article.

Table 4  
Quality of life: 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 <sup>1</sup>	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 were 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 (GQ6)	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 (GQ6)	Life satisfaction; Positive affect; SG (GAC)	Weekly log of TGT and Naikan questions	8 weeks	$d = -.51 (p < .001)$ $d = -.49 (p < .01)$ $d = -.39 (p < .05)$	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 (GQ6)	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.
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.
Ghandeharioun (2016)	E	27 (T)	Young adults	48	NR	TG (GQ6)	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.
Jackowska (2016)	E	40 (EG) 41 (ACG) 38 (WLCG)	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 best moment for expressing gratitude is after social interaction, physical activity and location change. The intervention did not increase levels of flourishing.
Jans-Beken (2017)	L	706 (T)	Adults	31	44 (14.00)	TG (SGRAT)	Subjective well-being	...	4 measures during 7.5 months	$\beta = .09 (p < .001)$	Trait gratitude is a predictor on the long run for increased well-being, accounting for previous levels of

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	$\eta^2 = .25$ ( $p < .01$ )*	psychopathological symptoms and subjective well-being. The results of the program differed between the experimental and the control group; the experimental group reported higher life satisfaction than the control group. Gratitude intervention raised the feeling of relatedness.
Kerr (2015)	E	16 (EG) 16 (ACG) 15 (CG)	Adults seeking psychological treatment	25	43 (11.10)	SG (GAC)	Relatedness	Gratitude journal (daily)	2 weeks	$d = 2.07$ ( $p < .01$ )	Gratitude intervention raised the feeling of relatedness.
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 (GO6)	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.
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.
O'Connell (2017)	E	63 (EG) 68 (ACG) 61 (CG)	Mainly young adult sample	33	27 (12.63)	TG (GO6)	Affect balance; Life satisfaction; Positive affect	Reflective behaviour – reflective only – control – journaling Gratitude journal (4x a week)	3 times a week for 3 weeks with 1 and 3-month follow-up 3 weeks	$\eta^2 = .06$ ( $p < .05$ )	Reflective behaviour improved affect balance at post-test. There were no differences in life satisfaction and positive affect in the different condition.
O'Leary (2015)	E	29 (EG) 22 (ACG) 10 (ACG)	Healthy adults	0	28 (6.65)	...	Happiness	Gratitude journal (once a week for 6 weeks)	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.
Owens (2013)	E	22 (EG) 23 (ACG) 17 (CG)	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.) <sup>2</sup>	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	$\eta^2 = .02$ ( $p < .05$ ) <sup>2</sup>	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 Gratitude journal (twice a week)	NR	$\eta^2 = .08$ ( $p < .05$ ) <sup>2</sup>	The program was able to increase levels of life satisfaction.
Rash (2011)	E	56 (T) NR (EG) NR (ACG)	Adult community sample	54	23 (3.00)	TG (GO6);	Life satisfaction		4 weeks	$\eta^2 = .10$ ( $p < .05$ ) $d = .63$ ( $p < .05$ ) <sup>2</sup>	The gratitude intervention increased the levels of life satisfaction; Trait gratitude moderated the association between the intervention and life satisfaction.
Ramirez (2014)	E	26 (EG) 20 (CG)	Elderly	65	71 (7.06)	...	Positive memories; Life satisfaction; Happiness	Gratitude letter	9 weeks	$\eta^2 = .15$ ( $p < .001$ ) $\eta^2 = .10$ ( $p < .05$ ) $\eta^4 = .09$ ( $p < .05$ )	The program was able to increase levels of positive memories, life satisfaction, and happiness.
Toepfer (2012)	E	219 (T) 141 (EG) 78 (CG)	Adults	14	26 (11.00)	TG (GO6)	Life satisfaction; Happiness	Gratitude letters (3 times)	4 weeks	$\eta^2 = .24$ ( $p < .001$ ) <sup>2</sup> $\eta^2 = .06$ ( $p < .01$ ) <sup>2</sup>	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	$\eta^2 = .05$ ( $p < .05$ )	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	$\eta^2 = .06$ ( $p < .05$ ) <sup>2</sup>	The gratitude condition improved positive affect.

*Note.* L = longitudinal observational; E = experimental; EG = experimental group; CG = control group; ACG = active control group; T = total group; NR = not reported; TG = trait gratitude; SG = state gratitude; GO6 = 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, n.s. = not statistically significant; 1 = see 'Summary of findings' for interpretation; 2 = estimation based on results in article.

Table 5  
Social and societal participation: 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 <sup>1</sup>	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 signalled 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.
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.) <sup>2</sup>	High-power individuals whose competence was threatened denigrated their subordinates. This pattern disappeared when the subordinate expressed gratitude.
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	Among low-power participants, there were no main effects of competence and gratitude expression, nor an interaction between competence and gratitude expression.
Converse (2012)	E	42 pairs of strangers (ongoing) NR (completed) 40 (T) NR (active) NR (completed)	Adults	NR	NR	SG (1 item asking for gratitude for helper)	Instrumentality of help	Trivia quiz with helpline	...	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	(completed) 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	$d = 1.03$ ( $p < .01$ )	Contestants in the ongoing game condition were more appreciative for the helpline than those in the completed game condition who even received more assistance.
Converse (2012)	E	114 (T)	College students	NR	NR	SG (1 item asking form appreciation of help)	Success of the goal	...	...	$d = 0.53$ ( $p < .05$ )	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.
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	$\eta^2 = .23$ ( $p < .001$ )	If assistance leads to success, appreciation will decrease when new goals take priority.  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	$d = .23$ ( $p < .01$ ) <sup>2</sup>	Gratitude predicts social integration through prosocial behaviour.
Grant (2010)	E	35 (EG) 34 (CG)	College students	36	22 (3.55)	...	Prosocial behaviour	E-mails with or without a gratitude expression	...	Not able to calculate	Gratitude expressions increase prosocial behaviour 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 behaviour	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 behaviour directed toward a different beneficiary.
Grant (2010)	E	20 (EG) 21 (CG)	Fundraisers	24	NR	...	Prosocial behaviour	Expression of gratitude from director	2 weeks	Not able to calculate	Expressing gratitude increased the prosocial behaviour. 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 behaviour	Expression of gratitude directly	...	Not able to calculate	Social worth predicted higher prosocial behaviour in the gratitude expression condition.
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.
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 behavioural displays were one way in which appreciation was communicated



between partners. When one partner felt appreciative and engaged in maintenance behaviours 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 maintenance promotes appreciation. 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.

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.

The more frequently individuals thought that their partner 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

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	
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	
Joel (2013)	L	69 couples (T)	Adults	50	NR	RG (AIR)	Relationship commitment	Daily diary (2 weeks)	3 months	Not able to calculate	

Kubacka (2011)	L	195 couples (T)	Newly weds	50	Men (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	grateful toward their partner 3 months later, which in turn lead to increased commitment to the relationship. Gratitude is a signal for perceived partner responsiveness and a motivator for relationship maintenance behaviours; 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 behaviours 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 behaviour)	Comfort of voicing relationship concerns	...	3.5 months	$\beta = .18$ ( $p < .01$ )	Expressing gratitude predicts comfort with relationship concerns on the long run.
Lambert (2011)	E	71 (EG) 78 (ACG)	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	76 (CG) 18 (EG) 17 (ACG) 20 (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	19 (ACG) 107 (EG) 105(ACG)	College students	33	21 (1.86)	SG (GAC)	Conformity	Writing about gratitude before rating colours on a sheet with correct or bogus answers from fake participants. Writing about gratitude before choosing between 2 products incl. their market shares.	...	$d = .33$ ( $p < .05$ )	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.
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 observational; E = experimental; EG = experimental group; CG = control group; T = total group; NR = not reported; TG = trait gratitude; SG = state gratitude; GB = gratitude behaviour; GQ6 = Gratitude Questionnaire 6; GAC = Gratitude Adjectives Checklist; AIR = Appreciation in Relationships; ES = effect size, n.s. = not statistically significant; 1 = see 'Summary of findings' for interpretation; 2 = estimation based on results in article.

Table 6  
Daily functioning: 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 <sup>1</sup>	Summary of findings
Millstein (2016)	L	156 (T)	Older adults after acute coronary syndrome (ACS)	84	62 (10.60)	TG (GQ6)	Adherence	...	2 weeks post-ACS and 6 month follow-up	$\beta = .10 (p < .05)$	There seems to be a positive association between state gratitude and adherence, adjusted for baseline values, gender, age, race, medical and social risk factors, and anxiety and depression.

Note. L = longitudinal observational; T = total group; TG = trait gratitude; GQ6 = Gratitude Questionnaire 6; ES = effect size; 1 = see 'Summary of findings' for interpretation.





## CHAPTER 3

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### Measuring Gratitude: A Comparative Validation of the Dutch Gratitude Questionnaire (GQ6) and Short Gratitude, Resentment, and Appreciation Test (SGRAT)

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## Abstract

The aim of this article was to validate and compare the Dutch translations of the Gratitude Questionnaire (GQ6) and the Short Gratitude, Resentment, and Appreciation Test (SGRAT) in an adult general population sample. In an online survey, 706 respondents ( $M_{\text{age}} = 44$ ,  $SD_{\text{age}} = 14$ ) completed Dutch versions of the GQ6, the SGRAT, the Satisfaction With Life Scale (SWLS) and the Positive Affect and Negative Affect Schedule (PANAS). At six-week follow-up, 440 (62%) of them ( $M_{\text{age}} = 46$ ,  $SD_{\text{age}} = 14$ ) again completed the GQ6-NL and SGRAT-NL. Parallel analyses, exploratory factor analyses and confirmatory factor analyses revealed and confirmed one factor for the GQ6-NL, and three factors for the SGRAT-NL. Internal consistency indices of the GQ6-NL and of the SGRAT-NL were satisfactory. Both questionnaires demonstrated good test-retest reliability. Regression analyses showed, for the total scores on both gratitude questionnaires, positive associations with the SWLS and the Positive Affect Scale, and negative associations with the Negative Affect Scale. The results support the validity of the Dutch GQ6 and SGRAT. These questionnaires can be used to conduct further research of the grateful disposition in Dutch speaking individuals and groups.



### Introduction

This article describes the validation study of the Dutch translations of the Gratitude Questionnaire (GQ6; McCullough, Emmons, & Tsang, 2002) and the Short Gratitude, Resentment, and Appreciation Test (SGRAT; Thomas & Watkins, 2003). These questionnaires were developed to measure the grateful disposition which is defined as a 'generalized tendency to recognize and respond with grateful emotion to the roles of other people's benevolence in the positive experiences and outcomes that one obtains' (McCullough et al., 2002, p. 112).

McCullough et al. (2002) proposed a theoretical framework wherein four facets of gratitude are distinguished: intensity, frequency, span, and density. An individual with a strong grateful disposition is thought to experience gratitude more intensely and more frequently than someone with a weaker grateful disposition. Span refers to the number of life events for which a person feels grateful at a given time, and density refers to the number of persons one is grateful to. McCullough et al. (2002) developed the GQ6 based on these four facets.

Another theoretical framework was proposed by Watkins, Woodward, Stone, and Kolts (2003), identifying three distinct characteristics within a grateful individual. The first characteristic is a lack of a sense of deprivation. The second characteristic is the tendency to appreciate simple pleasures, and the third characteristic is the tendency to appreciate the contributions of others to one's own well-being and to express this gratitude. Watkins et al. (2003) developed the SGRAT based on these three characteristics.

Recent empirical studies have shown positive associations of the grateful disposition with subjective well-being (Emmons & McCullough, 2003; McCullough et al., 2002; Thomas & Watkins, 2003; Watkins et al., 2003; Wood, Froh, & Geraghty, 2010), happiness (Watkins et al., 2003), spiritual transcendence (Diessner & Lewis, 2007), religiousness and spirituality (McCullough et al., 2002), optimism (Chen, Chen, Kee, & Tsai, 2009), and positive affect (Emmons & McCullough, 2003; McCullough et al., 2002; Thomas & Watkins, 2003; Watkins et al., 2003). Negative associations have been found between the grateful disposition and depression (Thomas & Watkins, 2003; Watkins et al., 2003), negative affect (Thomas & Watkins, 2003), and aggression (Watkins et al., 2003). These correlates have in turn been causally linked to cardiovascular disease (Krantz, Contrada, Hill, & Friedler, 1988; Suinn, 2001), hypertension (Shapiro & Goldstein, 1982), and immune system dysfunction (Cohen, Tyrrell, & Smith, 1993; Graham, Christian, & Kiecolt-Glaser, 2006). The results of the aforementioned empirical studies show the importance of dispositional gratitude as a possible protective factor in health care and thereby the importance of measures to assess the grateful disposition.

There are several reasons for validating Dutch translations of the gratitude questionnaires. First, although large numbers of people in the Netherlands and Belgium can speak and understand English, English reading comprehension is strongly associated with socioeconomic status (EF - EPI, 2014). Second, the use of a translated questionnaire prevents responses being affected by cultural accommodation (Harzing, 2005), misinterpretation, and reduces the cognitive and emotional bias that exists when answering questions in another language than one's mother tongue (Keysar, Hayakawa, & An, 2012). Third, Dutch is the official language in six countries of the world, representing a total population of more than twenty-eight million people. Taken together, a questionnaire in Dutch is invaluable for studying gratitude in Dutch speaking countries. These brief questionnaires were selected for validation because previous research showed them to be reliable and valid measures of the grateful disposition in English speaking populations (McCullough et al., 2002; Watkins et al., 2003). Particularly, a validation study of two different scales can help the reader to choose the most appropriate scale. The current comparative validation may be valuable for the international reader because the scales are based on different theoretical frameworks and the scales' comparison adds to the discussion on the grateful disposition as a psychological construct. For the translated scales we aimed to assess their factorial structure, their internal consistency, test-retest reliability, and the convergent, divergent, and concurrent validity.

## Method

### Respondents

We recruited participants mainly through social media, e-mails, personal contacts, and door-to-door flyers with the intention to collect a sample as heterogeneous as possible in terms of gender, age, education, employment status, and religious affiliation. Inclusion criteria were: (a) Dutch speaking, and (b) eighteen years or older. Participants enrolled voluntarily and were rewarded for participation with a raffle for gift cards. In the informed consent, ethical and privacy issues were covered. Confidentiality as well as anonymity were ensured. The convenience sample consisted of 706 Dutch speaking adults at baseline ( $M_{age} = 44$ ,  $SD_{age} = 14$ ,  $Range = 18 - 80$ ). At follow-up, 440 participants (62%) of the initial sample completed the survey ( $M_{age} = 46$ ,  $SD_{age} = 14$ ,  $Range = 18 - 80$ ). These subjects (hereafter: completers) were significantly higher educated and older, and reported less negative affect compared to subjects who completed only the baseline survey (hereafter: dropouts; Table 1).



## Measures

**Gratitude.** The grateful disposition was measured with Dutch translations of the GQ6 (McCullough et al., 2002), and the SGRAT (Thomas and Watkins, 2003).

**GQ6-NL.** The GQ6 consists of six propositions representing one single factor with acceptable internal consistency (Cronbach's  $\alpha = 0.82$ ) (McCullough et al., 2002). Respondents indicate their response on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). Two negatively formulated items are reverse coded and item scores are summed to a total score, ranging from 6 to 42, with high scores indicating a higher level of a grateful disposition.

**SGRAT-NL.** The GRAT was initially developed by Watkins et al. (2003). They conducted four studies to develop and validate this scale consisting of 44 items allocated to three subscales. Thomas and Watkins (2003) revised the GRAT and developed a short form. The remaining 16 items of the SGRAT displayed a Cronbach's  $\alpha = 0.92$  for the total score. This short version appeared to be as reliable and valid as the initial GRAT. Diessner and Lewis (2007) confirmed the original three-factor structure with factors (a) Lack of a Sense of Deprivation (LOSD), (b) Simple Appreciation (SA), and (c) Appreciation for Others (AO). Respondents indicate their response on a 9-point Likert scale, ranging from strongly disagree (1) to strongly agree (9). Five negatively formulated items are reverse coded. The total score ranges from 16 to 144, and high scores indicate a higher level of the grateful disposition.

**Subjective well-being.** We used the definition of Myers and Diener (1995) for subjective well-being, comprising frequent positive affect, infrequent negative affect, and a sense of life satisfaction.

**Life Satisfaction.** Life satisfaction is an evaluation of the quality of life according to criteria chosen by the individual (Shin & Johnson, 1978), which was measured with the validated Dutch version of the Satisfaction With Life Scale (SWLS; Arrindell, 1991; Diener, Emmons, Larsen, & Griffin, 1985). The questionnaire consists of five propositions on which the respondents indicate their response using a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). All item scores are summed to a total score, ranging from 5 to 35, with high scores indicating a higher level of life satisfaction. The SWLS is found to be a reliable measure with reported Cronbach's  $\alpha$  values in the range of 0.85 to 0.87 (Arrindell, 1991; Van Beuningen, 2012).

**Positive and negative affect.** Affect was measured with the validated Dutch Positive Affect and Negative Affect Schedule (PANAS; Peeters, Ponds, & Vermeeren, 1996). The schedule measures two dimensions: positive affect and negative affect. The questionnaire consists of twenty descriptor terms: ten items measuring positive affect, and ten items measuring negative affect. Respondents are asked to rate the extent to which they have

experienced each mood state during the past week on a 5-point Likert scale, ranging from very slightly or not at all (1) to extremely (5). Scores on each dimension are summed to a total score, ranging from 10 to 50 for each dimension, with high scores indicating a higher level of positive or negative affect. Dutch translations of the negative affect scale (NA-scale) and positive affect scale (PA-scale) showed internal consistencies of  $\alpha = 0.83$  and  $\alpha = 0.79$ , respectively (Peeters et al., 1996).

Table 2

*Short Gratitude, Resentment and Appreciation Test, Dutch translation (S-GRAT-NL)*

**Item**

1	Zonder de hulp van veel mensen had ik niet kunnen komen waar ik nu ben in mijn leven.
2	Het leven is goed voor me geweest.
3	Het lijkt alsof er nooit genoeg is waardoor ik mijn deel nooit krijg.
4	Ik ben vaak overweldigd door de schoonheid van de natuur.
5	Ik vind dat het niet alleen belangrijk is om trots te zijn op mijn prestaties maar ook te herinneren welke rol anderen hebben gespeeld bij het tot stand komen van de prestaties.
6	Ik denk niet dat ik alle goede dingen heb gekregen die ik verdien in het leven.
7	Elke herfst geniet ik echt van de bladeren die van kleur veranderen.
8	Ondanks dat ik de controle heb over mijn leven, denk ik toch veel aan de mensen die me hebben aangemoedigd en geholpen.
9	Het is belangrijk om af en toe stil te staan bij de mooie dingen in het leven.
10	Er zijn meer slechte dingen gebeurd in mijn leven dan dat ik verdien.
11	Door alles wat ik heb meegemaakt in mijn leven, vind ik dat de wereld me iets verschuldigd is.
12	Het is belangrijk om je zegeningen te tellen.
13	Het is belangrijk om te genieten van de simpele dingen in het leven.
14	Ik ben zeer dankbaar voor alle dingen die andere mensen voor me hebben gedaan in mijn leven.
15	Om de een of andere reden krijg ik niet de voordelen die anderen wel krijgen.
16	Het is belangrijk om iedere dag dat je leeft te waarderen.

*Note.* Items 3, 6, 10, 11, and 15 should be reverse coded.

Items 2, 3, 6, 10, 11, and 15 constitute the Lack of a Sense of Deprivation (LOSD) factor.

Items 4, 7, 9, 12, 13, and 16 constitute the Simple Appreciation (SA) factor.

Items 1, 5, 8, and 14 constitute the Appreciation for Others (AO) factor.

Answers are scored on a 9-point Likert scale: (1) *Sterk mee oneens*, (3) *Enigszins mee oneens*, (5) *Neutraal*, (7) *Enigszins mee eens*, (9) *Sterk mee eens*.

Table 1  
Sample characteristics at baseline including drop-outs and completers (N = 706)

	Whole sample	Drop-outs	Completers	Δ Drop-out - Completers
<i>n</i>	706	266	440	
Low education N(%)	173(25)	85(31)	88(20)	$\chi^2(1, N = 706) = 10.35^{**}$
High education N(%)	533(75)	181(69)	352(80)	
Full time employed N(%)	201(28)	88(33)	114(26)	$\chi^2(2, N = 706) = 4.38$
Part time employed N(%)	241(34)	85(32)	154(35)	
Not employed N(%)	264(38)	93(35)	172(39)	
No belief N(%)	327(47)	122(46)	202(46)	$\chi^2(2, N = 706) = 0.03$
Religious N(%)	234(33)	91(34)	145(33)	
Spiritual N(%)	145(20)	53(20)	93(21)	
Age <i>M</i> ( <i>SD</i> )	43.90(14.10)	40.07 (13.67)	46.22 (13.86)	<i>t</i> (704) = -5.74**
GQ6-NL <i>M</i> ( <i>SD</i> )	32.51(5.14)	32.12 (5.14)	32.75 (5.14)	<i>t</i> (704) = -1.58
SGRAT-NL <i>M</i> ( <i>SD</i> )	110.95(15.54)	109.71 (15.49)	111.70 (15.54)	<i>t</i> (704) = -1.65
SWLS <i>M</i> ( <i>SD</i> )	24.58(6.41)	24.03 (6.46)	24.92 (6.36)	<i>t</i> (704) = -1.78
PA-scale <i>M</i> ( <i>SD</i> )	35.40(7.05)	35.33 (7.06)	35.44 (7.05)	<i>t</i> (704) = -0.20
NA-scale <i>M</i> ( <i>SD</i> )	19.21(7.72)	20.15 (7.74)	18.64 (7.66)	<i>t</i> (704) = 2.52*

Note. \*\*  $p < 0.001$ , \*  $p < 0.05$ . Dropouts are participants who completed only the baseline survey. Completers are participants who completed both the baseline and six-week follow-up survey.

Procedure

Both the GQ6 and the SGRAT were translated into Dutch by a translator who was raised bilingual. A second bilingual translator translated the Dutch items back into English. Dutch and English items were evaluated by both translators and the researcher to ensure equivalence in meaning and comparability of the items. The items of the translated SGRAT and GQ6 are listed in Table 2 and Table 3, respectively. Study participants filled in an online survey at baseline (GQ6, SGRAT, SWLS, and the PANAS) and at six-weeks follow-up (GQ6 and SGRAT).

Table 3  
*Gratitude Questionnaire-6, Dutch translation (GQ-6-NL)*

Item	
1	Ik heb veel dingen in het leven om dankbaar voor te zijn.
2	Als ik een lijst zou maken van alle dingen waar ik dankbaar voor ben, wordt dat een hele lange lijst.
3	Als ik naar de wereld kijk, zijn er niet veel dingen om dankbaar voor te zijn.
4	Ik ben veel verschillende mensen dankbaar.
5	Naarmate ik ouder word, kan ik mensen, gebeurtenissen en situaties die deel van mijn leven zijn, meer waarderen.
6	Het duurt soms lang voor ik dankbaar kan zijn voor iets of iemand.

*Note.* Items 3 and 6 should be reverse coded. Answers are scored on a 7-point Likert scale: (1) *Sterk mee oneens*, (2) *Mee oneens*, (3) *Enigszins mee oneens*, (4) *Neutraal*, (5) *Enigszins mee eens*, (6) *Mee eens*, (7) *Sterk mee eens*.

Analyses

Differences in demographic variables, as well as in the main variables of gratitude and subjective well-being between completers and dropouts, were examined using chi-square tests for categorical variables and independent t-tests for continuous variables. Parallel analysis with Monte Carlo simulations was conducted on the items at baseline (T0) of the GQ6-NL and SGRAT-NL in order to determine the number of factors to retain in Exploratory Factor Analysis (Horn, 1965). The simulation was executed with 1000 parallel datasets based on permutations of the original raw data set, with the criterion set at the 95th percentile. The eigenvalue of the raw data needed to exceed the eigenvalue of the 95th percentile to be defined as a factor (O'Connor, 2000). Exploratory Factor Analyses (EFA) using maximum-likelihood were applied on the items of the GQ6-NL and SGRAT-NL at baseline (T0). To assess the sampling adequacy, a Kaiser-Meyer-Olkin (KMO) measure was conducted. A KMO is considered good when the outcome is between 0.7 - 0.8, and excellent

when between 0.8 - 0.9 (Hutcheson, & Sofroniou, 1999). Anti-image correlations of  $> 0.5$  were regarded acceptable (Field, 2013). Factor loadings were examined, and rotation of factors with direct oblimin was applied when more than one factor was found. Confirmatory factor analyses (CFA) using maximum-likelihood estimation were applied on respectively the items of the GQ6-NL and SGRAT-NL to confirm the factor structures of the questionnaires at six weeks follow-up (T1). To assess goodness of fit, the chi-square ( $\chi^2$ ), comparative fit index (CFI) and standardized root-mean-square residual (SRMR) statistics were examined. CFI values above 0.95 and SRMR values below 0.05 are typically considered to indicate that a model is adequately parameterized although values as high as 0.90 and as low as 0.10 are acceptable (Hu & Bentler, 1999). Internal consistency was determined by McDonald's omega ( $\omega$ ), accounting for the proportion of variance a potential latent variable explains on a general factor (Zinbarg, Revelle, Yovel, & Li, 2005). McDonald's omega values between 0.70 and 0.80 were considered acceptable, and between 0.80 and 0.90 as good (Terwee et al., 2007). The test-retest reliability was evaluated using the intraclass correlation coefficient (ICC) with a two-way random effects model with absolute agreement (Shrout & Fleiss, 1979). An ICC over 0.70 can be considered good in a sample with at least 50 cases (Terwee et al., 2007). Regression analyses were performed to test for convergent and divergent validity. For convergent validity, (1) total scores of gratitude scales, and (2) SGRAT-NL subscales were used as predictors of the SWLS and PA scores. To assess divergent validity, regression analyses were conducted for the NA scale using (1) gratitude scales' total scores, and (2) SGRAT-NL subscales as predictors. Regarding the subscales, we controlled for the variance inflation factor ( $VIF < 10$ ), and a tolerance of more than 0.10 to preclude multicollinearity (Fields, 2013). For convergent validity it was expected that the beta for the associations between gratitude (sub)scores measure with the GQ6 and SGRAT-NL and SWLS and PA would be positive and between 0.40 and 0.59 (Evans, 1996); for divergent validity a negative or no association was expected between gratitude (sub)scores measured with the GQ6 and SGRAT-NL and NA. To test for concurrent validity between gratitude scales, Pearson's correlation coefficient was calculated at T0 and T1. It was expected that the Pearson's  $r$  would be positive and 0.70 or greater (Terwee et al., 2007). All results were interpreted against a significance threshold of 5%, and 95% confidence intervals were calculated. Analyses were conducted using SPSS 20.0 except for the CFA and McDonalds omega, which were conducted using Lavaan 0.5–16 (Rosseel, 2012) in R 3.0.3.

## Results

### GQ6-NL

Parallel analysis showed one factor for the GQ6-NL (Table 4). The KMO of 0.74 verified the sampling adequacy for the EFA at T0. Anti-image correlation values for individual items were all  $\geq 0.70$ , which is well above the acceptable limit of 0.50. All but item six loaded satisfactory on the single factor (Table 5). Rotation was not conducted because of the one-factor scale of the GQ6-NL. Our CFA confirmed the one-factor structure of the GQ6-NL at T1 with a good fit with the sample,  $\chi^2 (9, N = 444) = 65.75, p < 0.001$ , CFI = 0.92, SRMR = 0.06. Internal consistency was acceptable,  $\omega_h = 0.75$ . Item six was retained in the factor because at least three items within the factor showed high loadings (Pasta & Suhr, 2004), all items had a good anti-image correlation, internal consistency of the factor did not improve with at least 0.05 when item 6 was removed ( $\omega_h = 0.77$ ), and CFA confirmed the one-factor structure. The test-retest reliability for the GQ6-NL was good (Table 6). Results of the regression analysis showed that the total score of the GQ6-NL was moderately positively associated with life satisfaction and positive affect, and moderately to weakly negatively associated with negative affect (Table 7).

Table 4

*Parallel analyses from the items of the GQ6-NL and SGRAT-NL (N = 706)*

Measures and factors	Raw data	95 <sup>th</sup> percentile	Variance explained
GQ6-NL			
- Factor 1	2.67	1.18	35.68
- Factor 2	1.04	1.18	
SGRAT-NL			
- Factor 1	4.35	1.32	23.74
- Factor 2	2.85	1.25	14.93
- Factor 3	1.86	1.20	8.43
- Factor 4	0.98	1.16	

*Note.* Parallel analyses with Monte Carlo simulations determines the number of factors to retain in Exploratory Factor Analysis (Ledesma & Valero-Mora, 2007). The simulation was executed with 1000 parallel datasets based on permutations of the original raw data set, with the criterion set at the 95<sup>th</sup> percentile. The eigenvalue of the raw data needs to exceed the eigenvalue of the 95<sup>th</sup> percentile to be defined as a factor (O'Connor, 2000).

Table 5  
*Factor matrix with loadings of GQ6-NL items (N = 706)*

Item	Factor 1
Item 2	0.89
Item 1	0.80
Item 4	0.49
Item 5	0.44
Item 3	0.41
Item 6	0.35

Note. Extraction Method: Maximum Likelihood.

Table 6  
*Test-retest reliability after a six week interval of the GQ6-NL and SGRAT-NL*

Measures	ICC(2,2)	CI
GQ6-NL	0.85**	0.82 – 0.88
SGRAT-NL	0.91**	0.89 – 0.92
LOSD	0.89**	0.87 – 0.91
SA	0.89**	0.87 – 0.91
AO	0.89**	0.86 – 0.91

Note. \*\*  $p < 0.001$ , ICC = intraclass correlation coefficient, CI = confidence interval, LOSD = Lack of a sense of deprivation, SA = Simple appreciation, AO = Appreciation of others.

### SGRAT-NL

Parallel analysis showed three factors for the SGRAT-NL (Table 4). The KMO of 0.84 verified the sampling adequacy for the EFA at T0. Anti-image correlation values for individual items were  $\geq 0.77$ , which is well above the acceptable limit of 0.50. The rotated component matrix showed that all items of a specific subscale loaded on the same factor (Table 8) corresponding with the subscales of the original SGRAT. CFA on T1 confirmed the three-factor structure of the SGRAT-NL with acceptable fit,  $\chi^2 (101, N = 444) = 481.80, p < 0.001$ , CFI = 0.88, SRMR = 0.07. The internal consistency of the subscales of the SGRAT-NL was good (LOSD  $\omega_h = 0.86$ , SA  $\omega_h = 0.79$ , AO  $\omega_h = 0.82$ ). The total SGRAT-NL also showed good internal consistency,  $\omega_h = 0.88$ . Test-retest reliability showed good results for the total score and for all subscales (Table 6). VIF and tolerance scores indicated no concern about multicollinearity. The total score of the SGRAT-NL was moderately positively associated with life satisfaction and positive affect, and moderately to weakly negatively associated with negative affect. When controlled for the separate contribution of all other SGRAT-NL subscale measures, scores on the LOSD subscale explained the largest proportion of

variance in the models of life satisfaction and negative affect. In the model of positive affect, no differences were found regarding the proportion of variance explained by each of the SGRAT-NL subscale scores. (Table 7). Pearson's correlation coefficients regarding the relationship between both gratitude questionnaires were  $r = 0.72$  ( $p < .001$ ) at T0 and  $r = 0.73$  ( $p < .001$ ) at T1.

### Discussion

In this study, we examined the Dutch GQ6 and SGRAT regarding their factorial structure, the internal consistency and test-retest reliability of the (sub)scales, and the association of the (sub)scales with measures of well-being in a Dutch speaking adult sample. Parallel analyses, exploratory factor analyses, and confirmatory factor analyses found and confirmed the one-factor structure of the GQ6-NL as well as the three-factor structure of the SGRAT-NL. Internal consistency and test-retest reliability of both questionnaires and their subscales were good. In addition, our results showed that individuals with a stronger grateful disposition reported higher life satisfaction, higher positive affect, and less negative affect. The results showed that the total scores of the GQ6-NL and SGRAT-NL were significantly and positively associated with both life satisfaction and positive affect, indicating good convergent validity for both questionnaires. With regard to divergent validity, scores on both questionnaires were negatively associated with negative affect. We found a strong correlation between both scales indicating that the scales measure the same construct. However, the correlations were not perfect, possibly due to different conceptualizations of gratitude underpinning both scales.

Associations between the three subscales of the SGRAT-NL and measures of well-being were not assessed previously to the best of our knowledge. In our research, the subscale lack of a sense of deprivation showed a positive association with life satisfaction, a positive association with positive affect, and a negative association with negative affect, when controlled for the separate contribution of all other SGRAT-NL subscale measures. The association between lack of a sense of deprivation and life satisfaction corresponds with previous research on relative deprivation. Relative deprivation has been described as 'the judgment that one is worse off compared to some standard and is accompanied by feelings of anger or resentment' (Smith, Pettigrew, Pippin, & Bialosiewicz, 2012). This judgment may lead individuals to believe that they do not get what they deserve (Smith et al., 2012), and can result in increased negative affect, decreased positive affect and a decrease in feeling gratitude in life.



Table 7  
Multiple regression coefficients of the independent variables GQ6-NL, SGRAT-NL, and subscales, and the dependent variables SWLS, PA-scale, and NA-scale

	SWLS				PA				NA			
	B(SE)	Beta	CI	R <sup>2</sup>	B(SE)	Beta	CI	R <sup>2</sup>	B(SE)	Beta	CI	R <sup>2</sup>
Model 1												
GQ6-NL	0.54 (0.04)	0.44**	0.46 - 0.63	0.19**	0.65 (0.05)	0.48**	0.56 - 0.74	0.23**	-0.40 (0.06)	-0.27**	-0.51 - - 0.29	0.07**
Model 2												
SGRAT-NL	0.21 (0.01)	0.51**	0.19 - 0.24	0.26**	0.17 (0.02)	0.38**	0.14 - 0.20	0.14**	-0.14 (0.02)	-0.29**	-0.18 - - 0.11	0.08**
Model 3												
LOSD	0.32 (0.02)	0.48**	0.28 - 0.36	0.31**	0.14 (0.03)	0.20**	0.09 - 0.19	0.15**	-0.26 (0.03)	-0.33**	-0.31 - - 0.20	0.14**
SA	0.17 (0.03)	0.17**	0.10 - 0.24	-	0.25 (0.04)	0.22**	0.17 - 0.33	-	-0.18 (0.05)	-0.15**	-0.27 - - 0.09	-
AO	0.05 (0.03)	0.05	-0.01 - 0.12	-	0.15 (0.04)	0.13**	0.07 - 0.23	-	0.12 (0.05)	0.10 *	0.03 - 0.21	-

Note. N = 706, \*  $p < 0.05$ , \*\*  $p < 0.001$ . CI = 95% confidence interval, R<sup>2</sup> = percentage variance explained.

SWLS = Satisfaction With Life Scale, PA = positive affect scale, NA = negative affect scale, SGRAT-NL subscales, LOSD = lack of a sense of deprivation, SA = simple appreciation, AO = appreciation of others.

The positive association of the subscale simple appreciation with life satisfaction and positive affect, and its negative association with negative affect supports these claims by suggesting that appreciation of the little things in life may increase positive feelings and life satisfaction, and reduces negative feelings. Interpretation of causality regarding these relationships is, however, hampered by the research design of the current study. The subscale appreciation of others showed no significant positive association with life satisfaction, a positive association with positive affect, and a positive association with negative affect. Wood, Maltby, Gillett, Linley, and Joseph (2008) stated that dispositional gratitude may lead to more conscious awareness about perceived social support. Because of this conscious awareness, it can be expected that appreciation of others would be positively associated to life satisfaction (a more evaluative state), than to positive and negative affect (emotional states). This positive association between perceived social support and life satisfaction has been found in previous research (Siedlecki, Salthouse, Oishi, & Jeswani, 2014). However, we found that appreciation of others is not related to life satisfaction, but seems to be associated with the experience of positive and negative emotions. The positive association with negative affect supports previous research that has shown gratitude to be not only related to positive affect, but also to negative affective experiences such as guilt and shame (McCullough, Emmons, Kilpatrick, & Larson, 2001), and indebtedness (Algoe, Gable, & Maisel, 2010; Watkins, Scheer, Ovnicek, & Kolts, 2006). Overall, our findings support that social components of gratitude are associated with both positive and negative affective experience.

There are some limitations of the current study that should be noted. First, the participants in this study were not randomly selected which may have led to a selective sample of adults. Furthermore, although the sample was demographically heterogeneous, participants who completed both measurements were higher educated, older, and showed less negative affect than those who dropped out after the baseline measurement. Although this may have introduced bias in the data, test-retest reliability was very good. Another limitation is that there is no direct comparison between the original and translated questionnaires within the same sample. However, to ensure an optimal translation of both questionnaires, the original versions were translated by bilingual translators to assure equivalence of meaning between both the translated and original versions.

Comparison of the outcomes of the SGRAT-NL with the outcomes of the GQ6-NL regarding reliability and validity in this study shows that there is great resemblance between both scales. The outcomes indicate that both scales are of sufficient psychometric quality to be used for assessment of the grateful disposition in individuals and groups (Kruyen, Emons, & Sijtsma, 2012). The choice between one scale or the other is therefore based on the amount of items, and on the different conceptualizations of both scales. The SGRAT-NL is

based on three characteristics of individuals: lack of a sense of deprivation, simple appreciation, and appreciation of others; the GQ6-NL is based on four descriptive facets: intensity, frequency, span, and density.

As this is the first research using the subscales of the SGRAT-NL, future research is needed. Especially the subscales simple appreciation and appreciation of others should be scrutinized further. Simple appreciation seems to be associated with more positive affect and life satisfaction, and less negative affect; the results regarding appreciation of others were partly inconsistent with findings from previous research.

## Conclusion

The outcomes of our study replicated and extended previous studies (Froh et al., 2011; McCullough et al., 2002; Thomas & Watkins, 2003; Watkins et al., 2003), showing that the GQ6-NL and SGRAT-NL can be used to assess the grateful disposition in a Dutch speaking sample. The subscales of the SGRAT-NL showed good internal consistency and test-retest reliability and may be used for future research in order to further disentangle the relationship between a lack of a sense of deprivation, simple appreciation and the appreciation of others in the context of the grateful disposition.

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## CHAPTER 4

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### Gratitude, Psychopathology and Subjective Well-Being: Results from a 7.5-Month Prospective General Population Study

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.

## Abstract

Gratitude is considered an important source of human strength in achieving and maintaining good mental health. Although complete mental health encompasses the absence of psychopathology and the presence of subjective well-being, no studies to date have examined relations between gratitude and both mental health dimensions together. Moreover, most studies focused on specific samples with a restricted demographic range. Our study, therefore, examined (a) demographic variability in the grateful trait, and (b) prospective associations between gratitude and both dimensions of mental health: psychopathology and subjective well-being. Using a four-wave prospective survey design in a large ( $N = 706$ ) sample of Dutch adults ( $M_{\text{age}} = 44$ ,  $SD_{\text{age}} = 14$ ,  $\text{Range} = 18\text{--}80$ ), we measured gratitude with the SGRAT, symptoms of psychopathology with the SCL-90, and subjective well-being with the PANAS and SWLS. Gratitude was significantly associated with age, gender, education level, and employment status. Multilevel time-lagged regression analyses showed that the grateful trait did not predict symptoms of psychopathology, but was a significant albeit weak predictor of subjective well-being, when adjusting for the effects of demographic factors, and prior levels of subjective well-being and psychopathology. Our findings indicate that the grateful trait is associated with demographic factors, and shows complex connections with the presence of well-being and absence of psychopathology. These dynamics should be taken into consideration when studying the role of gratitude in mental health, and developing, applying, and evaluating gratitude interventions with the aim of enhancing subjective well-being and/or reducing psychopathology.

## Introduction

Gratitude as a disposition, also called the grateful trait, refers to a wider life orientation based on a sense of abundance, the appreciation of little things in life, and the appreciation of what others have done for us (Thomas & Watkins, 2003). The grateful trait has been suggested to be an important source of human strength in achieving and maintaining good mental health (Emmons & Crumpler, 2000; Snyder & Lopez, 2009). Complete mental health, following Keyes' (2005) empirically grounded dual continuum model, consists of two related, yet distinct dimensions: psychopathology (or mental illness) and subjective well-being (or positive mental health; see also: Westerhof and Keyes (2010)). Evidence suggests that the absence of psychopathology does not necessarily imply the presence of subjective well-being, and vice versa (Keyes, 2005, 2007), and the study of mental health and determinants thereof should, thus, include the combined assessment of both dimensions (Keyes, 2007). Hence, a complete view of gratitude's contribution to mental health would require an examination of its effects on both psychopathology and subjective well-being. However, although a number of studies, both cross-sectional and longitudinal, have linked the grateful trait negatively to measures of psychopathology (Kleiman, Adams, Kashdan, & Riskind, 2013; Krause, 2009; Lies, Mellor, & Hong, 2014; Petrocchi & Couyoumdjian, 2016; Wood, Maltby, Gillett, Linley, & Joseph, 2008a), and other studies have reported positive associations between gratitude and measures of well-being (Chaves, Hervas, Garcia, & Vazquez, 2015; Gillham et al., 2011; Kong, Ding, & Zhao, 2015; Szczesniak & Soares, 2011; Thrash, Elliot, Maruskin, & Cassidy, 2010; Tsai, Sippel, Mota, Southwick, & Pietrzak, 2016; Watkins, Woodward, Stone, & Kolts, 2003; Zhou & Wu, 2015), no studies to date have examined relations between the grateful trait and both dimensions of mental health together. Our understanding of the grateful trait's contribution to mental health remains, therefore, incomplete, and calls for additional prospective examination of how gratitude impacts on the combinedly assessed dimensions of psychopathology and subjective well-being.

In addition, the majority of studies on the relationship between gratitude and mental health were carried out among adolescent (mainly student) convenience samples (Gillham et al., 2011; Kleiman et al., 2013; Kong et al., 2015; Petrocchi & Couyoumdjian, 2016; Watkins et al., 2003; Wood et al., 2008a), among elderly individuals (Krause, 2009), or among individuals within a particular psychological context, such as earthquake survivors (Lies et al., 2014; Zhou and Wu, 2015), military veterans (Tsai et al., 2016), breast cancer survivors (Hulett, Armer, Stewart, & Wanchai, 2015), or children with a life threatening illness (Chaves et al., 2015). It remains uncertain to what extent the results produced by these studies reflect general patterns at the population level. Furthermore, most study samples—in particular the adolescent convenience samples — suffer from a restricted demographic range, and the

gratitude literature in general, as pointed out by Watkins (2013), lacks adequate examination of demographic variation in the grateful trait. Apart from the consistent observation that women tend to be more grateful than men (Kaczmarek et al., 2015; Kashdan, Mishra, Breen, & Froh, 2009; Krause, 2006; Sommers & Kosmitzki, 1988), no strong or consistent demographic predictors of gratitude have emerged from the literature (see Watkins, 2013, for review). However, given the dearth of large-scale systematic studies on the demographics of distributed uniformly across demographic groups. Our study aims to contribute to the empirical study of gratitude and its contributions to mental health, by addressing the abovementioned shortcomings in the present literature. Using a four-wave, 7.5-months, prospective survey design in a large ( $N = 706$ ) general population sample of Dutch-speaking adults, we examined (a) demographic variability in the grateful trait, and (b) the prospective associations between gratitude and both dimensions of mental health: psychopathology and subjective well-being. We hypothesized that higher levels of gratitude would be longitudinally associated with lower levels of psychopathology and higher levels of subjective well-being, and that these associations would not be reducible to demographic characteristics or correlations in psychopathology and subjective well-being across time.

## **Materials and Methods**

### **Sample**

The sample at baseline (T0) consisted of 706 Dutch speaking respondents ( $M_{\text{age}} = 44$ ,  $SD_{\text{age}} = 14$ , *Range* 18–80), among which 220 men (31%). Inclusion criteria were: (a) at least 18 years old, and (b) sufficient command of the Dutch language to understand instructions and give informed consent. No exclusion criteria were applied to obtain a demographically heterogeneous sample. Demographic characteristics of the total sample, and a comparison of completers (respondents who completed all four measurements) and dropouts (respondents who dropped out of the study at one of the follow-up measurements T1, T2, or T3) are reported in Table 1. Response rates relative to baseline on T1, T2, and T3 assessments were, respectively, 62% ( $n = 440$ ), 45% ( $n = 321$ ), and 40% ( $n = 280$ ). Respondents participated voluntarily and were rewarded with a raffle for gift cards. The study was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for medical research involving humans. Informed consent was obtained from all respondents at study entry.

Table 1.  
Sample characteristics of total sample (N = 706), and dropout-completer comparison.

	Total sample	Dropouts	Completers	$\Delta$ Dropouts - Completers
N	706 (100)	426 (60)	280 (40)	
Age M (SD)	44 (14)	41 (14)	48 (14)	$t(704) = -6.37^{**}$
[range]	[18-80]	[18-76]	[18-80]	
Gender n (%)				
- Men	220 (31)	140 (33)	80 (29)	$\chi^2 (1, N = 706) = 1.45$
- Women	486 (69)	286 (67)	200 (71)	
Relationship status n (%)				
- Single	201 (29)	120 (28)	81 (29)	$\chi^2 (1, N = 706) = 0.05$
- In a relationship	505 (71)	306 (72)	199 (71)	
Family status n (%)				
- Not living with underage children	464 (66)	264 (62)	200 (71)	$\chi^2 (1, N = 706) = 6.71^*$
- Living with underage children	242 (34)	162 (38)	80 (29)	
Education level n (%)				
- Low education	94 (13)	65 (15)	29 (11)	$\chi^2 (1, N = 706) = 5.11$
- Medium education	140 (20)	89 (21)	51 (18)	
- High education	472 (67)	272 (64)	200 (71)	
Employment status n (%)				
- Fulltime	285 (40)	187 (44)	98 (35)	$\chi^2 (1, N = 706) = 5.83$
- Parttime	242 (35)	140 (33)	102 (36)	
- Not employed	179 (25)	99 (23)	80 (29)	
SGRAT-nl M (SD)	110.78 (15.38)	110.00 (15.04)	111.98 (15.84)	$t(704) = -1.68$
SCL-90 M (SD)	38.24 (37.22)	37.25 (35.15)	39.61 (39.92)	$t(704) = -0.81$
SWLS M (SD)	24.58 (6.24)	24.45 (6.42)	24.78 (5.97)	$t(704) = -0.68$
PA-scale M (SD)	35.09 (6.64)	35.03 (6.77)	35.18 (6.45)	$t(704) = -0.29$
NA-scale M (SD)	19.17 (7.03)	19.67 (7.43)	18.41 (6.32)	$t(704) = 2.33^*$
SWB M (SD)	40.50 (15.51)	39.80 (15.77)	41.56 (15.07)	$t(704) = -1.47$

Note.  $^{**} p < 0.001$ ,  $^* p < 0.05$ . Dropouts are respondents who dropped out of the study at one of the follow-up measurements T1, T2, or T3. Completers are respondents who completed all four measurements.

## Study Design and Procedure

Our study employed a longitudinal prospective design, consisting of a baseline online survey (T0) and three follow-up online surveys (T1, T2, and T3), covering a time period of 6, 18, and 30 weeks from baseline, respectively. Respondents were recruited through door-to-door flyers, social media, email, and face-to-face contact. Those who participated in the first measurement received an email with the request to fill out the second online survey that could be accessed by clicking on a link and logging in with a unique 15-character personal access code. This procedure was repeated for respondents who participated in the second and third measurement.

## Measures

**Gratitude.** The grateful trait was measured with the Dutch Short Gratitude, Resentment, and Appreciation Test (SGRAT-nl; Jans-Beken, Lataster, Leontjevas, & Jacobs, 2015; McCullough, Emmons, & Tsang, 2002). The SGRAT-nl consists of 16 propositions, for example “Life has been good to me”. Respondents indicated their response on a 9-point Likert scale, ranging from strongly disagree (1) to strongly agree (9). Five negatively formulated items were reverse coded, and item scores were summed to a total score, ranging from 16 to 144, with high scores indicating a higher level of a grateful trait. The SGRAT-nl is previously found to be a reliable measure (Jans-Beken et al., 2015), and McDonald's  $\omega_{\text{total}}$  reliability coefficients for the samples in the current study (T0-T3) showed a satisfactory range of .88 to .92. The SGRAT-nl showed high test–retest reliability across the four measurements in the current study: ICC(3, k) = .93, 95% CI [.92, .94] (see Terwee et al., 2007, for interpretation conventions).

**Psychopathology.** To assess symptoms of psychopathology, the Dutch version of the Symptom Checklist-90 was used (SCL-90; Arrindell & Ettema, 1981; Derogatis, 1977). The SCL-90 is used as a screening instrument for a broad range of psychological problems and symptoms of psychopathology and consists of 90 symptoms (e.g. “Experiencing feelings of worthlessness”, “Feeling an urge to check things that you do”, and “Feeling afraid”), comprising 8 subscales and a total score providing an overall measure of psychopathology. Respondents were asked to rate the extent to which they experienced each symptom during the last week on a scale from 0 (not at all) to 4 (extremely). The current study used the total score, ranging from 0 to 360, as a measure of psychopathology. The Dutch SCL-90 has been proven to be a reliable and valid measure of psychopathology (Arrindell & Ettema, 1981). For the samples in the current study, McDonald's  $\omega_{\text{total}}$  reliability coefficients for the SCL-90 ranged from .98 to .99, and test–retest reliability across the four measurements was high: ICC(3, k) = .91, 95% CI [.90, .92].

**Subjective Well-Being.** To assess subjective well-being, we employed the approach previously described by Diener (1994): scores of life satisfaction were added to net affect scores (positive minus negative) to obtain a composite measure of subjective well-being. To measure life satisfaction the Dutch version of the Satisfaction With Life Scale (SWLS: Arrindell, 1991; Diener et al., 1985) was used, and the Dutch Positive Affect and Negative Affect Schedule (PANAS: Peeters, Ponds, & Vermeeren, 1996; Watson, Clark, & Tellegen, 1988) was used to measure positive and negative affect. For the SWLS, respondents were asked to rate their response to five propositions, e.g. “I am satisfied with my life”, on a 7-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). All item scores were summed to a total score, ranging from 5 to 35, with high scores indicating a higher level of life satisfaction. The SWLS is found to be a reliable measure with reported Cronbach’s  $\alpha$  values in the range of 0.85 to 0.87 (Arrindell, 1991; Van Beuningen, 2012). In the samples of the current research, McDonald’s  $\omega_{\text{total}}$  reliability coefficients for the SWLS ranged from .87 to .89, and test–retest reliability across the four measurements was high: ICC(3, k) = .92, 95% CI [.91, .93]. For the PANAS, respondents were asked to rate the extent to which they had experienced ten mood states, among which “interested” and “nervous”, during the past week on a 5-point Likert scale, ranging from very slightly or not at all (1) to extremely (5). Scores on each affect dimension were summed to a total score, ranging from 10 to 50 for each dimension, with high scores indicating a higher level of positive or negative affect. Dutch translations of the negative affect scale and positive affect scale have shown internal consistencies of  $\alpha = 0.83$  and  $\alpha = 0.79$ , respectively (Peeters et al., 1996). In the samples of the current research, McDonald’s  $\omega_{\text{total}}$  reliability coefficients for the PANAS showed a range of .89–.90 for the negative affect scale, and .86–.90 for the positive affect scale. Both scales showed moderate to high test–retest reliability across the four measurements in the current study (NA: ICC(3, k) = .80, 95% CI [.78, .83]; PA: ICC(3, k) = .81, 95% CI [.78, .83]). For the combined subjective well-being scale, McDonald’s  $\omega_{\text{total}}$  reliability coefficients showed a satisfactory range of .93–.94, and test–retest reliability across the four measurements was high: ICC(3, k) = .89, 95% CI [.87, .90].

### Statistical Analyses

Analyses were performed using STATA version 14.0 (StataCorp, 2015), and R version 3.3.2 (R Core Team, 2016) psych package (Revelle, 2014) for calculating McDonald’s  $\omega_{\text{total}}$  and intraclass correlation coefficients. All findings were interpreted against a significance threshold of  $\alpha = 5\%$ . For regression analyses, all continuous variables were standardized to facilitate the interpretation of effect coefficients (Hox, 1995).

**Dropout-Completer Comparison.** To assess differences in demographic composition between dropouts and completers, Chi square and unpaired *t* tests were



performed, testing for differences in age, gender, relationship status, family status, education level, and employment status. Using unpaired *t* tests, we additionally tested differences between dropouts and completers in baseline scores on the grateful trait, symptoms of psychopathology, life satisfaction, positive and negative affect, and the composite subjective well-being measure.

**Demographic Variability in the Grateful Trait.** Using the measures obtained at baseline, cross-sectional associations between demographic characteristics and the grateful trait were analyzed using multiple regression analysis.

**Prospective Associations Between Gratitude and Symptoms of Psychopathology.** Given the prospective study design and hierarchical structure of the data, i.e. multiple measurements (level 1) clustered within respondents (level 2), multilevel time-lagged regression analyses were conducted using the 'lag' (t-1) and 'xtreg' commands in STATA version 14.0 (StataCorp, 2015). The level 1 intercept was allowed to vary randomly across respondents at level 2. The level 2 intercept and slope represent the average level 1 intercept and slope across the sample. Four models of psychopathology were tested consecutively. Model 1 included only gratitude at the previous time point (t-1) as predictor. Model 2 included gratitude at the previous time point (t-1), and age, gender, relationship status, family status, education level, and employment status as confounder variables. Model 3 included, in addition to the predictor variables specified in Model 2, also symptoms of psychopathology at the previous time point (t-1) as predictor. Model 4, finally, included, in addition to the predictor variables specified in Model 3, also subjective well-being at the previous time point (t-1) as predictor.

**Prospective Associations Between Gratitude and Subjective Well-Being.** Analogous to the model testing for the dependent variable psychopathology, four models of subjective well-being were tested consecutively. Model 1 included only gratitude at the previous time point (t-1) as predictor. Model 2 included gratitude at the previous time point (t-1), and age, gender, relationship status, family status, education level, and employment status as predictor variables. Model 3 included, in addition to the predictor variables specified in Model 2, also subjective well-being at the previous time point (t-1) as predictor. Model 4, finally, included, in addition to the predictor variables specified in Model 3, also symptoms of psychopathology at the previous time point (t-1) as predictor.



## Results

### Demographic Characteristics and Dropout-Completer Comparison

Table 1 presents a demographic description of the total sample, and a comparison between dropouts and completers. Dropouts were significantly younger than completers ( $t(704) = -6.37, p < .001$ ), lived more often in a household with underage children ( $\chi^2(1, N = 71) = 6.71, p < .01$ ), and reported higher levels of negative affect at baseline ( $t(704) = 2.33, p < .05$ ).

Table 2.

*Multiple regression analysis of associations between demographic variables and total score on the SGRAT-NL (n=706).*

Characteristic	B	SE	$\beta$	95% CI
Age	.28	.05	.26***	[ .19, .37]
[18 - 80]				
Gender	3.73	1.25	.11**	[1.27, 6.19]
(female vs. male)				
Relationship	1.17	1.31	.03	[-1.40, 3.74]
(in a relationship vs. single)				
Family status	1.99	1.24	.06	[ -.45, 4.43]
(parent vs. non-parent)				
Education level	3.86	.82	.18***	[ 2.25, 5.46]
(low vs. medium vs. high)				
Employment status	1.71	.79	.09*	[ .15, 3.26]
(not employed vs. partime vs. fulltime)				

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

### Demographic Variability in the Grateful Trait

Gratitude as a trait at baseline showed significant associations with age, gender, education level, and employment status: older individuals, women, more highly educated individuals, and employed individuals reported higher scores of the grateful trait than younger individuals, men, individuals with lower education levels, and unemployed individuals, respectively. Having a relationship or having underage children was not associated with the grateful trait (see Table 2).

### Prospective Associations Between Gratitude and Symptoms of Psychopathology

As illustrated in Table 3, the prospective model of the dependent variable psychopathology showed that the grateful trait was a significant negative longitudinal predictor of psychopathology symptoms (Model 1 estimate:  $b = -.15, SE = .03, p < .001$ ), also when adjusted for the effects of demographic factors (Model 2 estimate:  $b = -.13, SE = .03, p < .001$ ). However, the prospective association between gratitude and psychopathology lost

significance when adjusted for the effect of psychopathology at the previous time point (Model 3 estimate:  $b = -.02$ ,  $SE = .02$ ,  $p = .30$ ). Model 3 outcomes showed that the presence of psychopathology symptoms at a given time point was the only significant predictor of psychopathology one time point later (Model 3 estimate:  $b = .82$ ,  $SE = .02$ ,  $p < .001$ ), and remained so when further adding subjective well-being at the previous time point as a predictor to the prospective model of psychopathology (Model 4 estimate:  $b = .86$ ,  $SE = .03$ ,  $p < .001$ ).

### **Prospective Associations Between Gratitude and Subjective Well-Being**

As can be seen in Table 4, the prospective model of the dependent variable subjective well-being showed that the grateful trait was a modest, but significant positive longitudinal predictor of subjective well-being (Model 1 estimate:  $b = .29$ ,  $SE = .03$ ,  $p < .001$ ), and remained so when adjusted for the effects of demographic factors (Model 2 estimate:  $b = .25$ ,  $SE = .03$ ,  $p < .001$ ). Furthermore, gratitude remained a significant, albeit weak prospective predictor of subjective well-being when corrected for the effect of subjective well-being at the previous time point (Model 3 estimate:  $b = .07$ ,  $SE = .02$ ,  $p < .001$ ), and when symptoms of psychopathology at the previous time point were additionally included in the model (Model 4 estimate:  $b = .09$ ,  $SE = .02$ ,  $p < .001$ ). The variance in subjective well-being was, however, largely accounted for by the effects of subjective well-being and symptoms of psychopathology at the previous time point ( $b = .55$ ,  $SE = .03$ ,  $p < .001$ , and  $b = -.21$ ,  $SE = .03$ ,  $p < .001$ , respectively).

### **Discussion**

This longitudinal study in a large, demographically diverse, Dutch-speaking general population sample aimed to shed more light on the demography of gratitude, and the relationship between the grateful trait and the multidimensional construct of complete mental health, incorporating both psychopathology and subjective well-being (Keyes, 2005). First, our findings showed that gratitude as a trait is significantly associated with age, gender, education level, and employment. Secondly, higher levels of gratitude at one moment were shown to be weakly associated with lower levels of psychopathology, and moderately with higher levels of subjective well-being at a subsequent moment, irrespective of the effect of demographic factors. Thirdly, although the negative prospective effect of gratitude on psychopathology symptoms was reducible to correlations in psychopathology across time, the positive prospective effect of gratitude on subjective wellbeing, albeit weak, remained significant even when taking into account variance in subjective well-being attributable to prior levels of both well-being and psychopathology. Our findings indicate that the grateful trait is associated with demographic factors, and shows

complex connections with the presence of well-being and absence of psychopathology, further elucidating the role of gratitude in complete mental health.

### **Demographic Variation in the Grateful Trait**

Although levels of the grateful trait did not vary as a function of relationship or family status, gratitude as a trait at baseline was significantly associated with age, gender, education level, and employment status. These results do not support previous suggestions that the grateful trait is distributed uniformly across demographic groups (see Watkins, 2013, for review).

As individuals age, they appear to report higher levels of gratitude (Wood, Maltby, Stewart, & Joseph, 2008b), a process that can be understood in the light of socio-emotional selectivity theory, stating that the awareness of mortality shifts attention to current happiness (Carstensen, Fung, & Charles, 2003), in addition to being more prone to positive memories than younger individuals (Reed, Chan, & Mikels, 2014). Another explanation for the observed positive association between age and gratitude could be the previously described stability-despite-loss paradox; older individuals are more frequently confronted with disabled peers and deceased loved ones. As a consequence, they accept their strengths and weaknesses, and learn to appreciate life as it is (Kunzmann, Little, & Smith, 2000).

The current study showed women to be more grateful than men, a finding in line with several previous studies (Kashdan et al., 2009; Krause, 2006). Drawing on the social role theory (Eagly, 2013), one could suggest that women are more prone to social interaction and cooperation, established in the experience and expression of gratitude. Future research should, however, shed further light on the mechanisms underlying an increased sense of gratitude in women versus men.

A higher education level seems to be associated with higher levels of the grateful trait. This finding is interesting because previous research has shown that the well-established positive association between education level and healthy behavior (Singh-Manoux, Ferrie, Chandola, & Marmot, 2004) is mediated by personality traits (Edmonds, 2011). Given that gratitude also seems dispositional, and shows associations with both education level and mental health in our study data, its possible mediating role in the interrelationship of education level and health behaviours deserves further examination.

Table 3.  
*Multilevel models for the prospective effect of gratitude on psychopathology*

Parameters	Model 1 $\beta$ (SE)	Model 2 $\beta$ (SE)	Model 3 $\beta$ (SE)	Model 4 $\beta$ (SE)
Fixed effects				
Level 1				
Intercept	.08 (.07)	.52 (.18)**	-.01 (.09)	.00 (.09)
Gratitude (T-1)	-.15 (.03)***	-.13 (.03)***	-.02 (.02)	-.04 (.02)
Time	-.03 (.02)	-.03 (.02)	-.01 (.02)	-.01 (.02)
Age (standardized)		-.18 (.05)**	-.02 (.02)	-.02 (.02)
Gender		.16 (.10)	.06 (.04)	.05 (.04)
Relationship		-.14 (.10)	.01 (.04)	.01 (.04)
Family		-.23 (.10)*	-.07 (.04)	-.07 (.04)
Education		-.15 (.07)*	-.03 (.03)	-.03 (.03)
Employment		-.10 (.06)	-.01 (.03)	-.01 (.03)
Psychopathology (T-1)			.82 (.02)***	.86 (.03)***
Subjective wellbeing (T-1)				.06 (.03)
Random parameters				
Level 2				
Intercept (id)	.87 (.04)	.84 (.03)	.00 (.00)	.00 (.00)

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 4.  
*Multilevel models for the prospective effect of gratitude on subjective well-being*

Parameters	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)	Model 4 β (SE)
Fixed effects				
Level 1				
Intercept	-.10 (.07)	-.77 (.16)***	-.26 (.10)*	-.26 (.10)*
Gratitude (T-1)	.29 (.03)***	.25 (.03)***	.07 (.02)**	.09 (.02)***
Time	.04 (.02)	.04 (.02)	.03 (.02)	.03 (.02)
Age (standardized)		.24 (.05)***	.06 (.03)*	.06 (.02)*
Gender		.03 (.09)	-.03 (.05)	.01 (.04)
Relationship		.18 (.09)*	.06 (.04)	.06 (.04)
Family		.21 (.09)*	.11 (.05)*	.09 (.05)
Education		.12 (.06)*	.03 (.03)	.02 (.03)
Employment		.29 (.06)***	.04 (.03)	.05 (.03)
Subjective wellbeing (T-1)			.72 (.02)***	.55 (.03)***
Psychopathology (T-1)				-.21 (.03)***
Random parameters				
Level 2				
Intercept (id)	.73 (.03)	.70 (.03)	.00 (.00)	.00 (.00)

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Employed individuals report higher levels of gratitude, in line with previous reports of unemployment being related to reduced physical and mental health (Wilson & Walker, 1993) and subjective well-being (Clark & Oswald, 1994). However, the effect of employment status on gratitude is rather small, fitting the idea that being employed in itself is not necessarily or solely predictive of gratitude, but the appreciation of work activities or lack thereof may represent a far more important predictor of gratitude (Sverko & Vidovic, 1995; Adler & Fagley, 2005).

We found no associations between the grateful trait and relationship or family status. Higher levels of the grateful trait among couples have been previously associated with higher levels of relationship maintenance and partner responsiveness (Feeney & Collins, 2014; Kubacka, Finkenauer, Rusbult, & Keijsers, 2011), behaviours that have been suggested to lie at the base of thriving relationships, and higher levels of subjective well-being in both partners (Feeney & Collins, 2014). These studies only included couples, however, and further research is needed to systematically investigate the dynamics of gratitude in the context of interhuman relationships.

Being a parent is shown to evoke joy, positive affect, happiness, and meaning in life (Nelson, Kushlev, English, Dunn, & Lyubomirsky, 2013). On the contrary, non-parents report higher quality of life than parents (Hansen, 2012). The current study did not show gratitude to differ between parents and nonparents. This may, first, suggest that, although gratitude may be associated with positive emotional states and feelings of well-being, it is phenomenologically distinct from these states, and, secondly, that individuals with and without children experience similar levels of gratitude.

### **Prospective Associations Between Gratitude and Symptoms of Psychopathology**

The findings from the current study shed more light on the previously suggested protective effects of gratitude against psychopathology (Petrocchi & Couyoumdjian, 2016; Wood et al., 2008a). When not taking into account current symptoms of psychopathology, our study indeed found gratitude to be a highly significant, albeit weak negative predictor of future psychopathology symptoms, in line with previous research showing gratitude to longitudinally predict lower levels of stress, depression and anxiety (Kleiman et al., 2013; Krause, 2009; Lies et al., 2014; Wood et al., 2008a). However, our study findings also revealed that the current presence of psychopathology is by far the strongest predictor of psychopathology in the future, irrespective of gratitude, and a lack of attention thereto may have led, in part, to exaggerated or imprecise findings regarding the protective effects of gratitude against psychopathology in previous reports.

Our findings are somewhat contradictory to those from a study by Wood et al. (2008a) in which higher levels of gratitude were longitudinally linked to lower levels of stress and depression, also when correcting for previous levels of these mental illness symptoms. However, the study by Wood et al. (2008a) specifically focused on the mechanics of gratitude during a life transition, and the study sample therefore consisted of first year undergraduate students (18–19 years old) who had just started their studies, whereas the current study was performed in a large, demographically diverse general population sample without a specific focus on life events. The discrepancy in findings between Wood et al.'s study (2008a) and ours may therefore suggest that the protective impact of gratitude on psychopathology is possibly more apparent in the context of a stressful life event, during which an individual undergoes changes in levels of mental health (Wheaton, 1990), as further evidenced by longitudinal studies linking gratitude to post-traumatic growth (Tsai et al., 2016; Zhou & Wu, 2015), and long-term survivorship in cancer patients (Hulett et al., 2015). Further longitudinal studies are needed, however, to systematically map the mechanics of gratitude in the context of adjustment and resilience to adversity.

### **Prospective Associations Between Gratitude and Subjective Well-Being**

Our study findings showed that the grateful trait was a significant and positive, albeit weak predictor of subjective well-being in the future, also when accounting for the effect of demographic factors, and current levels of psychopathology and well-being. This finding adds further empirical support to previously reported longitudinal associations between gratitude and well-being (Gillham et al., 2011; Thrash et al. 2010), life satisfaction and positive emotions (Wood et al., 2008a).

The grateful trait may enhance subjective well-being through several previously described mechanisms (Wood, Froh, & Geraghty, 2010). The first mechanism is the positive affect mechanism that considers gratitude a positive emotion, and predicts that feelings of positive affect and positive emotion act in a direct upward spiral toward enhanced subjective well-being (Fredrickson & Joiner, 2002). Secondly, following the broaden-and-build mechanism of positive emotions (Fredrickson, 2001), gratitude strengthens social bonds (Algoe, Haidt, & Gable, 2008; Bartlett, Condon, Cruz, Baumann, & Desteno, 2012; Kong et al., 2015) that in turn function as a resource for maintaining mental health in times of adversity (Fredrickson, 2004; Kawachi & Berkman, 2001). Thirdly, gratitude may lead to enhanced well-being through more adaptive coping, resulting in lower levels of stress, and enhanced subjective well-being (Wood, Joseph, & Linley, 2007). Fourth and lastly, grateful individuals view help as more costly, valuable, and altruistic, an appraisal scheme that may enhance subjective well-being (Wood, Maltby, Stewart, Linley, & Joseph, 2008c). Replicating

the current study with additional attention to these mediating mechanisms will help to further our understanding of the pathways connecting the grateful trait to subjective well-being.

### **Implications**

First, although the observed associations between gratitude and the demographic factors age, gender, education level, and employment status need replication in other large-scale systematic studies, our findings imply that a lack of attention to demographic confounders in gratitude research may yield imprecise results. This may be especially relevant when studying gratitude in relation to health-related outcomes, which are well-illustrated to also vary as a function of demography (Pol & Thomas, 2013), and previous work has already hinted at complex interactions between gratitude and demographic factors in the context of mental health (Krause, 2009). Further research into the mechanisms underlying associations between demographic factors and the grateful trait may increase our understanding of gratitude's contribution to mental health.

The findings from our prospective analyses based on self-report measures suggest that cultivating a sense of gratitude may impact positively on an individual's future position on the subjective well-being axis of mental health (Keyes, 2005), regardless of its current levels of well-being and psychopathology, but an increased sense of gratitude is less likely to ameliorate symptoms of psychopathology when they are present. Gratitude interventions have been studied before and a recent meta-analysis by Davis, Choe, Meyers, Wade, Varjas, Gifford (2016) suggests that gratitude interventions such as gratitude journaling, the gratitude letter, and gratitude lists do increase subjective well-being, albeit with small effects. In line with the current study findings, recent research (Kerr, O'Donovan, & Pepping, 2015) showed a gratitude intervention in a clinical sample to have no effect on general psychological functioning, but to have a positive impact on feelings of connectedness, satisfaction with daily life, and optimism. The authors of said study have suggested that gratitude interventions can contribute to positive emotional experience, and possibly stimulate change during psychotherapy or reduce negative affect in pre-treatment intervention when an individual is on the waiting list for psychotherapy (Kerr et al., 2015). Cultivating gratitude may thus indirectly decrease psychopathology, by increasing levels of subjective well-being modestly but significantly. Moreover, research has suggested that grateful individuals are less prone to develop symptoms of psychopathology from adversity because they are more able to positively reframe negative life events, possibly adding to the prevention of psychopathology (Emmons, 2007; Watkins, Grimm, & Colts, 2004; Wood et al., 2008c).



Viewed in the light of practical significance, it needs to be acknowledged that the corrected prospective effect of gratitude on subjective well-being was rather small ( $b = .09$ ). However, first, we present findings from a non-experimental survey study, not aimed at manipulating certain variables under examination. Second, our results are based on multilevel regression modeling, with conservative statistical adjustment for demographic factors and fluctuations in subjective well-being and psychopathology over time. Indeed, the uncorrected prospective effect of gratitude on well-being was substantially larger ( $b = .29$ , see Table 1), although still moderate at most. In comparison, the only study on gratitude and mental health with a comparable multi-wave study design and data analysis, although not applying correction for demographic factors, reported SEM path coefficients between gratitude and post-traumatic growth in the range of .12 to .15 (Zhou & Wu, 2015), considered small by convention (Hu & Bentler, 1999). Moreover, a recent meta-analysis (Davis et al., 2016) concluded the overall effect of gratitude interventions on well-being to range from moderate (Cohen's  $d = .31$ ) to weak (Cohen's  $d = .14$ ) in size, depending on control conditions, in line with a previous meta-analysis by Bolier, Haverman, Westerhof, Riper, Smit, & Bohlmeijer (2013), showing on average small effects of positive psychology interventions on wellbeing (Cohen's  $d = .20$ ). However, despite the relatively small size of gratitude's effects on well-being reported in the literature, the grateful trait may have substantial relevance for an individual's subjective well-being, especially when considering the cumulative, upward spiral dynamic of positive emotion and personal and social resources (Fredrickson & Joiner, 2002). Studies (see Wood et al., 2010, for review) suggest substantial incremental implying a unique and distinct impact of gratitude on well-being. At the population level, even interventions presenting small effect sizes can, in theory, have a large impact when many people are reached, and adherence is high (Huppert, 2009). Using a self-help format to deliver gratitude interventions on a large scale, in combination with attention to factors affecting adherence, such as person-activity fit (Parks & Biswas-Diener, 2013), tailoring (Schueller, 2011), and interactive support (Cuijpers, Donker, van Straten, Li, & Andersson, 2010), may improve effectiveness of gratitude interventions for enhancing well-being.

### Strengths and Limitations

The current study showed, for the first time, how the related but distinct dimensions of psychopathology and subjective well-being (Westerhof & Keyes, 2010) vary as a function of gratitude when studied together prospectively. Further strengths of the study lie in the use of a four-wave prospective study design, spanning a total of 7.5 months, and collecting data from a large and demographically diverse sample. Multilevel regression techniques were used to test our prospective hypotheses, and we systematically corrected for the effects of

demographic variation and correlations in psychopathology and subjective well-being across time in the prospective models under investigation. Despite these strengths, some limitations require consideration.

First, although the measures of subjective well-being and psychopathology used in the current study were selected for the specific purpose of optimizing comparability between our study and previous reports, they may paint an incomplete picture of complete mental health, defined by Keyes (2002, 2005) as the absence of mental illness, and the presence of positive mental health. Caution is warranted when extending the interpretation of our study findings to domains of mental health other than subjective well-being, and mental illness beyond current symptoms of psychopathology. Secondly, our findings could be affected by the normal but somewhat right skewed distribution in psychopathology symptoms and left skewed distribution in subjective well-being that was, however, inherent to the general population characteristics of the sample under examination. Thirdly, consideration should be given to a possible selectivity in study dropout with respect to respondent age, family status, and negative affect. There was a tendency for younger (vs. older) respondents, respondents living with (vs. without) underage children, and respondents with higher (vs. lower) negative affect at baseline, to more likely dropout of the study. However, apart from age (the baseline sample was significantly younger than the other samples), the sample did not differ in terms of demographic composition across the four measurements, and the aggregated measure of subjective well-being revealed no differences between dropouts and completers. Furthermore, all analyses were corrected for demographic factors, leaving it possible but unlikely that selectivity in dropout hampers the interpretation of our findings. Fourth and lastly, future research should incorporate measures of adverse life events to further elucidate whether the protective effect of gratitude on the development of psychopathology is more apparent in the context of a stressful life event.

## **Conclusion**

To our knowledge, the present study is the first to systematically examine the demography of gratitude, and prospective associations between the grateful trait and both dimensions of complete mental health, in a large demographically diverse general population sample.

First, our data do not support a uniform demographic distribution of gratitude, and suggest that a lack of attention to demographic confounders in gratitude research may yield imprecise results. In addition, we believe that further research into the mechanisms underlying associations between demographic factors and the grateful trait may provide important new leads in the empirical study of gratitude and its contributions to mental health.

Second, although our findings showed that the negative prospective effect of gratitude on psychopathology was reducible to correlations in psychopathology over time, the positive prospective effect of gratitude on subjective well-being, albeit weak, remained significant even when taking into account demographic factors, and variance in subjective well-being attributable to prior levels of both well-being and psychopathology. These results, thus, indicate that gratitude as a trait shows complex connections with the presence of well-being and absence of psychopathology, that should be taken into consideration when studying the dynamics of gratitude and mental health, and developing, applying, and evaluating gratitude interventions with the aim of enhancing subjective well-being and/or reducing psychopathology.

We encourage replication of our study in both general population and clinical study samples, and emphasize Keyes' (2007) recommendation of using a combined assessment of psychopathology and subjective well-being when studying mental health and its determinants.

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## CHAPTER 5

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### Upward Spirals of Gratitude and Positive Affect in Daily Life: A Time-lagged Ecological Assessment Study Using the Experience Sampling Method

Jans-Beken, L. G. P. J., Jacobs, N., Janssens, M., Peeters, S., Reijnders, J., Lechner, L., & Lataster, J. (Under Review). Upward Spirals of Gratitude and Positive Affect in Daily Life: A Time-lagged Ecological Assessment Study Using the Experience Sampling Method.

## Abstract

This study set out to assess whether momentary state gratitude and positive affect engage in upward spirals in daily life, and whether these are connected to positive mental health and psychopathology phenotypes. 106 participants ( $M_{age} = 39$ ,  $SD_{age} = 15$ ) completed the GQ6, MHC-SF and SQ48; Experience Sampling Method was used to prospectively assess state gratitude and positive affect in daily life. Multilevel time-lagged regression analyses showed that state gratitude and momentary positive affect reciprocally predict one another. The positive prospective effect of positive affect ( $t - 1$ ) on state gratitude ( $t$ ) was significantly stronger for individuals with high vs. low levels of positive mental health, and low vs. high levels of psychopathology. Findings suggest that state gratitude and positive affect tend to be reciprocally associated over time at the micro-level of daily life, and that this emotion dynamic is linked to optimal human functioning.

## Introduction

Positive emotions are considered to serve a vital role in optimal human functioning, fostering physical health, subjective well-being, and psychological resilience (Fredrickson, 2001). Out of all positive emotions, gratitude has been forwarded as particularly potent due to its capacity to build a variety of enduring personal and social resources (Armenta, Fritz, & Lyubomirsky, 2016; Fredrickson, 2004b), with beneficial impacts on various domains of health and well-being (Wood, Froh, & Geraghty, 2010). Gratitude has been conceptualized on a trait and state level (Wood, Maltby, Stewart, Linley, & Joseph, 2008). Trait or dispositional gratitude refers to the overall tendency to feel and express grateful feelings when obtaining positive outcomes (McCullough, Emmons, & Tsang, 2002), and a wider life orientation towards noticing and being grateful for the positive in the world (Wood et al., 2010). State gratitude, or 'the grateful emotion' (McCullough et al., 2004), refers to a temporary affect with associated thought and action tendencies (Clare, Ortony, & Foss, 1987; Rosenberg, 1998; Wood, Maltby, Stewart, et al., 2008). The grateful emotion arises when appraising a received benefit as a positive outcome, and recognizing that the source of this positive outcome lies outside the self (Emmons & Crumpler, 2000; Tsang, 2006; Teigen, 1997). The present study zooms in on the momentary, state level of gratitude, and its relation to other positive emotional states in daily life.

The broaden-and-build theory (Fredrickson, 2001) explains how positive emotions, such as gratitude, are able to initiate an upward spiral toward positive mental health, set in motion by their 'broadening' effect on momentary thought-action repertoires. In contrast to negative emotions, which tend to *narrow* our behavioral repertoire towards immediate survival (Cannon, 1929; Selye, 1946), positive emotions evoke a tendency to 'let our guard down', characterized by *broadened* thought and action patterns (e.g. playing, exploring) that intuitively seem to lack immediate survival value (Fredrickson, 2004a). However, the broaden-and-build theory suggests that positive emotions have survived as part of human experience because their broadening effect enables us to build durable personal resources – e.g. social play builds social bonds, exploration builds knowledge (Fredrickson, 2001, 2004a; Panksepp, 2001), with indirect benefits for survival in the long run. The broadening effects of gratitude include the encouragement of prosocial behaviour toward and beyond benefactors, increased creativity regarding the expression of gratitude (e.g. conveying love and appreciation), and improved quality of reciprocity beyond simple 'tit-for-tat' responses (Fredrickson, 2004a). These thought-action tendencies promote our personal well-being and that of others, and help in forming lasting relationships and friendships through reciprocal responsiveness (Canevello & Crocker, 2010). The broadening effects of gratitude, thus, are thought to contribute to the building of valuable resources on the personal, social, and



societal level (Fredrickson, 2004b), ultimately fostering human resilience and sustaining positive mental health (Wood et al., 2010).

A key implication of the broaden-and-build theory is that positive emotions, through their broadening effects on thought and action, will increase the likelihood of finding positive meaning in subsequent events, in turn promoting future positive emotional states. Positive emotions are, thus, theorized to self-sustain over time (Fredrickson & Joiner, 2002). Prospective correlational and daily-diary studies indeed show that the experience of positive emotions is related to future positive emotional experiences over the course of months (Burns et al., 2008), weeks (Fredrickson & Joiner, 2002), and from one day to the next (Garland et al., 2015). However, although emotional phenomena are generally short-lived and momentary in nature (Fredrickson & Branigan, 2005; Reeve, 2014), it remains unclear whether positive emotions also tend to engage in self-sustaining cycles throughout a single day, and, more specifically, whether gratitude interacts reciprocally with other positive emotional states at the level of momentary, daily life experience.

The broaden-and-build theory implies, secondly, that upward spirals of positive emotions represent an important resilience mechanism (Tugade & Fredrickson, 2004), contributing positively to the presence of positive mental health and the absence of psychopathology (Garland et al., 2015), and vice versa. This is partly evidenced by Catalino & Fredrickson's work (2011), showing that 'flourishers' – i.e. individuals with optimal levels of well-being – tend to react with more positive emotion to everyday pleasant events than 'non-flourishers' and depressed individuals, suggestive of a 'positive potentiation process' involved in human flourishing. However, use of the retrospective Day Reconstruction Method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) in their study did not allow to capture moment-to-moment affective dynamics, and may have, additionally, induced recall bias (Talarico, Berntsen, & Rubin, 2009). Moreover, Catalino & Fredrickson's study (2011) did not focus specifically on the positive emotion of gratitude.

Therefore, in order to further our scientific knowledge about the value of everyday positive emotions in general, and state gratitude in particular, the current study used the Experience Sampling Method (ESM; Csikszentmihalyi & Larson, 2014), a structured ecological assessment technique, to prospectively obtain a fine-grained, high resolution film of the moment-to-moment ('micro-level'; Kramer, 2015) dynamics of gratitude and other positive emotional states as they play out in daily life. Using the ESM, we investigated (i) whether momentary states of gratitude and positive affect tend to reciprocally engage in self-perpetuating cycles in daily life, and (ii) whether such upward spirals of positive emotions, at the micro-level of daily life experience, are connected to inter-individual differences in macro-level positive mental health and psychopathology phenotypes. Based on broaden-and-build theory, it was hypothesized that state gratitude and positive affect would reciprocally and

prospectively predict one another from one moment to the next, and that this upward spiral in daily life would be stronger for individuals with relatively high vs. low levels of positive mental health, as for individuals with relatively low vs. high levels of psychopathology.

## Methods

### Sample

The sample consisted of 126 Dutch speaking adults from the general population, recruited by graduate students of the Open University of the Netherlands through personal contact and online social media. Study entry criteria were (i) aged 18+ years, and (ii) sufficient command of the Dutch language to understand instructions and provided informed consent. The study was approved by the local research ethics committee, and was carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for medical research involving humans. Participation in the study was voluntary and all participants gave digital informed consent after being fully informed about the study, and having had the opportunity to have any questions answered.

Of the 126 participants that entered the study, 20 were excluded from analyses due to insufficient valid ESM-reports (see Experience Sampling Method). The final study sample, thus, consisted of 106 participants ( $M_{\text{age}} = 39$ ,  $SD_{\text{age}} = 15$ , range 18 – 65) among which 43 men (41%), that completed on average 46 (68%) out of 70 diary assessments ( $SD = 12$ ;  $Min = 23$ ,  $Max = 70$ ), resulting in a total of 4,870 observations. Further sample characteristics are presented in *Table 1*.

### Procedure

Participants were first requested to fill out a one-time online questionnaire asking them about demographic information, positive mental health, psychopathology, and trait gratitude. After having filled out the online questionnaire, participants received an instruction to install a mobile application (RealLife™ Exp, vers. 2.4.8; Lifedata LLC, 2015) on their smartphone that was used to prospectively collect Experience Sampling data during seven consecutive days. Participants were additionally provided with a telephone number that they could call if assistance was desired at any point during the study; some participants contacted the researcher for assistance with installation of the mobile application. After having completed the Experience Sampling protocol, participants were debriefed about the study and received an electronic thank you card.

Table 1.

*Sample characteristics*

	Total sample
<i>N</i> (%)	106 (100)
Age <i>M</i> ( <i>SD</i> )	39 (15)
]	[18-65]
Gender <i>n</i> (%)	
- Men	43 (41)
- Women	63 (59)
Relationship status <i>n</i> (%)	
- Single	30 (28)
- In a relationship	76 (72)
Household <i>n</i> (%)	
- Living with underage children	35 (33)
- Not living with underage children	71 (67)
Education level <i>n</i> (%)	
- Elementary school	2 (2)
- Lower vocational education	11 (10)
- Intermediate vocational education	17 (16)
- Pre-university education	21 (20)
- Bachelor's degree	42 (40)
- Master's degree or higher	13 (12)
Employment status <i>n</i> (%)	
- Full-time	52 (49)
- Part-time	37 (35)
- Unemployed or retired	17 (16)

Note. *M* = mean, *SD* = standard deviation

### Experience Sampling Method

The Experience Sampling Method (ESM) is a well-validated structured diary technique to assess participants' thoughts, feelings, and (the appraisal of) contexts in everyday life (Delespaul, 1995; Hektner, Schmidt, & Csikszentmihalyi, 2007; Jacobs et al., 2005; Myin-Germeys et al., 2009). The RealLife Exp mobile application that was used to collect Experience Sampling data, was programmed to signal at an unpredictable moment in each of ten 90-min time blocks between 7:30 a.m. and 22:30 p.m., on seven consecutive days, with signals separated by a minimum of 30 and maximum of 150 minutes. At each prompt, participants were presented with a number of items they had to rate, collecting reports of affect, gratitude, current context, and appraisal thereof. The number of items was kept to a minimum to reduce the likelihood of participant fatigue and attrition (Bolger, Davis, & Rafaeli, 2003; Thiele, Laireiter, & Baumann, 2002). Participants were instructed to complete their reports immediately after the signal but definitely within 15 minutes of the



signal, thus minimizing memory distortion. When a participant did not respond within 15 minutes to a signal, the signal expired and was no longer accessible to the participant. Previous work has shown that reports completed after this interval are less reliable (Delespaul, 1995). For the same reason, subjects with less than 23 valid reports (one-third (33⅓%) of 70 signals in total) were excluded from analyses (Delespaul, 1995).

## Measures

**Momentary mood states.** Based on previous ESM studies (Jacobs et al., 2007; Myin-Germeys & van Os, 2007; Peeters, Berkhof, Delespaul, Rottenberg, & Nicolson, 2006; Wichers et al., 2009), momentary mood was assessed with positive and negative affect scale measures, each consisting of scores on several items derived from the Positive And Negative Affect Schedule (PANAS; Engelen, De Peuter, Victoir, Van Diest, & Van den Bergh, 2006; Watson, Clark, & Tellegen, 1988), rated on a 7-point Likert scale with a range of 1 (*not at all*) to 7 (*very*). The presence of negative affect may counteract or attenuate upward spirals of positive emotions (Garland et al., 2015), and was therefore assessed alongside positive affect. In addition, this provided participants with a balanced set of positively and negatively valenced items at each prompt, thus minimizing likelihood of emotional reactivity in any specific direction.

Positive affect was defined as the mean score on the items “I feel cheerful”, “I feel satisfied”, and “I feel happy” for each momentary report (Cronbach’s  $\alpha_{(within)} = .77$ ; Cronbach’s  $\alpha_{(aggregated)} = .94$ ; Huang & Weng, 2012). Negative affect was defined as the mean score on the items “I feel insecure”, “I feel anxious”, “I feel down”, and “I feel guilty” for each momentary report (Cronbach’s  $\alpha_{(within)} = .64$ ; Cronbach’s  $\alpha_{(aggregated)} = .95$ ).

**State gratitude.** In accordance with previous measurements of daily gratitude (DeWall, Lambert, Pond, Kashdan, & Fincham, 2012; Emmons & McCullough, 2003; Visserman, Righetti, Impett, Keltner, & Van Lange, 2017), we assessed state gratitude using the single-item measure “I feel grateful”, rated on a 7-point Likert scale (1 = *not at all* to 7 = *very*).

**Positive mental health.** We used The Mental Health Continuum Short Form (MHC-SF; Keyes, 2002; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011) to measure positive mental health once at the start of the study. The questionnaire consists of 14 questions that tap into the presence of different aspects of emotional (e.g., “...did you feel satisfied with life?”), psychological (e.g., “... did you feel that your life has a sense of direction or meaning to it?”), and social well-being (e.g., “... did you feel that you belonged to a community?”) during the past month, answered on a 6-point Likert scale (1 = *never* to 6 = *every day*). The mean score represents the overall level of positive mental health, with higher scores indicating higher levels of positive mental health. The psychometric properties of the

Dutch MHC-SF are good: Cronbach's  $\alpha = .89$  (Lamers et al., 2011), and  $\alpha = .93$  in the current study sample.

**Psychopathology.** The Symptom Questionnaire 48 (SQ48; Carlier et al., 2012), presented once at the start of the study, measures 48 symptoms of psychopathology across a number of domains (aggression, agoraphobia, anxiety, cognitive problems, depression, somatization, social phobia, overall lack of vitality, and work-related stress). Participants were asked how often each symptom (e.g., "I felt down or depressed") was present during the past week, and indicated their response on a 5-point Likert scale (0=*never* to 4=*very often*). As suggested by Carlier et al. (2012), items from the work subscale of the SQ48 may not be reliably answered by unemployed participants, and were therefore omitted. The mean score of the remaining subscales represents the overall level of psychopathology, with higher scores indicating more symptoms of psychopathology. The psychometric properties of the SQ48 are good;  $\alpha = .94 - .97$  (Carlier et al., 2015; Carlier et al., 2012), and  $\alpha = .95$  in the current study sample.

**Trait gratitude.** Gratitude as an affective trait has been linked to both increased and decreased grateful reactivity to positive events (McCullough, Tsang, & Emmons, 2004), thus possibly influencing the affective dynamics under examination. Trait gratitude was, therefore, assessed once at the start of the study with the Dutch version of the Gratitude Questionnaire (GQ6; Jans-Beken, Lataster, Leontjevas, & Jacobs, 2015; McCullough et al., 2002). The questionnaire consists of six propositions, and participants rated their response to each proposition (e.g., "I have so much in life to be thankful for") on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Two negatively formulated items were reverse coded, and the mean score across the six propositions was used as indicator of trait gratitude, with higher scores indicating a higher level of trait gratitude. The psychometric properties of the Dutch GQ6 are considered good (Jans-Beken et al., 2015), with Cronbach's  $\alpha = .72$  in the current study sample.

## Statistical analyses

Given the prospective study design and hypotheses, and hierarchical structure of the data, i.e. multiple measurements (level 1) clustered within individuals (level 2), multilevel time-lagged regression analyses were conducted using the 'LAG' ( $t - 1$ ) and 'MIXED' (mixed linear model) commands in SPSS version 24.0 (IBM Corp, 2016). Lagged ( $t - 1$ ) values were constructed for all observations, except for those representing the first response of a day. To facilitate interpretation of level 1 associations and cross-level interactions, level 1 predictors were centered around each individual's mean, and level 2 predictors and covariates measured on a continuous scale were standardized based on the grand mean and standard deviation (Curran & Bauer, 2011; Enders & Tofighi, 2007; Van de Pol & Wright, 2009). All

analyses were a priori corrected for the demographic factors age, gender (0 = male; 1 = female), and education level (0 = low – intermediate vocational education or lower; 1 = high – pre-university education or higher), given their previously established association with gratitude (Jans-Beken, Lataster, Peels, Lechner, & Jacobs, 2017) and affect regulation (Zimmermann & Iwanski, 2014). We additionally adjusted for predispositions towards gratitude by adding mean scores on the GQ6 as level 2 covariate. Reciprocal level 1 associations between state gratitude and positive affect were further adjusted for the possible confounding influence of negative affect (hereafter: NA) at time  $t$ . All models included a variable representing time (sampling days 1 to 7), and a lagged ( $t - 1$ ) version of the outcome variable, to correct for first-order autoregression. Level 1 intercepts and associations were allowed to vary randomly across individuals at level 2 (Snijders, 2005), and the level 2 intercept and slope represent the average level 1 intercept and slope across individuals. Significance was interpreted against a threshold of  $p = .05$ .

First, to examine whether momentary states of gratitude (hereafter: SG) and positive affect (hereafter: PA) showed reciprocal associations over time, we ran two models: Model 1 tested whether  $SG(t - 1)$  was a significant predictor of  $PA(t)$ . Model 2, reversely, tested whether  $PA(t - 1)$  was a significant predictor of  $SG(t)$ . Next, positive mental health and psychopathology were added separately as level 2 moderators to both models, resulting in Models 3 through 6: Models 3 and 5 tested whether levels of positive mental health (Model 3) and, resp., psychopathology (Model 5) moderated the association between  $SG(t - 1)$  and  $PA(t)$ . Models 4 and 6 tested whether levels of positive mental health (Model 4) and, resp., psychopathology (Model 6) moderated the association between  $PA(t - 1)$  and  $SG(t)$ . Significant interactions were followed up with stratified analyses to facilitate interpretation of the interaction effect, for which the sample was divided in two strata of equal size based on the median value of the moderating variable.

## Results

Means, standard deviations and correlations of the aggregated measures for momentary positive and negative affect, gratitude (state and trait), positive mental health and psychopathology are presented in *Table 2*.

**Reciprocal prospective associations between momentary gratitude and positive affect in daily life.** The models assessing reciprocal associations between SG and PA revealed significant overall effects of both  $SG(t - 1)$  on  $PA(t)$  ( $B = .04$ ,  $p = .02$ , 95% CI [.01, .07], Model 1), and  $PA(t - 1)$  on  $SG(t)$  ( $B = .12$ ,  $p < .001$ , 95% CI [.07, .18], Model 2): higher levels of SG were followed by higher levels of PA and vice versa, see *Table 3*. We additionally observed significant between-subject variation in intra-individual associations

between NA( $t$ ) and PA( $t$ ) ( $B = .10, p < .01, 95\% \text{ CI } [.06, .19]$ ), NA( $t$ ) and SG( $t$ ) ( $B = .09, p < .01, 95\% \text{ CI } [.04, .19]$ ), and in autoregressive associations of PA ( $B = .02; p < .01, 95\% \text{ CI } [.01, .04]$ ), and SG ( $B = .02, p < .01, 95\% \text{ CI } [.01, .04]$ ).

Table 2.

*Means, standard deviations and correlation matrix of aggregated scores of the measures GQ6, MHC-SF, SQ48, PA scale, NA scale, State gratitude*

Measure	<i>M</i> ( <i>SD</i> )	1	2	3	4	5	6
1. GQ6 <sup>a</sup>	5.50 (0.79)	-					
2. MHC-SF <sup>b</sup>	2.89 (0.97)	.48	-				
3. SQ48 <sup>c</sup>	1.03 (0.51)	-.35	-.52	-			
4. PA scale <sup>a</sup>	4.98 (0.93)	.35	.54	-.47	-		
5. NA scale <sup>a</sup>	1.76 (0.79)	-.31	-.46	.57	-.61	-	
6. State gratitude <sup>a</sup>	4.85 (1.06)	.38	.51	-.35	.79	-.37	-

*Note.* *M* = mean, *SD* = standard deviation. All correlations significant at .01 level (one-tailed)

<sup>a</sup> measured on a 7-point Likert scale (1-7) <sup>b</sup> measured on a 6-point Likert scale (1-6) <sup>c</sup> measured on a 5-point Likert scale (0-4)

**Moderating effects of positive mental health on reciprocal prospective associations between momentary gratitude and positive affect in daily life.** Although model fit for the PA( $t$ ) model improved significantly with addition of the positive mental health\*SG( $t - 1$ ) interaction term ( $\chi^2_{\text{Change}}(2) = 10.77, p < .01$ ), positive mental health did not prove to be a significant moderator of the association between SG( $t - 1$ ) and PA( $t$ ) ( $B = .00, p = .85, 95\% \text{ CI } [-.03, .03]$ , Model 3).

Model fit for the SG( $t$ ) model improved significantly with addition of the positive mental health\*PA( $t - 1$ ) interaction term ( $\chi^2_{\text{Change}}(2) = 12.69, p < .01$ ), and revealed a significant moderating effect of positive mental health on the association between PA( $t - 1$ ) and SG( $t$ ) ( $B = .05, p = .03, 95\% \text{ CI } [.00, .09]$ , Model 4). Stratified analyses showed that individuals scoring higher on positive mental health displayed, on average, stronger associations between PA( $t - 1$ ) and SG( $t$ ) ( $B = .17, p < .001, 95\% \text{ CI } [.10, .24]$ ) than those scoring lower on positive mental health ( $B = .07, p = .08$  (n.s.),  $95\% \text{ CI } [-.01, .16]$ ).

Table 3.  
Results of multilevel analyses assessing reciprocal associations between positive affect and state gratitude at the micro-level of everyday life.

	Positive affect (t)			State gratitude (t)		
	B (SE)	95% CI	p	B (SE)	95% CI	p
<b>Fixed effects</b>						
Age	.15 (.08)	-.02, .31	.08	.15 (.09)	-.03, .33	.09
Gender	.14 (.17)	-.20, .48	.42	.33 (.19)	-.04, .70	.08
Education level	-.46 (.19)	-.83, -.09	*	-.52 (.20)	-.93, -.12	<.01
Trait gratitude	.37 (.09)	.20, .54	**	.46 (.09)	.27, .64	<.001
State gratitude ( $t-1$ )	.04 (.02)	.01, .07	*	.12 (.03)	.07, .17	<.001
Positive affect ( $t-1$ )	.20 (.02)	.15, .25	**	.12 (.03)	.07, .18	<.001
Negative affect (t)	-.62 (.05)	-.71, -.53	**	-.48 (.05)	-.58, -.39	<.001
Time	-.03 (.01)	-.04, -.01	*	-.02 (.01)	-.04, .00	.09
<b>Random effects</b>						
State gratitude ( $t-1$ )	.00 (.00)	.00, .02		.02 (.01)	.01, .04	<.01
Positive affect ( $t-1$ )	.02 (.01)	.01, .04	*	.01 (.01)	.00, .05	.11
Negative affect (t)	.10 (.03)	.06, .19	*	.09 (.03)	.04, .19	<.01
Time	.00 (.00)	.00, .01	**	.01 (.00)	.00, .01	<.01

Note. \*  $p < .05$ , \*\*  $p < .001$ ; ( $t-1$ ) = previous signal; SE = standard error; CI = confidence interval. Age and gender standardized based on grand mean and standard deviation. Gender (0=male; 1=female). Education level (0=low; 1=high). Time = sampling days 1-7. Level 1 predictors centered around individual mean.

**Moderating effects of psychopathology on reciprocal prospective associations between momentary gratitude and positive affect in daily life.** No significant moderating effect was found of psychopathology on the association between  $SG(t - 1)$  and  $PA(t)$  ( $B = -.00$ ,  $p = .77$ , 95% CI  $[-.03, .02]$ , Model 5), even though addition of the psychopathology\* $SG(t - 1)$  interaction term led to improved model fit ( $\chi^2_{\text{Change}}(2) = 10.53$ ,  $p < .01$ ) of the  $PA(t)$  model.

Adding the interaction term psychopathology\* $PA(t - 1)$  to the model of  $SG(t)$  yielded improved model fit ( $\chi^2_{\text{Change}}(2) = 13.91$ ,  $p < .001$ ), and identified psychopathology as a significant, negative moderator of the association between  $PA(t - 1)$  and  $SG(t)$  ( $B = -.10$ ,  $p < .001$ , 95% CI  $[-.14, -.05]$ , Model 6). Stratified analyses revealed that individuals scoring higher on psychopathology showed, on average, weaker associations between  $PA(t - 1)$  and  $SG(t)$  ( $B = .09$ ,  $p = .02$ , 95% CI  $[-.01, .17]$ ) than those scoring lower on psychopathology ( $B = .17$ ,  $p < .001$ , 95% CI  $[-.10, .24]$ ).

## Discussion

The aim of this study was to assess whether momentary states of gratitude and positive affect tend to engage in upward, self-perpetuating cycles in daily life, and whether such upward spirals of positive emotions, at the micro-level of daily life experience, are connected to macro-level positive mental health and psychopathology phenotypes. Our daily-life ESM data – prospectively collected using a mobile application, and analysed with multilevel time-lagged regression techniques – show that state gratitude and positive affect, as hypothesized, reciprocally predict one another from one moment to the next, although the prospective effect of positive affect ( $t - 1$ ) on state gratitude ( $t$ ) was more pronounced than that of state gratitude ( $t - 1$ ) on positive affect ( $t$ ). Secondly, although the strength of the positive prospective relationship between state gratitude ( $t - 1$ ) and positive affect ( $t$ ) did not vary as a function of inter-individual differences in positive mental health and psychopathology, the positive prospective effect of positive affect ( $t - 1$ ) on state gratitude ( $t$ ) was significantly stronger for individuals with relatively high vs. low levels of positive mental health, as for individuals with relatively low vs. high levels of psychopathology, thus lending partial support to our second hypothesis. Taken together, our findings support the idea that the positive emotional states of gratitude and positive affect tend to be reciprocally associated over time at the micro-level of daily life experience, and that this tendency may be – at least partly – more pronounced in individuals with relatively high levels of positive mental health and/or low levels of psychopathology.

### **Reciprocal connections between state gratitude and positive affect in daily life**

The current study was built on the premise that positive emotions, through their broadening effects on thought and action, increase the likelihood of finding positive meaning in subsequent events, thereby promoting positive emotional experience in the future (Fredrickson, 2003). Although previous studies have already demonstrated temporal associations between positive emotional states over the course of months, weeks, and from one day to the next (Burns et al., 2008; Fredrickson & Joiner, 2002; Garland et al., 2015, resp.), our study shows that positive emotional states are temporally associated over the course of, on average, 90 minute intervals throughout the day. More specifically, the present study is the first to show bidirectional intra-individual associations between gratitude and positive affect in daily life, extending previous work on day-level associations between gratitude and positive affectivity (Emmons & McCullough, 2003).

With regard to the moment-to-moment dynamics of gratitude and positive affect, the current findings suggest a certain degree of directional asymmetry, with positive affect being roughly four times as strong a predictor of subsequent feelings of gratitude than the other way around. The experience of positive affect may increase the likelihood of later gratitude through broadened thought-action patterns, encouraging the appreciation of what is positive, important and meaningful in future events (Lambert, Graham, Fincham, & Stillman, 2009). In addition, feelings of positive affect may accompany achieved positive outcomes or benefits, which in turn may trigger the experience of gratitude when consciously acknowledged (Emmons & McCullough, 2003). Positive affect, thus, may foster a general state of thankfulness or appreciation – possibly through attentional broadening – as well as signifying experiences and benefits for which one can be grateful for (Lambert et al., 2009). Further research is required, however, to uncover the exact cognitive-affective mechanisms at play.

Although our data also support the presence of a reverse path between gratitude and subsequent positive affect in daily life, the strength of this prospective association was considerably less pronounced. Armenta et al. (2016) have argued that gratitude, although considered a motivating and energizing emotion (Emmons & Mishra, 2011), may not necessarily lead to immediate positive affectivity. Indeed, the experience and expression of gratitude towards a benefactor may initially induce feelings of indebtedness, guilt and a general sense of discomfort (Armenta et al., 2016), as well as increasing efforts to assist the benefactor even when these are emotionally costly (Bartlett & DeSteno, 2006). The effects of gratitude on emotional well-being are, thus, likely indirect and mediated in part by a moral motivation to engage in prosocial behaviors (Algoe, 2012; Emmons & Mishra, 2011; Wood, Maltby, Gillett, Linley, & Joseph, 2008). Therefore, although gratitude-fueled desires of being a better person and helping others may eventually lead to self-improvement, more satisfactory relationships and associated well-being (Layous, Nelson, Kurtz, & Lyubomirsky,

2017), they may not necessarily evoke positive affect in the short run (Layous, Lee, Choi, & Lyubomirsky, 2013). Nonetheless, our findings identify gratitude as a significant predictor of subsequent positive affect in daily life, and future ecological assessment studies should further clarify the role of prosocial tendencies therein. Findings from a recent ESM study by Snippe et al. (2017), for instance, have shown prosocial acts and positive affect to mutually reinforce each other across 6-hour intervals, and extending this work with the additional assessment of momentary feelings of gratitude and indebtedness may be an interesting starting point for future research.

### **Prospective associations between daily life positive affect and gratitude vary as a function of inter-individual differences in positive mental health and psychopathology**

Individuals with higher levels of positive mental health displayed, on average, stronger intra-individual prospective associations between daily life positive affect and subsequent state gratitude than individuals with lower levels of positive mental health. This finding was not reducible to between-subject differences in predispositions towards gratitude, as these were accounted for in all statistical models. Our observations align with the idea that the positive mental health or 'flourishing' phenotype, in comparison to the 'non-flourishing' phenotype, may endorse increased salience towards positive experiences, as well as a stronger tendency to respond to these with thought-action patterns that highlight 'the good' in interaction with its environment, thereby facilitating personal resource building (Fredrickson, 2004a). In addition to experiencing stronger positive emotional reactivity to pleasant events, 'flourishers' have been shown to demonstrate mindful acceptance of distressing thoughts and feelings, and increased attentiveness to their internal and external surroundings, when compared to 'non-flourishers' and depressed individuals (Catalino & Fredrickson, 2011). Future studies may help to further elucidate to what extent these characteristics may underlie the observed stronger temporal association between daily life positive affective experiences and gratitude in individuals with relatively high vs. low positive mental health.

Although our global measure of psychopathology encompassed various domains of mental illness, the majority of items pertained to the symptom domains of mood and anxiety disorders. Individuals with depression have been shown to display reduced capacity to generate (Geschwind et al., 2010; Wichers et al., 2009) and sustain (Heller et al., 2009) positive emotions, in line with the current observation of weaker temporal associations between positive emotional states in individuals with higher (vs. lower) levels of psychopathology. In addition, the experience of positive affect and positive events in daily life has been shown to be attenuated by levels of anxiety in individuals with anxiety disorder (Kashdan & Steger, 2006), and neuroticism, a marker of general risk for psychopathology (Ormel et al., 2013), has been linked to a faster decay of positive emotions over time



(Hemenover, 2003). The process of 'positive potentiation' — i.e. positive emotional sensitivity and (re)activity (Fredrickson, 2013b) — that is considered fundamental to the state of human flourishing may, thus, be less pronounced or absent in individuals with (risk for) psychopathology, in line with the present study findings. Previous observational and experimental research has shown, moreover, that mindful acceptance of emotional experiences appears to positively counteract reduced hedonic capacity, and partly restore reward experience in individuals with anxiety and depression (Geschwind, Peeters, Drukker, van Os, & Wichers, 2011; Kashdan & Steger, 2006). This is consistent with the broaden-and-build originated idea that being curious, open and accepting (i.e., mindful) towards internal and external events increases the likelihood of positive emotional experiences (Fredrickson & Joiner, 2002), whereas a lack of broadened thinking may hinder the ability to observe what is positive or beneficial, and consequently hampers the potential to evoke grateful emotions. Moreover, in addition to reduced positive potentiation, mood disorders in particular have been characterized by increased negative emotional sensitivity (O'Neill, Cohen, Tolpin, & Gunthert, 2004; Wichers et al., 2007), linked to the onset and persistence of depressive symptoms over time (Cohen, Gunthert, Butler, O'Neill, & Tolpin, 2005), and shown to interact with positive emotional experiences in daily life (Myin-Germeys et al., 2007). Although our analyses were adjusted for the influence of negative affectivity at the momentary level, temporal associations between positive emotional states in daily life are thus likely driven, in part, by the complex interaction of positive and negative potentiation tendencies, which may be affected in individuals with psychopathology.

Our data suggest that the prospective effect of state gratitude on positive affect in daily life is similar for individuals with different levels of positive mental health and psychopathology. As described above, gratitude may differ from other positive mood states in that it is an 'other-oriented', moral affect, encouraging prosocial efforts regardless of possible emotional consequences (positive or negative) thereof (Weiner & Lerman, 1979; Bartlett & DeSteno, 2006). The broadening effects of gratitude may, therefore, manifest themselves in daily life predominantly at the (cognitive-)behavioral rather than emotional level, taking the form of prosocial thoughts and acts that are in turn linked to human flourishing through social resource building (Fredrickson, 2004a; Nelson, Layous, Cole, & Lyubomirsky, 2016). Thus, although the experience of positive affect following gratitude in daily life may not differentiate individuals with high vs. low levels of positive mental health or psychopathology, these individuals may differ in their tendency to respond to grateful experiences with prosocial thoughts and behaviors. As addressed above, replication and extension of the present study findings is therefore warranted in studies with additional attention to social behavioral and contextual factors.

## Implications

The findings of the present study show small but significant moment-to-moment associations between positive affect and state gratitude in daily life. Previous daily and momentary assessment studies on affective dynamics have shown effects of similar size in daily life to possess clinical significance for e.g. depression (Wichers et al., 2010), anxiety (Farmer & Kashdan, 2014), addiction (Shiffman & Waters, 2004), and long-term physical health (Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013; Sin, Graham-Engeland, Ong, & Almeida, 2015). The daily life prospective association between positive affect and state gratitude, although small, may similarly represent a relevant mechanism for optimal human functioning, as supported by its tendency to vary in strength as a function of positive mental health and psychopathology. Although our findings could give rise to the interpretation that positive affect and state gratitude engage in a never-ending buildup of positive emotion that is bound to eventually go ‘through the roof’, it is important to bear in mind that only *on average*, a small positive association between subsequent positive emotional states was found in daily life. Thus, positive affect and gratitude were not necessarily positively associated across *all* subsequent time-points in *all* individuals, nor did they linearly increase as the sampling week proceeded. Rather, our observations point towards a self-perpetuating cycle of positive emotions in daily life – more pronounced in some than others – that generates energy ‘by itself’, without necessarily gaining momentum beyond the equilibrium state in the absence of a potentiating stimulus. Nonetheless, given the current observation that individuals with relatively high levels of positive mental health and/or low levels of psychopathology tend to show stronger temporal associations between positive affect and state gratitude in daily life, it may be relevant to investigate to what extent these emotion dynamics in daily life contribute to optimal human functioning when investigated over longer periods of time.

Although our findings suggest temporal directionality, they do not imply causality, as our study did not include any experimental manipulation, such as the induction of gratitude and/or positive affect. Any inference about cause and effect, based on the current findings, remains therefore highly speculative. However, although evidence for the efficacy of gratitude interventions on subjective well-being is currently weak (see Davis et al., 2016 for meta-analysis), experimental studies have demonstrated that inducing positive emotional experience, e.g. by loving kindness meditation, can set in motion a self-perpetuating flow of increased positive emotion (e.g. Kok et al., 2013). In addition, recent technological developments have opened up the avenue for low-threshold, personalized mHealth programs to enhance daily life positive emotions (van Os et al., 2017), with promising results in the field of depression (Kramer et al., 2014). Given the supposed interaction between positive and negative emotional spirals in daily life (Garland et al., 2015), interventions

focusing on a more general, mindful acceptance of momentary emotional experiences (e.g. Batink et al., 2016), whether positive or negative, may be particularly potent for increasing daily-life emotional well-being. Care should be taken, however, to investigate to what extent such interventions are in line with an individual's background, interests, and motivation (Layous & Lyubomirsky, 2014), as this will likely predict their effectiveness.

### Strengths and limitations

Our study has several strengths, most notably the use of an ecologically valid design with a considerable number of prospective assessments over a 7-day period, allowing to reliably capture moment-to-moment variations in daily life emotional experience without retrospective bias. Further strengths lie in the use of multilevel regression techniques to examine intra-individual associations, as well as inter-individual differences therein, and attention to confounding factors at trait and momentary levels of measurement. Nonetheless, the present study has some limitations that require consideration.

First, apart from considerable variation in age and gender, our participants represented a rather homogenous group of highly educated, working individuals in a relationship. Although all analyses were adjusted for the effects of demographic factors, the current study findings may nonetheless lack accuracy regarding generalization to the population level. Non-representativeness of study samples is a common issue in behavioural science (Henrich, Heine, & Norenzayan, 2010), and future studies are advised to recruit representative samples that accurately reflect the population composition, or focus on specific demographic groups and not generalize findings beyond them. Secondly, the sensitivity to detect inter-individual differences regarding the effect of state gratitude on subsequent positive affect may have been limited by a lack of variation in positive mental health and psychopathology in the present study sample, in addition to overall high mean levels of state gratitude and positive affect in daily life. However, this alone unlikely explains why prospective associations between state gratitude and subsequent positive affect were not found to vary between individuals with different levels of positive mental health and psychopathology (Models 3 and 5, resp.), given such inter-individual differences *were* detected with regard to the reverse associations between positive affect and subsequent state gratitude (Models 4 and 6). Third, the present study assessed state gratitude with a single item (i.e. "I feel grateful" – described and used previously; DeWall et al., 2012; Emmons & McCullough, 2003; Visserman et al., 2017). Although constructs are preferably measured with a number of items, questionnaire conciseness is crucial for increasing compliance and response reliability, and preventing attrition in ecological assessment studies (Bolger et al., 2003; Thiele et al., 2002). Moreover, a 1-item measure can be as effective as a multi-item scale when it is unambiguous and concrete (Bergkvist, 2015). Nonetheless, future

ecological assessment studies may consider using more than one item to assess gratitude, in order to gain more insight in its cognitive-affective workings in everyday life. Fourth, state gratitude may represent a subordinate component of a broader positive affect construct, which could explain our finding of directional asymmetry regarding reciprocal relationships between state gratitude and positive affect at the momentary level, and thus possibly hampers interpretation thereof. Fifth and lastly, although clear strengths of the ESM have been highlighted above, ecological assessment methods can be potentially burdensome and elicit reactivity in participants (Conner, Tennen, Fleeson, & Barrett, 2009). Response rates in the current study were similar to those typically observed in computerized signal-contingent ESM studies with multiple notifications per day (see e.g. Christensen et al., 2003). Although we did, indeed, observe a slight decrease in positive affect during the sampling week at group level, this does not reflect reactivity per se, and in any case unlikely hampers interpretation of our findings, given all analyses were adjusted for the effect of sampling day.

## Conclusion

The present study adds to the existing literature on gratitude and other positive emotions by showing, for the first time, that state gratitude and positive affect reciprocally predict one another at the micro-level of daily life experience: higher levels of state gratitude are followed by higher levels of positive affect and vice versa. Moreover, the positive prospective effect of state gratitude on positive affect was small, and similar for individuals with different levels of positive mental health and psychopathology. The somewhat larger prospective effect of positive affect on state gratitude, however, was shown to vary in strength between individuals with different levels of positive mental health and/or psychopathology. Although our results warrant replication, they suggest that daily life dynamics of gratitude and positive affect are linked to optimal human functioning, and future studies are needed to further uncover the mechanisms at play.

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## CHAPTER 6

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### General Discussion

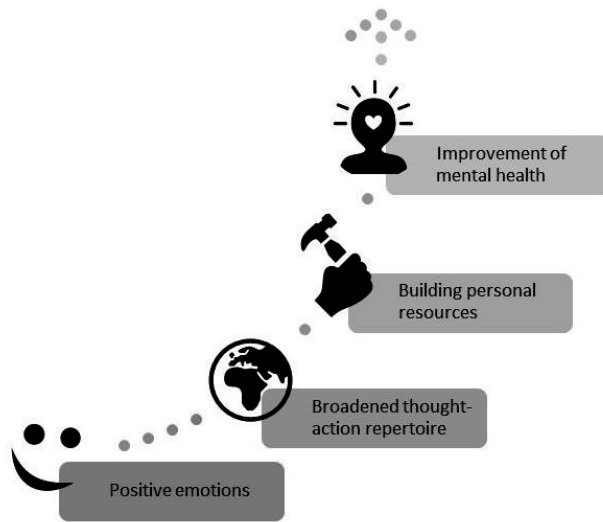




The research presented in this dissertation aimed at furthering our knowledge on the presumed connection between gratitude and mental health, by looking more closely at their associations in the moment and over time. Previous research suggests that gratitude benefits mental health (Emmons & Mishra, 2011; Wood, Froh, & Geraghty, 2010), but a clear picture of possible causality, and the strength of these associations, remained absent. It is important to know to what extent and in what way gratitude plays a role in mental health before incorporating gratitude and gratitude exercises in clinical and coaching interventions. A critical look at existing scholarly literature (Chapter 2) revealed outcomes of and gaps in the research to date that can be important in this light. Prospective research (Chapter 4 and 5), based on translated and validated Dutch gratitude measures (Chapter 3), helped to further our insight in the association between trait and state gratitude and mental health, and shed light on why and how gratitude might enhance mental health at the microlevel of momentary experience and at the macrolevel of weeks and months. This knowledge can support the development and adjustment of gratitude interventions supporting healthy individuals to be more resilient in times of adversity, and to complement the treatment of psychopathology symptoms.

### **The broaden-and-build theory**

The main findings of this dissertation can be integrated within the broaden-and-build theory of positive emotions by Fredrickson (2001). This theory is complementary to Darwin's survival of the fittest theorem, which puts emphasis on the value of negative emotions that narrow our attention to facilitate direct action towards a threat that might harm our existence. Fredrickson (Fredrickson, 1998, 2001, 2004a) provided an evolutionary view on positive emotions, stating that their central role in human experience is equally suggestive of survival value. The broaden-and-build theory suggests that positive emotions tend to broaden our attention to facilitate the occurrence of more diverse thoughts and actions for exploration, relationships, and other life skills with indirect relevance for survival. This broadened thought-action repertoire will help to build personal resources that are useful when adversity strikes (Fredrickson & Joiner, 2002), and, in turn, improve human well-being. Based on the premises of this theory, positive emotions can improve mental health in the long run (Figure 1).



*Figure 1. The upward spiral of positive emotions (Fredrickson & Joiner, 2002)*

### **Gratitude on the path from positive emotions to broadened thoughts and actions**

The first path in the broaden-and-build theory suggests that experienced positive emotions tend to broaden the attention of an individual, and increase possible ways to think and act in times of safety and prosperity. The study in chapter 5 intended to capture momentary state gratitude at the micro-level of everyday life to see whether grateful emotion engages in an upward spiral with positive affect (Fredrickson & Joiner, 2002). To do so, an ESM research by means of a smartphone application was conducted. Results showed that state gratitude and momentary positive affect reciprocally predict one another, when accounting for the presence of negative affect, at the micro-level of daily life.

Positive affect was roughly four times as strong a predictor of state gratitude than vice versa. From the broaden-and-build theory, this can be explained by positive affect leading to a broadened thought-action repertoire that is turning an individual's attention to positive, important, and meaningful factors in occurring events to be grateful for (Lambert, Graham, Fincham, & Stillman, 2009) and that are consciously acknowledged (Emmons & McCullough, 2003). The reverse path between gratitude and subsequent positive affect in daily life was less pronounced. Experiencing state gratitude is considered a positive emotion (Fredrickson, 2004b) but it can also lead to feelings of indebtedness, guilt, and a general sense of discomfort (Armenta, Fritz, & Lyubomirsky, 2016; Bartlett & DeSteno, 2006; Wong, 2011), pointing to the cognitive and social factors of state gratitude when acting as a moral motivator (McCullough, Emmons, Kilpatrick, & Larson, 2001) to engage in prosocial behaviours (Algoe, 2012; Emmons & Mishra, 2011; Wood, Maltby, Stewart, Linley, & Joseph,

2008). The positive affect accompanying state gratitude may therefore be less prominent when one or more of the negative emotions are present right after an event where gratitude is felt (Layous, Lee, Choi, & Lyubomirsky, 2013), but in the end the positive association between state gratitude and positive emotions seem to outweigh the possible effects of negative emotions. Based on these findings, it can be concluded that positive emotions and state gratitude are reciprocally associated with each other, and these emotions possibly broaden the thought-action repertoire.

### **Gratitude as building block of personal resources**

The next path in the broaden-and-build theory suggests that a broadened thought-action repertoire leads to building personal resources that can be helpful when adversity strikes. In chapter 2, the presented review about gratitude associated with the six pillars of positive health provides further insight therein. The six pillars of positive health are bodily functions, mental well-being, quality of life, meaningfulness, social and societal participation, and activities of daily living.

Chapter 2 showed that gratitude and gratitude interventions are associated with the pillar quality of life, comprising concepts such as life satisfaction, happiness, and positive affect. A recent meta-analysis by Dickens (2017) also concluded that gratitude and gratitude interventions can, with small to moderate effects, enhance levels of these quality of life concepts. These beneficial effects might be due to upward spirals of positive emotions in daily life as was suggested by the work presented in chapter 5 and previous reports (Fredrickson & Joiner, 2002; Garland et al., 2010; Kruse, Chancellor, Ruberton, & Lyubomirsky, 2014). These studies all show that momentary states and more durable characteristics and behaviours such as state gratitude, broad-minded coping, humility, open-mindedness, and positive emotions engage in a dynamic upward spiral leading to lasting effects and sustainable positive mood (Diener, Sandvik, & Pavot, 2009) which enhances personal resources such as resilience (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009), coping strategies (Fredrickson & Joiner, 2002; Tugade, Fredrickson, & Feldman Barrett, 2004), and happiness (Danner, Snowdon, & Friesen, 2001). In chapter 3, the validation study showed moderate positive associations between trait gratitude, and positive affect and life satisfaction between baseline and six weeks later. Comparable, and more compelling results are presented in chapter 4, where the prospective association between trait gratitude and the combined measures of positive affect, life satisfaction, and negative affect showed a positive association over the course of seven and a half months, even when accounting for previous levels of well-being and psychopathology. State and trait gratitude show to be enhancers of personal resources such as life satisfaction, resilience, and happiness embedded in the pillar of quality of life.

Besides quality of life, gratitude appeared to be a predictor of the pillar social and societal participation. Findings in chapter 2 show that when experiencing gratitude, individuals are more likely to behave in ways that induce gratitude in others, enhancing the well-being of both the benefactor as well as the beneficiary. This points to the function of gratitude as a moral reinforcer, as mentioned by McCullough et al. (2001), and to the concept of upstream reciprocity (Froh, Bono, & Emmons, 2010; Nowak & Roch, 2007). This might have its origin in an upward spiral between positive affect and positive aspects of close relationships – parent/child relationships, friendships, and romantic relationships – as proposed by Ramsey and Gentzler (2015). These upward spirals are not only present in individuals but also in dyads, and referred to as interpersonal affect regulation. Individuals may try to act in such a way that their behaviour increases positive emotions of others, because this subsequently improves the positive emotions in themselves. This leads to enhanced feelings of trust and relatedness within the dyad (Ramsey & Gentzler, 2015). Another explanation for an upward spiral in close relationships is capitalizing, which refers to the deliberate or unconsciously sharing of positive events with others. The sharing of positive events leads to, for instance, increased life satisfaction, relationship satisfaction, and feelings of closeness (Ramsey & Gentzler, 2015). These mechanisms of thoughts and actions within and between individuals may lead to satisfactory relationships as long-term personal resources (Layous, Nelson, Kurtz, & Lyubomirsky, 2017).

Findings in chapter 2 show that evidence for beneficial effects of gratitude on the pillar bodily functions is limited. This is in line with findings from a recent meta-analysis reporting on missing effects of gratitude interventions on physical health, sleep, and exercise, although these findings might be biased due to the scant research in this realm (Dickens, 2017). Given the observation that gratitude interventions positively affect well-being, and the well-substantiated notion that “happy people live longer” (i.e. high well-being is linked to better health and longevity; Diener & Chan, 2011; Lamers, Bolier, Westerhof, Smit, & Bohlmeijer, 2012), there is a possibility that gratitude interventions may indirectly and positively impact physical health through their effects on well-being (Dickens, 2017).

The study discussed in Chapter 2 also revealed that research regarding gratitude and the pillar basic and functional activities of daily living (ADL) is practically non-existent although this can be a very important personal resource to prevent mental health problems in the future. Nevertheless, other scholarly articles report positive associations between other positive psychological concepts such as optimism (Balck, Lippmann, Jeszenszky, Günther, & Kirschner, 2016), positive affect (Seale, Berges, Ottenbacher, & Ostir, 2010), personality factors and coping style (Elmståhl, Sommer, & Hagberg, 1996), and self-efficacy (Hellström, Lindmark, Wahlberg, & Fugl-Meyer, 2003) on ADL recovery. Considering this literature, it

could be interesting to explore whether levels of trait gratitude and gratitude interventions also add to ADL recovery as a personal resource.

To summarize, both on the microlevel of everyday life as on the macrolevel of weeks and months, state and trait gratitude are consistently positively associated with measures of quality of life and measures of social and societal participation. State and trait gratitude can contribute to personal mental resources and valuable relationships, supporting the premises that positive emotions broaden the thought-action repertoire and subsequently lead to enhanced personal resources on the long run.

### **Gratitude can support good mental health**

The final path of the broaden-and-build theory posits that personal resources aid mental health by providing individuals with coping strategies, mental resilience, and valuable relationships. Findings in chapter 2 regarding the pillar mental well-being were mixed. Most observational studies included in chapter 2 showed negative associations between trait gratitude, as it is, with concepts of the pillar mental well-being. Having a grateful disposition seems to be a personal resource to prevent psychopathological symptoms to arise, or to reduce psychopathological symptoms over time (Lies, Mellor, & Hong, 2014; Sirois & Wood, 2017). The mixed findings regarding the pillar mental well-being can be contributed to the experimental studies. It seems that caution is warranted when exposing clinical samples to gratitude based interventions with the aim of decreasing psychopathological symptoms, as these interventions may be deleterious (Sin, Della Porta, & Lyubomirsky, 2011), and challenging for dysphoric individuals because of self-referential bias (Beck, 2008) or maladaptive self-focus in individuals with depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Psychopathological symptoms are thought to concur with the self-referential bias, where individuals with psychopathology, such as depression, relate external events to the self incorrectly (Beck, 1979, 2008), and the maladaptive self-focus which can manifest itself for instance as rumination, where the individual repetitively and passively focusses on symptoms and distress, and their potential causes and consequences (Nolen-Hoeksema et al., 2008). Careful selection of active control exercises is equally important, as focussing on deepest thoughts and feelings about stressful experiences is likely to induce negative emotional reactivity that might have contrasting effects on psychopathology. Also, timing of implementing gratitude interventions in individuals with mental health problems is important. Gratitude interventions for recent trauma victims will unlikely produce positive outcomes, as can be similarly expected to be the case when asking individuals in acute phases of depression to focus on perceived benefits (Hammar & Årdal, 2009; Lies et al., 2014; Parks & Biswas-Diener, 2013). 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 well-being in patients in clinical remission (Sin et al., 2011). Moreover, as suggested by the findings from Otto, Szczeny, Soriano, Laurenceau, and Siegel (2016), 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.

The pillars quality of life and social and societal participation were two of the pillars of positive health directly linked to possible personal resources as defined in the broaden-and-build theory. The findings regarding the pillar of meaningfulness appeared to be more inconclusive. No studies reporting on direct effects of gratitude and meaningfulness were included in the review of chapter 2. A small number of studies reported an indirect effect of concepts of meaningfulness between gratitude and depression (Disabato, Kashdan, Short, & Jarden, 2017) and post-traumatic growth (Zhou & Wu, 2015). However, while having a sense of gratitude is considered an important source of meaningfulness (Kleiman, Adams, Kashdan, & Riskind, 2013a), the presumed contribution of gratitude to the pillar meaningfulness is only scarcely investigated. This might be because gratitude is conceptually embedded within meaningfulness and therefore difficult to draw apart from the construct in its entirety (Westerhof, Bohlmeijer, & Valenkamp, 2004). Most important conclusion regarding the pillar meaningfulness is that its indirect associations with gratitude might function as a personal resource to aid mental well-being on the long run.

To summarize, trait gratitude in itself could be a personal resource to prevent poor mental well-being, but when trying to intervene with gratitude exercises in individuals with existing psychopathology symptoms, some considerations are needed regarding these specific clinical samples.

### **Gratitude and the dual-continua model of mental health**

In chapter 4, another theoretical framework was proposed to explain the interrelatedness between personal resources and mental health, called the dual-continua model by Keyes (Keyes, 2002, 2005). This model seems to especially play its role at the path of the broaden-and-build theory between building personal resources and improvement of mental health. The dual-continua model of mental health consists of two axes. The first axis is called psychopathology which refers to the absence or presence of psychopathological symptoms; the second axis is called well-being which is defined as the absence or presence of emotional, psychological, and social well-being (Keyes, 2002). Research shows that psychopathology and well-being are related yet distinct concepts (Keyes, 2005; Westerhof & Keyes, 2008). Although good mental health according to Keyes encompasses the absence of psychopathology and the presence of well-being, studies examining relations between trait gratitude and both mental health dimensions combined were non-existent. The study presented in chapter 4 of this dissertation fills this gap and examined prospective

associations between gratitude and both dimensions of mental health: psychopathology and well-being. The grateful trait was a significant albeit weak predictor of well-being, when adjusting for the effects of demographic factors, and prior levels of well-being and psychopathology. Our findings indicate that the grateful trait shows complex connections with the presence of well-being and absence of psychopathology, in line with the assumption that these represent partly independent dimensions of mental health (Keyes, 2002; 2005).

In chapter 5, the results of the ESM study showed an association between positive affect and state gratitude, dependable on levels of psychopathology symptoms and well-being between individuals. Those with higher levels of well-being and/or lower levels of psychopathology reported, on average, stronger prospective associations between positive affect and subsequent state gratitude in daily life than individuals with lower levels of well-being and/or higher levels of psychopathology. Previous research shows gratitude to be more consistently linked to emotional (Proyer, Ruch, & Buschor, 2013; Ramírez, Ortega, Chamorro, & Colmenero, 2014), psychological (Jackowska, Brown, Ronaldson, & Steptoe, 2016; Zhou & Wu, 2015), and social well-being (Algoe & Zhaoyang, 2016; Gordon, Impett, Kogan, Oveis, & Keltner, 2012), than to symptoms of psychopathology (Davis et al., 2016). Our observations align with the idea that individuals possessing a higher level of well-being and/or lower level of psychopathology seem to be more susceptible towards positive experiences and show a stronger tendency to respond to anything in the world with greater state gratitude, which facilitates resource building, compared to individuals who show poorer well-being or higher levels of psychopathology (Fredrickson, 2001). This susceptibility might be in part due to an increased attentiveness to their internal and external surroundings, and a mindful acceptance of distressing thoughts and feelings, compared to individuals with poorer well-being or individuals with psychopathology symptoms (Catalino & Fredrickson, 2011). Mindful acceptance of distressing thoughts and feelings appears to positively counteract anhedonia and partly restores reward experience in individuals with anxiety and depression (Geschwind, Peeters, Drukker, van Os, & Wichers, 2011; Kashdan & Steger, 2006). Being mindful towards internal and external events increases the likelihood of positive emotional experiences (Fredrickson & Joiner, 2002), whereas a narrower outlook on events may hinder the ability to observe what is positive or beneficial, hampering the experience of grateful emotions in individuals with psychopathology symptoms. For instance, individuals with depression have shown reduced ability to generate (Geschwind et al., 2010; Wichers et al., 2010) and sustain (Heller et al., 2009) positive emotions. Also, higher levels of anxiety in individuals hamper the experience of positive affect and positive events in daily life (Kashdan & Steger, 2006). Additionally, neuroticism, which is a general risk factor for psychopathology (Jacobs et al., 2011; Ormel et al., 2013), has been observed to decrease positive emotions over time (Hemenover, 2003). Additionally, psychopathological symptoms are thought to

concur with the self-referential bias (Beck, 1979, 2008), and the maladaptive self-focus (Nolen-Hoeksema et al., 2008). These tendencies might override being sensitive to the intentions and needs of others, i.e. social cognitive bias (Roberts et al., 2017). Individuals with psychopathological symptoms therefor may be unable to benefit from state gratitude because they lack the ability to empathize with others, and their cognitive resources are occupied, hampering the social-cognitive affect of gratitude. The same tendencies might also be a hindrance to be able to notice and acknowledge experienced benefits and sufficiency on a regular basis which is a core condition in the grateful trait. These considerations are in line with the observation of weaker prospective associations between positive affect and state gratitude in individuals with higher levels of psychopathology symptoms, compared to individuals with lower levels of psychopathology symptoms in chapter 5. Our findings indicate that the grateful trait shows complex connections with the presence of well-being and absence of psychopathology, in line with the assumption that these represent partly independent dimensions of mental health (Keyes, 2002; 2005).

To conclude, findings from the studies of this dissertation show support for the paths of the broaden-and-build theory of positive emotions (Erickson, 2001; Erickson & Joiner, 2002) and the role gratitude plays therein. Upward spirals between positive emotions and state gratitude broaden the thought-action repertoires of individuals to build sustainable personal resources, of which trait gratitude can be one. In addition, our findings consistently showed that trait gratitude as a personal resource is a considerable predictor of well-being. Although less clear, our findings also point to the possible role of trait gratitude as a personal resource in preventing the occurrence or aggravation of psychopathology symptoms, important for mental health on the long run. This shows the interacting but distinct functions of both axes of the dual-continua model (Jans-Beken, Lataster, Peels, Lechner, & Jacob, 2017; Lamers, Westerhof, Glas, & Bohlmeijer, 2015). The main findings of this dissertation therefore provide new perspectives on the gratitude-mental health connection explained from the contemporary theoretical frameworks of broaden-and-build theory, positive health, and the dual-continua model.

### **Not all feel grateful: demographic variation in the grateful trait**

The gratitude-mental health connection might not apply to all, and knowledge about the demographic distribution within state and trait gratitude is lacking in the literature (Watkins, 2013). The only consistent finding is that women tend to be more grateful than men (Kaczmarek et al., 2015; Kashdan, Mishra, Breen, & Froh, 2009; Krause, 2006; Sommers & Kosmitzki, 1988). This is confirmed in our studies as gender was a significant predictor of trait gratitude in the large prospective study presented in chapter 4. However, in the smaller scale ESM study presented in chapter 5, men and women experienced state gratitude in



equal amounts. Drawing on the social role theory (Eagly, 2013), one could suggest that women are more prone to social interaction and cooperation (Soutschek et al., 2017), leading them to express or experiencing state gratitude more frequent, as reflected in a higher levels of trait gratitude. However, on the microlevel of everyday, men and women may experience state gratitude with the same intensity.

With regard to age, individuals appeared to report higher levels of trait gratitude with increasing age (chapter 4), but in the ESM study presented in chapter 5 younger and older individuals reported equal levels of state gratitude. An older individual reporting higher levels of trait gratitude might reflect processes based on the socio-emotional selectivity theory (Carstensen, Fung, & Charles, 2003). This theory suggests that with the shrinking of the time horizon, individuals tend to become more selective in choosing of and investing in emotional meaningful goals and activities (Carstensen et al., 2003), and being able to do so might increase the frequency of grateful feelings. In addition, people of age might be more prone to positive memories than younger individuals (Reed, Chan, & Mikels, 2014), leading to more frequent feelings of gratitude regarding these memories.

Education was positively associated with trait gratitude in chapter 4 but negatively associated with state gratitude in chapter 5. Previous research has shown that the well-established positive association between education level and healthy behaviour (Singh-Manoux, Ferrie, Chandola, & Marmot, 2004) is mediated by personality traits (Edmonds, 2011). Given the supposed dispositional character of gratitude, it is possible that also trait gratitude acts as a mediator between education level and health behaviour. In higher educated individuals, cognitive abilities might be more developed, enhancing the possibility of being more often aware of benefits or opportunities in the environment to be grateful for. This higher cognitive ability might lead to more frequent feelings of gratitude, but it might also be the reason to experience less intense feelings of state gratitude, compared to individuals with lower cognitive ability. Because higher educated individuals are more aware of the cost in exchange of benefits, feelings of guilt or indebtedness can decrease the positive feelings that accompany state gratitude (Layous, Sweeny, et al., 2017). Future research can look into these differences in levels of education regarding the social-cognitive-affective nature of state gratitude and how these less feelings of state gratitude is associated with a higher trait gratitude in highly educated individuals.

The found differences at group level in trait gratitude, and the similarity in state gratitude associated with gender and age, but not level of education, is relevant for future research and practice to consider. It appears to be that state gratitude is equally present in both genders and all ages, but this might be different for individuals with various levels of education. When targeting trait gratitude, the ceiling effect should be considered as women and older individuals might show less room for improvement. Of course, apart from the

differences between groups, individual differences should be taken into account when choosing an intervention to enhance well-being or reduce psychopathology symptoms.

### **Methodological review and recommendations for future research**

**Conceptual considerations.** One can argue about the word *trait* associated with gratitude, because personality psychologists have disagreed about what a trait is for centuries (Pervin, 1994). The debate narrows down to two sides: the social-cognitive approach and the trait approach. The social-cognitive approach emphasizes the consistent interpretation of a situation, and therefore posits that an individual can react in different ways in different situations. The trait approach emphasizes the cross-situational consistency in the interpretation of and reaction to different situations (Fleeson & Jayawickreme, 2015). Nevertheless, gratitude can be looked at from both approaches. As a social-cognitive affect, state gratitude arises when in a given situation a benefit is recognized and appreciated, fitting into the social-cognitive approach because in specific situations, when a benefit is recognized, state gratitude is experienced. The general tendency of trait gratitude refers to reacting in a consistent way in different situations where a benefit is presented, pointing to the cross-situationally of trait gratitude, which can also be seen in light of the trait approach. Gratitude can be incorporated in both approaches that can complement each other; explaining the general tendency to be grateful across situations by experiencing state gratitude in certain situations that offer a benefit which is experienced as such. In the light of both approaches to personality traits, we can conclude that gratitude can indeed be seen as a trait. Previous research showed that trait gratitude predicts levels of well-being above and beyond other Big Five personality traits such as agreeableness, extraversion and neuroticism (Fagley, 2012; McCullough, Emmons, & Tsang, 2002; Wood, Joseph, & Maltby, 2009), and trait gratitude explains to some degree variance in measures of well-being and psychopathology as reported in chapter 3 and 4, and studies by other researchers (Disabato et al., 2017; Kleiman, Adams, Kashdan, & Riskind, 2013b). Taken together, this indicates that trait gratitude is worth bearing in mind when thinking about health; developing and enhancing trait gratitude can add to the well-being of individuals.

The main findings in this dissertation underline the small to moderate contribution of trait gratitude to mental health. In Chapters 2 to 5 the results showed gratitude to be more consistently associated with measures of well-being, both on the microlevel of everyday as on the macrolevel across time; its association with psychopathological symptoms is much more unclear. Trait gratitude may therefore be associated to mental health through an indirect connection with well-being as a mediator; trait gratitude improves well-being, which in turn can function as personal resource when adversity strikes, and prevents psychopathological symptoms to arise or to worsen (Disabato et al., 2017; Zhou & Wu,

2015). This shows the importance of attention to both well-being and psychopathological symptoms in research to unravel the benefits of trait gratitude on mental health as forwarded in the dual-continua model and the broaden-and-build theory. It also shows the complex interaction between the pillars of positive health that not only focusses on mental health but the overall health of humans. Future research on trait gratitude should include at least measures of both well-being, consisting of social, emotional, and psychological well-being, and psychopathological symptoms in research, preferably supplemented with measures of bodily functions and activities of daily living to attain a full picture of the contribution of trait gratitude to human health.

**Population and samples.** Recruitment of the participants of the included studies was mainly done by open invitations on social media, therefore the response rate is unknown. The recruitment resulted in a large heterogeneous sample of Dutch adults for the validation study in chapter 3 and the prospective study in chapter 4; the ESM study in chapter 5 was conducted in a rather homogenous group of highly educated, working individuals in a relationship, apart from considerable variation in age and gender. The participants in chapter 4 were higher educated, older, and reported less negative affect than the dropouts of the study. However, apart from age, the sample did not differ in terms of demographic composition across the measurements, and analyses revealed no differences between dropouts and participants that completed all measures. Also, our findings could be affected by the somewhat right skewed distribution in psychopathology symptoms and left skewed distribution in well-being and trait gratitude that is inherent to the general population characteristics of the sample. Additionally, selection bias was a problem in the samples in chapter 3, 4, and 5. Invitations for the studies included the information that the research was about gratitude and this attracted mainly individuals that were interested in the topic, excluding individuals that are less interested or less aware of gratitude. To account for the demographic variability, most analyses across the included studies were adjusted for the effects of demographic factors, but the outcomes may nonetheless lack accuracy regarding generalization to the population level. Findings of the empirical research of this dissertation, therefore, can only be generalized to populations with the same demographic characteristics as the included samples. A more heterogeneous sample can reduce the skewness in samples, providing a more precise sample mean and reducing the confidence interval to assess interindividual variability in the measured concepts. If there are real differences in gratitude and measures of health in the general population, the findings will be more pronounced.

Although the studies were based on sufficient samples of Dutch adults, the non-representativeness of samples that consists of mainly Western and well-educated participants is a common issue in behavioural and social science (Henrich, Heine, &

Norenzayan, 2010). Future research should take note of this phenomenon and expand sample diversity. There are several ways in which sample diversity can be established. First, this can be done by inviting participants with other demographic characteristics to take part in future studies. Second, research groups could reach out and cooperate with research groups in other parts of the world (Henrich et al., 2010). Third, samples can be expanded with clinical participants with both (chronic) mental and physical ailments. Lastly, the purpose of the study can be obscured for the potential participants. These suggestions not only increase the diversity of samples, but they also can help prevent skewed distributions. The last suggestion, obscuring the purpose of the study, not only enhances diversity, but it can also counteract the selection bias that was present in the studies of this dissertation. With these suggestions representativeness and generalizability can be enhanced for future research.

**Design.** The review in chapter 2 focused on longitudinal and experimental research designs to attain a better understanding of the causal relationship between gratitude and the pillars of positive health. The review was not intended to be a comprehensive and cumulative overview of the recent research on gratitude. The search yielded only scholarly articles that contained the given search terms in the title and abstract. There might be articles or other publications out there that would have been suitable for our review, but which lacked the chosen words in the title or abstract, and therefore did not show up in the search results. The integrative review in chapter 2 nonetheless aimed to paint a comprehensive picture of the current state of affairs in gratitude research on a conceptual level. To be able to draw statistical conclusions beyond individual studies, a meta-analysis is advised. Combining the point estimates and confidence intervals from independent studies approaches the unknown common truth of state or trait gratitude. Additionally, meta-analyses can uncover contrasting results between studies, identify certain patterns among studies, or present other interesting results that emerge, furthering the knowledge of the role of gratitude in human health.

The large sample in chapter 3 was assessed at baseline and after six weeks to establish the test-retest reliability of both gratitude questionnaires. This time-interval prevents the learning effect in participants which improves the reliability of the outcomes of the test-retest procedure (Lavrakas, 2008). The main strengths of the study in chapter 4 lie in the use of a four-wave prospective study design, spanning a total of seven and a half months, and collecting data from a large and demographically diverse sample. The ESM study in Chapter 5 has several strengths, of which the most important one is the use of an ecologically valid sampling design with a considerable number of prospective assessments over a 7-day period, combined with scores on one-time measurements at the start of the study. This allowed to reliably capture moment-to-moment variations in state gratitude and other emotions in daily life without retrospective bias and relate them to more stable levels of trait gratitude, mental health, and psychopathology. In the studies in chapter 3, 4, and 5 sufficient

power in longitudinal studies was established to infer conclusions from the presented data. In addition to well-powered replication studies of the presented studies over considerable amounts of time, randomized control trials (RCT's) are necessary to unravel the complex causal dynamics between gratitude and mental health, and to make valid statements about the presumed effects of gratitude on human health on the long run.

A consideration about the used study designs relates to the applied time frames. In chapter 3, participants answered questions at baseline and again after six weeks. Another follow-up after six weeks would have increased the robustness of the found test-retest reliability of both gratitude questionnaires. In chapter 4, there were four measurements across seven and a half months: at baseline, after six weeks, after four and a half months after baseline, and after seven and a half months after baseline. This study would have gained reliability when it was extended with another follow-up measure after at least six months to be able to assess the long-term prospective association of trait gratitude and well-being and psychopathology. Regarding the ESM study in chapter 5, the chosen interval of a random beep in a time span of one and a half hour might be too narrow. Possibly, state gratitude is less frequently experienced during the day than other positive and negative affects. However, although individuals report feelings of gratitude less frequently than other affects, the variability between high and low trait gratitude individuals can still emerge in these narrow time spans due to the interindividual differences.

A further weakness of the ESM study design is that participants may be prone to practice effects and fatigue (Conner, Tennen, Fleeson, & Barrett, 2009). To counteract the practice effect, the smartphone app presented the questions in random order. The response rates in chapter 5 were similar to those typically observed in ESM studies with multiple notifications per day (Christensen, Barrett, Bliss-Moreau, Lebo, & Kaschub, 2003). The data showed a slight decrease in positive affect during the sampling week at group level, but this does not necessarily reflect reactivity, and unlikely hampers interpretation of our findings, given that the analyses were adjusted for the effect of sampling day. The length of the study may be too long or the number of signals per day may be too many, because a number of participants indicated after the sampling week that completing the ten signals for seven days was a heavy burden for them in daily life. However, this signalling scheme is essential to assess the volatile nature of emotions, accompanying thoughts and behaviour, and the appraisal of events throughout the day. Compliance to the sampling protocol can be increased by using incentives and other strategies. Using a monetary incentive enhances the response considerable, even more so when the incentive is presented before the research is executed. Other ways to improve compliance are short and personalized questionnaires, personalized letters, and personal contact before the study starts to enhance compliance (Edwards et al., 2002). Thus, suggestions for future research regarding ESM studies mostly

lie in procedural aspects associated with the researcher-respondent relationship to improve compliance during the study.

**Analyses.** Analyses in the validation study in chapter 3 were not adjusted for demographic characteristics. In retrospect, based on the outcomes of chapter 4, it would have been better to adjust for age, gender, and education to reduce their confounding effects in the two measures of the validation study. Although adjusting for the demographic characteristics would yield a more precise estimate, results in chapter 3 would have likely remained similar, as the demographic factors in chapter 4 showed non-significant effects in the more complex models. The data of the prospective study in chapter 4 and the ESM study in chapter 5 were analysed using time-lagged multilevel analyses. Here, demographic characteristics were included in the analyses to obtain a more precise estimate. An important advantage of multilevel analyses, in regard of skewed distributions, is that they rely more on the individual sensitivity between each item or respondent as an explanation of overall differences between conditions, rather than relying on the overall mean (Locker, Hoffman, & Bovaird, 2007). Additionally, by using the multilevel analyses, the within-subjects variability can be modelled, reducing error variance associated with individual differences (Hox, Moerbeek, & van de Schoot, 2010).

Demographics such as gender, age, and education level seem to be connected to levels of trait gratitude. Although the contribution of these demographics was small, and even reduced to zero in the complex models, future research should include these demographics as control variables to attain the added value of trait gratitude on well-being and psychopathological symptoms beyond demographic characteristics. By using multilevel analyses in chapter 4 and 5, the maximum information was attained from the hierarchical data that was available. Especially for within-subjects data from ESM studies, future research should consider using network analyses to unravel the interdependencies and interrelationships of experienced emotions, thoughts and behaviour, and appraisal of events. There is a high level of connectivity between these components in individuals and because of the lack of methodological tools to grasp this connectivity in the past, researchers studied psychological processes in isolation. Network analyses can help to map the structure of the components that are under scrutiny in an ESM study and software is able to visualize the interdependency and interrelatedness of the components of interest. It is possible to analyse these networks for the (reciprocal) connectivity between components and to reveal the structure of the components with an indication of the most vital component within the network. The visualized results, besides valuable for research purposes, are also valuable for personal feedback (Borsboom, 2012). In this way, the results of an ESM study can add a personal touch towards the participants which, in turn, enhances compliance in time consuming studies.

**Measurements.** Research shows that questionnaires in native languages prevent responses being affected by cultural accommodation (Harzing, 2005), reduce the cognitive and emotional bias that exists when answering questions in another language than one's mother tongue (Keysar, Hayakawa, & An, 2012), and prevent plain misunderstanding of questions. Therefore, it was necessary to translate the existing English questionnaires into Dutch. Bilingual translators, proficient in psychology, executed the blind translation and back-translation process of both trait gratitude questionnaires. After this process, the translations were assessed for comparability in meaning by the translators and the researcher. It is unknown if this is the best procedure to translate questionnaires for cross-cultural research, as comparative research finds no consensus between different methods for translations, although back-translation may not be mandatory (Epstein, Santo, & Guillemin, 2015). Another approach to adapt questionnaires is a translation procedure with two separate teams of translators, followed by presenting both the original and translated versions to a pilot sample of participants proficient in both languages before carrying out the intended research (Sousa & Rojjanasrirat, 2011). In this way, validity of the newly translated questionnaire can be established in a more reliable way.

Additionally, both trait gratitude questionnaires are self-report measures, representing the common method to assess traits or personality. An important disadvantage of self-report measures is social desirability in answering items (Quirin & Bode, 2014), wanting to maintain a positive image of oneself, and camouflaging reality in favour of this image (Mischel, 2013). Therefore, self-report measures are mostly subjective and evaluative in nature. A more complete picture can be achieved by complementing the self-reporting with peer-reporting. In peer-reporting, others report on previous observations of the individual to which the assessment relates, considering different behaviours and contexts when answering items (McDonald, 2008). Combining self-reports and peer-reports make a reliable assessment tool because it entails the judgement of different individuals, painting a more complete picture (Martel, Markon, & Smith, 2017). Disadvantages of peer-reporting are that it is more time-consuming, and peers are sometimes uncooperative, providing information that is not reliable. Also, information can be incorrect depending on the relationship between the individual to which the assessments relates and the peer reporting on this individual (McDonald, 2008). Before utilizing peer-reporting, these disadvantages should be considered. On top of that, McCullough et al. (2002) found that outcomes of trait gratitude self-report measures and outcomes of trait gratitude peer-report measures are comparable, so peer-reporting is possibly redundant, but can also lead to more robust outcomes in personality research.

The ESM study in chapter 5 assessed state gratitude with a single item. ESM studies can be used to assess the dynamics of positive and negative emotions in daily life with one

or a couple of items, trying to capture the volatile nature of emotions. Previous research used a single-item measure to assess state gratitude with good reliability (DeWall, Lambert, Pond, Kashdan, & Fincham, 2012; Emmons & McCullough, 2003; Visserman, Righetti, Impett, Keltner, & Van Lange, 2017). Single-item measures can be used when the construct is unambiguous (Bergkvist, 2015; Wanous, Reichers, & Hudy, 1997), and they show to be reliable in test-retest correlations (Zimmerman et al., 2006). Therefore, the study in chapter 5 used the single-item measure *Ik voel me dankbaar*, meaning I feel grateful. The study allowed to reliably capture moment-to-moment variations in state gratitude and other emotions in daily life without retrospective bias. Although constructs are preferably measured with a number of items, questionnaire conciseness, especially in ESM research design, is crucial for compliance and response reliability, and preventing attrition in ecological assessment studies (Bolger, Davis, & Rafaeli, 2003; Thiele, Laireiter, & Baumann, 2002). However, researchers may consider using more than one item to assess gratitude in ESM study in the future, to gain more insight in the complex workings in everyday life because state gratitude is a dynamic and complex emotion with a cognitive, affective, and social component. The one item might be better complemented with items, such as 'I feel appreciative' and 'I feel grateful for this person', that tap into the cognitive and social components to create a more all-encompassing image of state gratitude in ESM research.

### **Implications for science and practice**

The main findings of this dissertation show the importance of both well-being and psychopathological symptoms in research to unravel the possible benefits of trait gratitude on mental health as forwarded in the dual-continua model and the broaden-and-build theory. It also shows the complex interaction between the pillars of positive health that not only focusses on mental health but the overall health of humans. The holistic framework of positive health can help to disentangle the complex dynamics of body and mind of individuals and this framework is increasingly integrated in the primary health care in the Netherlands. Health care practices that have started to work according to the concept of positive health, presented the first results of this innovative approach to health, and they showed that a health care approach based on the premises of positive health caused 25% less redirections to specialist health care (Bukman, 2017). If gratitude can contribute to one or several positive health pillars, it is worthwhile to continue research into gratitude to improve overall health of individuals and make an effort to cultivate a grateful trait.

Interventions to cultivate or enhance personality traits such as gratitude can be done from a bottom-up model of change (Roberts, Lejuez, Krueger, Richards, & Hill, 2014); a trait is a higher order function that is governed by certain trait processes. When intervening in the processes underlying a certain trait, the unconscious character of a trait can be changed.



This can be done by imprinting new processes on the social, cognitive, and affective level until these new processes become automatic and sustainable (Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014). Thus, through repeated practice of new behaviours, thoughts, and affect, targeted through intervention, the aim is for these new processes to become implicit and ultimately to manifest themselves in trait-level changes (Chapman, Hampson, & Clarkin, 2014).

As for trait gratitude, change can take place by intervening on the core facets of the definition of trait gratitude. Thus, interventions to promote trait gratitude should target recognizing and acknowledging benefits (cognitive aspect), experiencing and expressing state gratitude (affective aspect), and fostering interpersonal relationships (social aspect). This dissertation adds to the knowledge of the affective facet of trait gratitude because in chapter 5 it was reported that state gratitude at the micro-level of everyday engages in an upward spiral with positive affect, accounting for negative affect. This means, although negative affect is present at a given moment, positive affect and gratitude are positively associated from one moment to the other. By evoking or stimulating this upward spiral by means of an intervention, the feeling of gratitude may become imprinted, adding to the development and enhancement of trait gratitude. However, by recalling received benefits using interventions such as gratitude journaling, state gratitude is indeed elicited, but this does not necessarily enhance the level of trait gratitude (Krentzman et al., 2015; Martínez-Martí, Avia, & Hernández-Lloreda, 2010; O'Connell, O'Shea, & Gallagher, 2017). By only eliciting state gratitude, the cognitive and social aspect of trait gratitude are left out while they also are important aspects of trait gratitude.

A point of concern is that developing trait gratitude to reach a certain goal such as enhanced well-being or less symptoms of psychopathology, as an extrinsic or instrumental incentive, can be ineffective and even deleterious (Morgan, Gulliford, & Carr, 2015). Trait gratitude should be conceived as an intrinsic and moral virtue on its own and it should be sincerely felt to provide its benefits for well-being (Kristjánsson, 2013). There is an analogy with laughter and humour because they too are beneficial for health (Cann & Collette, 2014; Savage, Lujan, Thipparthi, & DiCarlo, 2017). If someone does not perceive something or someone as funny, there will be a lack of sincere feeling of joy or pleasure. This may be the same for gratitude; if one does not acknowledge the received benefit, just saying thanks will not result in the same feelings as when gratitude is sincerely felt. By looking at gratitude in an instrumental way, it turns attention away from its moral and intrinsic value and this implies that gratitude could be replaced by any other positive psychological concept (Bolier et al., 2013; Morgan et al., 2015). This might explain why other positive psychology interventions were also successful in enhancing well-being and alleviating psychopathology compared to gratitude related interventions (Kerr, O'Donovan, & Pepping, 2015; O'Leary & Dockray,

2015). This concern fits into the bottom-up model of change for trait gratitude as the awareness of this sincerity can be part of the psychoeducational part that targets the cognitive facet of trait gratitude in a gratitude promoting program. An example of a trait gratitude promotion program that targets multiple facets of trait gratitude is that of Jung and Han (2017). This 4-week program targets four facets of trait gratitude: cognition, recognition, expression, and empathy. These multi-faceted interventions are more likely to be able to achieve sustainable changes compared to interventions solely eliciting state gratitude, and may be important for both experimental inductions in research as practical programs to cultivate trait gratitude.

Important for the efficacy of interventions in general and that of gratitude interventions in particular for improving well-being 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 (self-selection bias). Curiosity seems to raise these intentions while depressive symptoms decrease them (Kaczmarek et al., 2013). Proposed underlying motivational pathways for these associations are utility beliefs, social norm beliefs, and perceived self-control (Kaczmarek, Kashdan, Drajkowski, Bujacz, & Goodman, 2014). When an individual intends to engage in a gratitude intervention, giving instructional support hampers the desirability to actually engage in it (Kaczmarek, Goodman, et al., 2014). Another factor that may influence gratitude intervention engagement is the intervention itself: gratitude letters versus gratitude journaling. Both interventions are perceived as useful and socially acceptable, but writing gratitude letters is perceived as less effective for enhancing 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 well-being, whereas writing gratitude letters as an intervention may have 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 up avenues for large scale delivery of low-threshold gratitude interventions, such as the Kind and Grateful app (Ghandeharioun, Azaria, Taylor, & Picard, 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, Moore, Chang, & May, 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), i.e. combining different (positive) intervention

elements into a larger, comprehensive program, has previously been suggested to increase chances of establishing effects on indicators of 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).

To summarize, because of the consistent, small to moderate, contribution of trait gratitude to well-being, it is valuable to cultivate trait gratitude which can be achieved by conceptually well-founded trait gratitude promoting programs. Interventions based on inducing gratitude or combined intervention programs including gratitude exercises are able to build personal mental and social resources to aid improvement of mental health on the long run. Important in this light is, based on the broaden-and-build theory, that these interventions can lead to building of personal resources, especially in good times. In challenging times, interventions may not be able to reduce mental health problems, but they might prevent the decline of positive emotions present.

### **To conclude**

The studies in this dissertation paint a comprehensive picture of trait gratitude at the macro-level of weeks and months, and state gratitude at the micro-level of everyday. The study of gratitude was approached from contemporary theoretical frameworks such as the broaden-and-build theory (Fredrickson, 2001), the dual-continua model (Keyes, 2002, 2005) and positive health (Huber et al., 2011; Huber et al., 2016), in order to give gratitude a place within today's models that gain ground in scientific research, and clinical and coaching practice. The findings of the studies show that trait and state gratitude may help in enhancing well-being and possibly in decreasing psychopathology. Therefore, researchers and practitioners may start appreciating gratitude as a way to support healthy individuals to be more resilient in times of adversity, and to complement the treatment of psychopathological symptoms.

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## Summary

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Appreciating Gratitude:  
New Perspectives on the  
Gratitude-Mental Health Connection



The research presented in this dissertation aimed at furthering our knowledge on the presumed role of gratitude in mental health, by looking more closely at the link of trait and state gratitude to psychopathology and mental well-being. Knowing to what extent and in what way state and trait gratitude play a role in mental health helps the development and adjustment of gratitude interventions supporting healthy individuals to be more resilient in times of adversity, and to complement the treatment of psychopathology symptoms.

In psychological science, gratitude can be seen as a state and a trait. Trait gratitude can be viewed as a general tendency to recognize small to large benefits, to experience sufficiency, and to acknowledge anything in the world, both human and non-human, with grateful emotion and expression of this emotion which promotes personal well-being and the well-being of others. State gratitude has been conceptualized as a complex emotion with a cognitive, affective, and social component. The cognitive component is recognizing and acknowledging that a benefit is received. The affective component is the emotion that is experienced with a mainly positive connotation. The social component is, among others, about empathy.

Gratitude is considered one of the positive emotions. Fredrickson (2001) provided a renewed evolutionary view on positive emotions because they, too, have evolved to ensure our existence, just like negative emotions have done. The work of Fredrickson suggests that positive emotions tend to broaden our attention to facilitate exploration, relationships, and skills development, which in turn help to build resources that are useful when adversity strikes. This theoretical perspective – called the broaden-and-build theory – provides a framework that helps to understand why gratitude is part of human experience and its connections to facets of mental health.

### **Gratitude as source for mental health – what is the evidence?**

Chapter 2 presents an integrative review of articles reporting on experimental and/or longitudinal investigations of gratitude associated with concepts of the pillars of *positive health*. Positive health is defined as “the ability to adapt and to self-manage, in the face of social, physical and emotional challenges” (Huber, 2011), and consists of six pillars considered to be important for the overall health of individuals: bodily functions, mental well-being, meaningfulness, quality of life, social and societal participation, and daily functioning. The 56 articles included in the integrative review of chapter 2 are found using the scientific databases PsycINFO and PubMed. The results suggest that gratitude is positively linked to quality of life, and social and societal participation, but not necessarily to other pillars of positive health. This means that gratitude tends to consistently show positive associations with measures of quality of life such as subjective well-being and life satisfaction, as well as measures of social and societal participation such as social engagement and relationship

quality. However, studies regarding associations between gratitude and bodily functions, meaningfulness, and daily functioning are scant or inconclusive, and studies regarding gratitude and mental well-being show mixed results. Future research should look into the direct and indirect small to moderate associations of gratitude and all pillars of positive health. The results of chapter 2 can support scholars, practitioners, and policy makers to designing further research, applying findings in practice, and developing new policies regarding gratitude and positive health.

### Measuring gratitude

Chapter 3 reports on the translation and validation of two trait gratitude questionnaires: The Gratitude Questionnaire (GQ6) and the Short Gratitude, Resentment, and Appreciation Test (SGRAT). The GQ6 is a one-dimension scale and the SGRAT consists of three subscales: lack of a sense of deprivation, simple appreciation, and appreciation of others; a total score of the SGRAT indicates the overall level of trait gratitude. To assess trait gratitude in Dutch speaking participants, it was necessary to translate the existing English questionnaires into Dutch. To do so, the translation and back-translation procedure was applied in order to ensure equivalence of meaning and comparability of items. The translated versions of the GQ6 and SGRAT were answered by a large general population sample of Dutch speaking participants ( $N = 706$ ,  $M_{age} = 44$ ,  $SD_{age} = 14$ ), together with the Positive Affect and Negative Affect Schedule (PANAS) and the Satisfaction With Life Scale (SWLS), at baseline and after six weeks. Internal consistency indices of the GQ6-NL and of the SGRAT-NL were satisfactory and both questionnaires demonstrated good test-retest reliability. Regression analyses showed, for the total scores on both gratitude questionnaires, positive associations with the SWLS and the Positive Affect Scale, and negative associations with the Negative Affect Scale. The subscales of the SGRAT-NL all showed associations in the expected directions with positive affect, negative affect, and life satisfaction except for the subscale appreciation of others associated with life satisfaction. Overall, results showed that both the GQ6-NL and SGRAT-NL are valid and reliable measures to assess trait gratitude in a Dutch speaking sample.

State gratitude was measured with a single item in the Experience Sampling Method (ESM) research in chapter 5: *Ik voel me dankbaar* (I feel grateful). This ESM research was conducted by means of a smartphone app that signalled ten times a day for seven consecutive days. Participants were prompted to fill out questions about current emotions, thoughts and behaviour, and the appraisal of events. Single-item measures can be used when the construct is unambiguous, and they show to be reliable in test-retest correlations. However, researchers may consider using more than one item to assess gratitude in ESM study in the future, to gain more insight in the complex workings in everyday life because

state gratitude is a dynamic and complex emotion with a cognitive, affective, and social component. The one item might be better complemented with items, such as 'I feel grateful for this person' and 'I realise that I received a benefit' that tap into the cognitive and social components to create a more all-encompassing image of state gratitude in ESM research.

### **Gratitude and the two continua of mental health**

The study presented in chapter 4 of this dissertation examined prospective associations between trait gratitude and two dimensions of mental health: psychopathology and well-being. This study design is based on Keyes' dual-continua model (2002) which distinguishes well-being and psychopathology as two related but distinct dimensions of mental health. Although mental health encompasses the absence of psychopathology and the presence of well-being, studies examining relations between trait gratitude and both mental health dimensions combined are non-existent, and the study in chapter 4 fills this gap in the scientific literature. The study consisted of four measurements across seven and a half months: at baseline, after six weeks, after four and a half months, and after seven and a half months after baseline. The initial large sample consisted of 706 Dutch speaking adults ( $M_{age} = 44$ ,  $SD_{age} = 14$ ) and they filled out the SGRAT-NL to assess trait gratitude, the Symptom Checklist (SCL-90) to assess symptoms of psychopathology, and a combined measure of the PANAS and SWLS to assess well-being. Results from the time lagged multilevel regression analyses showed that the grateful trait was a significant albeit weak predictor of well-being, when adjusting for the effects of demographic factors, and prior levels of subjective well-being and psychopathology. Our findings indicate that the grateful trait shows complex connections with the presence of well-being and absence of psychopathology, in line with the dual-continua model of Keyes. These findings support the image that emerged in chapter 2 where the associations between gratitude and the pillars quality of life and social and societal participation were more pronounced than the association between gratitude and mental well-being.

### **How grateful do you feel? Upward spirals of gratitude and positive affect in daily life**

The ESM-study in chapter 5 captured momentary state gratitude, as a vital part of trait gratitude, at the micro-level of everyday life to see whether grateful emotion engages in an upward spiral with positive affect based on the premise of the broaden-and-build theory. Additionally, a supposedly upward spiral was assessed connected to levels of positive mental health and psychopathology phenotypes. To do so, one-time baseline measures and an ESM research design by means of a smartphone application was conducted in a sample of 106 adults ( $M_{age} = 39$ ,  $SD_{age} = 15$ ). The baseline measures where the Mental Health Continuum (MHC-SF), the Symptom Questionnaire (SQ48), and the GQ6-NL. The

momentary affects were assessed in the app with three items for positive affect, four items for negative affect, and one item for state gratitude. The app signalled ten times a day for seven consecutive days. Participants had to answer at least third of the 70 signals to be included in the data analyses. The results showed that state gratitude and momentary positive affect reciprocally predict one another when accounting for negative affect at the present moment, and that the positive prospective effect of positive affect on state gratitude was significantly stronger for individuals with high versus low levels of well-being, and low versus high levels of psychopathology. The findings presented in chapter 5 suggest that state gratitude and positive affect tend to be reciprocally associated over time at the micro-level of daily life, and that this emotion dynamic is linked to optimal human functioning by means of higher levels of well-being and lower psychopathology.

### **Not all feel grateful: demographic variation in the grateful trait**

Gender was a significant predictor of trait gratitude in the prospective study in chapter 4, but in the ESM-study in chapter 5, men and women seem to experience state gratitude in equal levels. A similar effect was found for age. With increasing age, individuals appeared to report higher levels of trait gratitude in chapter 4, but in the ESM-study in chapter 5 younger and older individuals reported equal levels of state gratitude. Education was positively associated with trait gratitude in chapter 4 but negatively associated with state gratitude in chapter 5. The differences at group level in trait gratitude, and the similarity in state gratitude associated with gender and age, but not level of education, is relevant for future research and practice to consider.


### **To conclude**

The studies in this dissertation paint a comprehensive picture of trait gratitude at the macro-level of weeks and months, and state gratitude at the micro-level of everyday. We have related gratitude to theoretical frameworks such as the broaden-and-build theory (Fredrickson, 2001), the dual-continua model (Keyes, 2002, 2005) and positive health (Huber, 2011, 2016) to give gratitude a place within today's models that gain ground in scientific research, and clinical and coaching practice. The findings of the studies show that trait and state gratitude are small to moderate associated with measures of well-being, and therefore can be helpful in enhancing well-being and possibly in decreasing psychopathology. Researchers and practitioners may start appreciating gratitude as a way to support healthy individuals to be more resilient in times of adversity, and to complement the treatment of psychopathological symptoms.









## Samenvatting

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Waardering voor Dankbaarheid:  
Nieuwe Perspectieven op de Verbinding Tussen  
Dankbaarheid en Geestelijke Gezondheid



Het doel van het onderzoek in dit proefschrift is het vergroten van de kennis over de rol die dankbaarheid speelt in de mentale gezondheid. Dit is gedaan door te kijken naar de samenhang tussen de karaktertrek dankbaarheid en de emotie dankbaarheid enerzijds en psychische klachten en mentaal welzijn anderzijds. Door meer te weten te komen over de mate waarin en de manier waarop dankbaarheid als karaktertrek en dankbaarheid als emotie samenhangen met mentale gezondheid is het mogelijk om programma's die dankbaarheid inzetten om gezonde mensen te ondersteunen om mentaal veerkrachtiger te zijn in moeilijke tijden te verbeteren, en behandelingen voor het verminderen van psychische problemen aan te vullen.

In de psychologie wordt dankbaarheid beschouwd als een karaktertrek en als een emotie. De karaktertrek dankbaarheid wordt gezien als een consequente neiging van iemand om kleine en grote voordelen in de wereld te herkennen en te erkennen, zowel gekregen van mensen of toegeschreven aan iets anders, en hierbij een dankbare emotie en een gevoel van overvloed te ervaren dat niet alleen het eigen mentale welzijn kan bevorderen maar ook het mentale welzijn van anderen. De emotie dankbaarheid is een ingewikkeld gevoel met tegelijkertijd een verstandelijk deel, een gevoelsdeel en een sociaal deel. Het verstandelijke deel is het herkennen en erkennen dat een voordeel is ontvangen. Het gevoelsdeel is het gevoel dat wordt ervaren en hoofdzakelijk positief van aard is. Het sociale deel gaat onder andere over het kunnen inleven in anderen.

Dankbaarheid wordt gezien als een positieve emotie. Fredrickson (2001) formuleerde een evolutionaire theorie over positieve emoties omdat deze positieve emoties zich ook hebben ontwikkeld om onze overlevingskans te vergroten, net zoals negatieve emoties belangrijk zijn voor het overleven van de menselijke soort. De theorie van Fredrickson suggereert dat positieve emoties onze aandacht verbreden en ons zo helpen bij het verkennen van de omgeving, het vormen van duurzame relaties en het ontwikkelen van belangrijke vaardigheden. Deze kennis, relaties en vaardigheden kunnen ons vervolgens helpen onze hulpbronnen op te bouwen die belangrijk kunnen zijn als het leven tegenzit. Deze theorie – de verbreed-en-bouwtheorie van positieve emoties – voorziet in een theoretisch kader dat helpt om te begrijpen waarom dankbaarheid een deel is van de menselijke ervaring en hoe dankbaarheid samenhangt met de dimensies van mentale gezondheid.

### **Dankbaarheid als een hulpbron voor mentale gezondheid – wat is er bekend?**

Hoofdstuk 2 presenteert een overzicht van artikelen die rapporteren over experimentele en/of langlopende onderzoeken van dankbaarheid en de pilaren van het nieuwe concept van *positieve gezondheid*. Positieve gezondheid is het vermogen van mensen om met de lichamelijke, emotionele en sociale uitdagingen van het leven om te gaan

en zoveel mogelijk zelf beslissingen te nemen die hiermee te maken hebben (Huber, 2011). Positieve gezondheid kent zes pijlers die belangrijk zijn voor de gezondheid van mensen: lichamelijke functies, mentale functies, zingeving, kwaliteit van leven, sociaal leven en het dagelijks functioneren. De 56 artikelen die zijn opgenomen in het overzicht in hoofdstuk 2, zijn gevonden in de wetenschappelijke verzamelingen PsycINFO en PubMed. De resultaten suggereren dat dankbaarheid een positieve rol lijkt te spelen in de pijlers kwaliteit van leven en sociaal leven van positieve gezondheid. De resultaten voor de andere pijlers bieden geen overtuigend bewijs voor een gezondheidsbevorderende rol van dankbaarheid. Dit betekent dat dankbaarheid over het algemeen positief samenhangt met metingen van kwaliteit van leven zoals geluk en levenstevredenheid, en met metingen van het sociaal leven zoals sociale betrokkenheid en de kwaliteit van relaties. Onderzoeken die betrekking hebben op dankbaarheid en lichamelijke functies, zingeving en dagelijks functioneren zijn schaars en niet overtuigend, en onderzoeken die betrekking hebben op mentale functies laten gemengde uitkomsten zien. Toekomstig onderzoek zal meer duidelijkheid moeten bieden over de directe en indirecte kleine en gemiddelde effecten van dankbaarheid ten aanzien van de pijlers van positieve gezondheid. De uitkomsten in hoofdstuk 2 kunnen onderzoekers, mensen uit de praktijk en beleidsmakers helpen bij de planning van nieuw onderzoek, toepassing in de praktijk en de ontwikkeling van nieuw beleid met betrekking tot dankbaarheid en positieve gezondheid.

### Het meten van dankbaarheid

Hoofdstuk 3 bevat het verslag van de vertaling en validatie van twee vragenlijsten die de karaktertrek dankbaarheid meten: de Gratitude Questionnaire (GQ6) en de Short Gratitude, Resentment, and Appreciation Test (SGRAT). De GQ6 is een schaal met één dimensie om dankbaarheid als karaktertrek weer te geven en de SGRAT bestaat uit drie subschalen: gevoel van overvloed, eenvoudige waardering en waardering voor anderen. De totaalscore van de SGRAT geeft het algehele niveau van de karaktertrek dankbaarheid weer. Om de karaktertrek dankbaarheid te meten in Nederlandssprekende deelnemers was het nodig om de bestaande Engelse vragenlijsten te vertalen in het Nederlands. Hiervoor werd de procedure van vertalen en terugvertalen gebruikt om er zeker van te zijn dat de vragen in beide versies overeenkomen. De vertaalde versies van de GQ6 en de SGRAT werden ingevuld door een grote steekproef van Nederlandssprekende deelnemers ( $N = 706$ ,  $M_{leeftijd} = 44$ ,  $SD_{leeftijd} = 14$ ). Naast de GQ6-NL en SGRAT-NL hebben deze deelnemers ook de Positive Affect and Negative Affect Schedule (PANAS; meetinstrument voor positieve en negatieve emoties) en de Satisfaction With Life Scale (SWLS; meetinstrument voor levenstevredenheid) ingevuld. Dit hebben ze gedaan aan het begin van het onderzoek en nog een keer na zes weken. De betrouwbaarheid van beide in het Nederlands vertaalde

vragenlijsten bleek goed te zijn. Dit betekent dat de deelnemers op zowel de eerste week als op de meting na zes weken ongeveer hetzelfde scoorden. Regressieanalyses lieten zien dat als iemand hoger scoort op de karaktertrek dankbaarheid deze persoon ook meer positieve emoties en levenstevredenheid zegt te hebben; een hogere score op de karaktertrek dankbaarheid gaat samen met minder negatieve emoties. De subschalen van de SGRAT-NL lieten allemaal gelijke uitkomsten zien met betrekking tot positieve en negatieve emoties en levenstevredenheid; de subschaal waardering voor anderen liet alleen geen samenhang zien met levenstevredenheid. De resultaten tonen aan dat zowel de GQ6-NL en SGRAT-NL betrouwbare vragenlijsten zijn om de karaktertrek dankbaarheid te meten in Nederlandssprekende deelnemers.

De emotie dankbaarheid werd gemeten met één vraag in het Experience Sampling Method (ESM) onderzoek in hoofdstuk 5: *Ik voel me dankbaar*. ESM-onderzoek houdt in dat mensen, met behulp van een app op hun mobiele telefoon, tien keer per dag zeven dagen achter elkaar vragen over hun emoties, gedrag en gedachten, en hun beoordeling van gebeurtenissen invullen. Onderzoek met behulp van één vraag kan in dat geval betrouwbaar worden uitgevoerd als datgene wat men wil meten overduidelijk is, en er geen twijfel mogelijk is over wat de onderzoeker wil weten. Eerdere wetenschappelijke artikelen met onderzoeken waarbij één vraag werd gebruikt om iets te meten, laten zien dat dit een betrouwbare methode kan zijn. Toch zouden onderzoekers in toekomstig onderzoek kunnen overwegen om de emotie dankbaarheid met meer vragen te onderzoeken omdat dankbaarheid als een emotie een complexe emotie is met een verstandelijk deel, een gevoelsdeel en een sociaal deel. De vraag kan worden aangevuld met vragen zoals “Ik ben deze persoon dankbaar” en “Ik besef dat ik een voordeel heb ontvangen” die vragen naar de andere belangrijke delen van dankbaarheid als een emotie. Op deze manier kan er een completer beeld wordt gekregen van dankbaarheid als emotie in EMS-onderzoek.

### **Dankbaarheid en het twee-continuummodel van mentale gezondheid**

Het onderzoek in hoofdstuk 4 van dit proefschrift presenteert de resultaten van de samenhang tussen de karaktertrek dankbaarheid en twee dimensies van mentale gezondheid. Het onderzoeksontwerp dat gebaseerd is op het twee-continuum model van Keyes (2002) suggereert dat mentale gezondheid globaal is te verdelen in twee dimensie. Aan de ene kant is er de aanwezigheid of afwezigheid van mentaal welzijn. Aan de andere kant is er de aanwezigheid of afwezigheid van psychische problemen. Hoewel deze twee bestanddelen van mentale gezondheid verschillend zijn van elkaar en elkaar aanvullen, zijn er geen onderzoeken bekend naar de relatie tussen de karaktertrek dankbaarheid en beide dimensies van mentale gezondheid tegelijkertijd en het onderzoek in hoofdstuk 4 vult dit gat in de wetenschappelijke literatuur. Gedurende zeven en halve maand vulden de deelnemers

( $N = 706$ ,  $M_{leeftijd} = 44$ ,  $SD_{leeftijd} = 14$ ) vier keer een aantal vragenlijsten in: aan het begin van het onderzoek en na zes weken, vier en halve maand en zeven en een halve maand na het begin van het onderzoek. Naast de SGRAT-NL om de karaktertrek dankbaarheid te meten, vulden de deelnemers ook de Symptom Checklist (SCL-90; meetinstrument voor psychische klachten), de PANAS en de SWLS in. De scores van de PANAS en SWLS werden gecombineerd tot een score voor welzijn. De uitkomsten van de multilevel regressieanalyse lieten zien dat dankbaarheid op een eerder moment een significante voorspeller, met een klein effect, is van welzijn op een volgend moment bovenop de demografische kenmerken, aanwezigheid van psychische problemen en een goed mentaal welzijn op een eerder moment. Dit laat zien dat de karaktertrek dankbaarheid ingewikkelde relaties heeft met de aanwezigheid van mentaal welzijn en de afwezigheid van psychische problemen, wat aansluit bij het twee-continua model van Keyes. Deze uitkomsten ondersteunen het beeld van hoofdstuk 2 waar de samenhang tussen dankbaarheid en de pijlers van kwaliteit van leven en sociaal leven meer uitgesproken waren dan de samenhang tussen dankbaarheid en mentale functies.

### **Een opwaartse spiraal tussen dankbaarheid en positieve emoties in het dagelijks leven**

Het ESM-onderzoek in hoofdstuk 5 keek naar de emotie dankbaarheid, als een vitaal onderdeel van de karaktertrek dankbaarheid, op het niveau van het dagelijkse leven om te zien of de emotie dankbaarheid een opwaartse spiraal laat zien met andere positieve emoties gebaseerd op de aannames van de verbreed-en-bouwtheorie. Meer specifiek werd onderzocht of deze mogelijke opwaartse spiraal samengaat met welzijn en psychische problemen. Aan het begin van het onderzoek vulden 106 deelnemers ( $M_{leeftijd} = 39$ ,  $SD_{leeftijd} = 15$ ) de GQ6-NL, de Mental Health Continuum (MHC-SF; meetinstrument voor welzijn) en de Symptom Questionnaire (SQ48; meetinstrument voor psychische klachten) in. Daarna werd met behulp van een app op de mobiele telefoon de op dat moment ervaren positieve emoties (drie vragen), negatieve emoties (vier vragen) en de emotie dankbaarheid (1 vraag) verzameld. De app gaf hiervoor tien keer per dag, zeven dagen op een rij, een signaal af. Gegevens van deelnemers die minimaal een derde van de in totaal 70 ontvangen signalen hadden ingevuld werden meegenomen in de data-analyse. De resultaten van deze analyses suggereerden dat de emotie dankbaarheid en andere positieve emoties inderdaad wederzijds op elkaar inwerken, zelfs in de aanwezigheid van negatieve emoties. Deze wederzijdse relatie tussen positieve emoties en de emotie dankbaarheid lijkt tot op zekere hoogte sterker voor mensen met een beter mentaal welzijn en met minder psychische problemen dan voor mensen met een slechter mentaal welzijn en met meer psychische problemen. De resultaten in hoofdstuk 5 wijzen erop dat de emotie dankbaarheid en andere

positieve emoties een opwaartse spiraal vertonen in het dagelijkse leven, en dat deze spiraal sterker is bij mensen met een beter mentaal welzijn en/of minder psychische problemen.

### **Niet iedereen ervaart dankbaarheid in dezelfde mate**

Geslacht was een significante voorspeller van de karaktertrek dankbaarheid in het onderzoek in hoofdstuk 4, maar in het ESM-onderzoek in hoofdstuk 5 leken mannen en vrouwen in dezelfde mate de emotie dankbaarheid te ervaren. Dit verschijnsel was ook zichtbaar voor leeftijd. Als mensen ouder worden, scoren ze hoger op de karaktertrek dankbaarheid maar in het onderzoek naar de emotie dankbaarheid was er geen verschil tussen de verschillende leeftijden. Opleidingsniveau liet een positieve samenhang zien met de karaktertrek dankbaarheid in hoofdstuk 4; hoger opgeleide mensen rapporteerden een hogere niveau van de karaktertrek dankbaarheid vergeleken met lager opgeleide mensen. Echter, hoger opgeleide mensen scoorden juist lager op de emotie dankbaarheid dan lager opgeleide mensen. Deze verschillen in de karaktertrek dankbaarheid op groepsniveau en de overeenkomsten in de emotie dankbaarheid in relatie tot geslacht en leeftijd, maar niet in relatie tot opleidingsniveau, is belangrijk voor toekomstig onderzoek en de praktijk.

### **Conclusie**

De onderzoeken in dit proefschrift geven een uitgebreid beeld van de karaktertrek dankbaarheid op het niveau van weken en maanden, en van de emotie dankbaarheid op het niveau van het dagelijkse leven. We hebben dankbaarheid gekoppeld aan theoretische kaders zoals de verbreed-en-bouwtheorie (Fredrickson, 2001), het twee-continuummodel (Keyes, 2002, 2005) en positieve gezondheid (Huber, 2011, 2016) om zo dankbaarheid een plaats te geven in modellen die steeds meer een plek veroveren in wetenschappelijk onderzoek en de klinische en coachpraktijk. De resultaten van deze onderzoeken laten zien dat dankbaarheid als karaktertrek en als emotie een kleine tot gemiddelde samenhang vertoont met meetinstrumenten voor welzijn en daardoor een bijdrage kan leveren aan het verbeteren van welzijn; mogelijk kan dankbaarheid ook ondersteunen bij het verminderen van psychische klachten. Dit proefschrift helpt onderzoekers en de mensen in de praktijk dankbaarheid te waarderen, hiermee gezonde mensen te ondersteunen om veerkrachtiger te zijn in moeilijke tijden en behandelingen aan te vullen voor het verminderen van psychische problemen.







## Dankwoord Acknowledgements

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Oudorp, maart 2018





## Biography and List of Publications

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### Curriculum Vitae

Lilian Jans-Beken was born in Venray in The Netherlands on the 3rd of October 1969. She left high school prematurely at 16 and started working in information and communication technology and transportation. In 2007, she decided to change career and started studying applied psychology at Hogeschool NTI with a major in clinical- and health psychology. Psychology captured her full interest and she proceeded her study in psychology at the Open University Netherlands where she received her bachelor's degree in 2013. Because of her interest in personal strengths and resilience, she entered the master of Lifespan Psychology also at the Open University Netherlands, which is grounded on positive psychology. One year later she graduated with honours with a thesis based on a validation study of gratitude questionnaires. This master thesis was nominated for the Jan Brouwer Thesis Award in 2015 because of the high-quality paper written and thorough research conducted as a master student. Her PhD project as an external PhD candidate started immediately after graduation in March 2014 and her research proposal about the connection between gratitude and mental health was approved in November that year by the research committee of the Open University. She visited conferences, congresses, seminars, courses, and workshops to broaden her scientific knowledge and connect with researchers and other people in science and beyond.

During her PhD, from 2015 to 2017, Lilian worked as a voluntary scientific core member for Immunowell, a foundation that is working on defining a research program on 'Immune Fitness' and an 'experiential expert' platform called ImmunoWeb. In 2015 she was elected as participant of the Royal Netherlands Academy of Arts and Sciences and Hendrik Muller Summer Seminar covering the topic of academic freedom and scientific integrity. Together with the other participants of this edition, Lilian took the initiative to set up the KNAW Hendrik Muller Network to provide a network of promising scientists and highly educated professionals for the future; participants of next editions of the summer seminar are eligible for membership. Due to this summer seminar she learned about open science, which she considers very important, and therefore became a member of the Society of the Improvement of Psychological Science, an organisation that wants to bring together scholars to improve methods and practices in psychological science. She is also a member of the International Society of Quality of Life Studies, an interdisciplinary and professional organisation that connects scientists doing quality of life or well-being research in the basic and applied social and behavioural sciences. On Science Open, a research and publishing network, she is the editor of a collection of articles regarding gratitude. She also is a peer reviewer for several scientific journals and writes book reviews of psychology books for the journal of the Dutch Association of Psychologists, *De Psycholoog*.

Besides her PhD research, she started working as a freelance supervisor and teacher for private psychology students, for the Amsterdam University of Applied Sciences and for the Open University Netherlands. She currently proceeds working as a freelance supervisor and teacher and is looking for a position in research and/or higher education.

## Publications\*

### Publications in peer-reviewed journals

Jans-Beken, L. G. P. J., Jacobs, N., Janssens, M., Peeters, S., Reijnders, J., Lechner, L., & Lataster, J. (Under Review). Gratitude and Positive Health: An Integrative Review.

Jans-Beken, L. G. P. J., Jacobs, N., Janssens, M., Peeters, S., Reijnders, J., Lechner, L., & Lataster, J. (Under Review). Upward Spirals of Gratitude and Positive Affect in Daily Life: A Time-lagged Ecological Assessment Study Using the Experience Sampling Method.

Jans-Beken, L., 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*.

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Te Velde, A. A., Bezema, T., van Kampen, A. H., Kraneveld, A. D., A't Hart, B., van Middendorp, H., ... & Pieters, R. H. (2016). Embracing Complexity Beyond Systems Medicine: A New Approach to Chronic Immune Disorders. *Frontiers in Immunology*, 7.

Jans-Beken, L., Lataster, J., Leontjevas, R., & Jacobs, N. (2015). Measuring Gratitude: A Comparative Validation of the Dutch Gratitude Questionnaire (GQ6) and Short Gratitude, Resentment, and Appreciation Test (SGRAT). *Psychologica Belgica*, 55(1).

### Conference contributions

- Poster presentation Upward Spirals of Gratitude and Positive Affect in Daily Life: A Time-lagged Ecological Assessment Study @Annual Conference of International Society of Quality of Life Studies, Innsbruck 2017.
- Oral presentation Upward Spirals of State Gratitude and Positive Affect in Daily Life @European Congress for Psychology, Amsterdam 2017.
- Poster presentation Gratitude and Associated Demographic Determinants, Psychological Distress and Subjective Well-being @European Conference on Positive Psychology, Angers 2016.
- Oral presentation Measuring Gratitude @European Congress for Psychology, Milan 2015.
- Poster presentation Measuring Gratitude @European Conference on Positive Psychology, Amsterdam 2014.

\* An up-to-date list is available at <http://publications.lilianjansbeken.nl>

