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## DEVELOPMENTAL PSYCHOLOGY | RESEARCH ARTICLE

# Examining well-being, anxiety, and self-deception in university students

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**Abstract:** This study examined the combined influence of six positive psychology variables (optimism, hope, self-efficacy, grit, gratitude, and subjective life satisfaction), termed covitality, in relation to buffering individuals against anxiety symptoms. In addition, the influence of self-deception was examined to test whether this construct had an influence on the reporting of these positive psychology variables. A total of 268 individuals (203 females and 65 males) with a mean age of 22.2 years ( $SD = 7.4$  years) from one Queensland university took part in the study. The participants completed an online questionnaire, which included a battery of positive psychological measures, plus a measure of anxiety and self-deception. The results indicated that the covitality constructs had a moderation effect on anxiety. In a regression analysis, the six covitality constructs explained an additional 24.5% of the variance in anxiety, after controlling for self-deception. Further analyses revealed that those higher in self-deception scored higher in self-efficacy and all positive covitality measures and lower in anxiety, than those lower in self-deception. These findings illustrate the importance of considering the role that self-deception might play in the reporting of positive psychology variables.

**Subjects:** Positive Psychology; Anxiety in Adults; Mental Health Research; Educational Psychology

**Keywords:** well-being; covitality; anxiety; self-deception; positive psychology

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### PUBLIC INTEREST STATEMENT

This paper sought to explore the relationship between positive psychological human strengths, such as optimism, and general well-being and anxiety in adults. Its premise is that these human strengths do not work in isolation, but just as combining steel with concrete strengthens the foundations of a building, a combination of these strengths are needed to strengthen our well-being and help us to resist some of the common issues of modern life, such as anxiety. However, we were concerned that some people may report they have these strengths but may not really do so as they are deceiving themselves. Hence, we also measured their levels of self-deception. We concluded that a small amount of self-deception is fine, and possibly even healthy, but when these levels are high we may fail to realise that we are anxious and not as strong as we like to pretend.

## 1. Introduction

Positive psychology, as a branch of psychology, formally began in 2000 when Seligman and Csikszentmihalyi (2000) edited a special issue of *American Psychologist*. While psychological research had traditionally focused on psychopathology and other negative personality traits (Kristjánsson, 2012), positive psychology aimed to focus research on what goes “right” for people (Avey, Wernsing, & Mhatre, 2011). The major underlying premise of positive psychology is that prevention of psychopathology is most effective when efforts are focused on building individuals strengths, rather than on repairing their deficits (Suldo & Huebner, 2004). Seligman (1998) set out three primary goals of positive psychology research including describing and measuring positive traits and building human strengths, promoting positive experiences and emotions, and creating positive communities that strive to promote these strengths and experiences. It is argued that a better understanding of these human strengths may prevent or lessen the damage of psychological disorders, and help to develop effective interventions to increase and sustain well-being (Gable & Haidt, 2005). Recently, positive psychology has also become interested in the co-occurrence of these positive traits within an individual and how, in combination, they may contribute to well-being. This concept is referred to as covitality.

### 1.1. Covitality

Weiss, King, and Enns (2002) first coined the term covitality to describe the co-occurrence of phenotypic and genetic correlations of positive traits, such as well-being, confidence, and health in chimpanzees. Covitality can be considered an antonym of comorbidity, a term used to describe the co-occurrence of undesirable traits within an individual, such as anger, stress, and depression. Covitality, therefore, as a research phenomenon seeks to draw on many constructs to measure what goes right for an individual. Jones, You, and Furlong (2013) investigated components of covitality such as hope, optimism, self-efficacy, life satisfaction, happiness, and gratitude. They found their covitality model to be positively related to personal adjustment and negatively related to negative emotional symptoms, such as depression and anxiety. Similarly, Lavy and Littman-Ovadia (2011) found that love, gratitude, and hope were associated with life satisfaction. Research has also examined the role of four specific psychological traits—hope, resilience, optimism, and self-efficacy—in relation to protecting individuals against stress, anxiety, and enhancing well-being (Avey et al., 2011). Together, these studies provide information about how protective personality constructs work together to promote psychological well-being and the absence of psychopathology. This research is particularly valuable, as previous research has mainly focused on studying the role of positive traits separately, without considering how they may interact to produce psychologically healthy individuals.

In order to identify and classify these aforementioned positive psychological traits in individuals, Peterson and Seligman (2004) developed the *Character Strengths and Virtues (CSV) Handbook*. Similarly to the DSM, the CSV has been developed to understand psychological well-being and mental wellness. The CSV consists of 24 character strengths, which are organized into six core values. These core values include: (1) wisdom and knowledge, (2) courage, (3) humanity, (4) justice, (5) temperance, and (6) transcendence (Peterson & Seligman, 2004). These core values are further classified into intellectual and self-oriented strengths (strengths of the head) as well as emotional and interpersonal strengths (strengths of the heart) that promote psychological well-being (Park, Peterson & Seligman, 2004). Therefore, the six human strengths examined within this study (optimism, hope, self-efficacy, grit, gratitude, and subjective life satisfaction) were chosen to reflect these intellectual, emotional, and interpersonal human strengths.

#### 1.1.1. Optimism

Optimism has been defined as a relatively stable generalized tendency to expect positive (as opposed to negative) life outcomes (Zenger, Brix, Borowski, Stolzenburg, & Hinz, 2010). Optimism is regarded as a cognitive, affective, and motivational drive to think and feel positively about the future (Forgeard & Seligman, 2012). Research suggests that optimism is significantly associated with well-being (Lavasani, Ejei, & Mohammadi, 2013). In addition, an optimistic way of perceiving the world is

seen as an important coping strategy, particularly in relation to health (Gustavsson-Lilius, Julkunen, Keskivaara, Lipsanen, & Hietanen, 2012; Rauch, Defever, Oetting, Graham-Bermann, & Seng, 2013; Zenger et al., 2010).

#### 1.1.2. Hope

Hope has been defined as a positive motivational state that is based on an interactively derived sense of successful (1) agency (goal-directed energy), and (2) pathways (planning to meet goals; Powell, 2011). In other words, hope is defined as a goal-directed way of thinking in which people perceive that they can find routes to desired goals, and is motivated to do so (Kelsey et al., 2011). It has been theorized that because anxiety often cuts off foresight and commits the individual to the psychological present, anxious individuals are more responsive to immediate experiences in basing their expectancies of the future (Boone, Roessler, & Cooper, 1978). Researchers also suggest that hope may represent a shield against the negative consequences implied by uncertainty about the future (Miceli & Castelfranchi, 2010). For instance, hope has been found to reduce worry in parents of children with a disability, and is associated with better coping strategies, such as being able to plan for, and meet goals (Ogston, Mackintosh, & Myers, 2011). In general, hope has been found to be associated with lower levels of anxiety symptoms (Scioli & Abdel-Khalek, 2010; Arnau, Rosen, Finch, Rhudy, & Fortunato, 2007) and has been found to be a predictor of positive mental health variables, such as self-esteem (Halama & Dedova, 2007), happiness (Wnuk, Marcinkowski, & Fobair, 2012), and as a source of resilience in later adulthood (Ong, Edwards, & Bergeman, 2006).

#### 1.1.3. Self-efficacy

Bandura (1977) defined self-efficacy as “the conviction that one can successfully execute the behavior required to produce the desired outcome” (p. 193). Self-efficacy has also been described as a motivational drive, which is influenced by a belief about what one can achieve (Bandura, 1993). Research suggests that self-efficacy can be seen as a mediator between personality and life satisfaction. For example, people low in neuroticism and high in extraversion, openness, and conscientiousness are not only predisposed to be more satisfied with their life, but are also higher in self-efficacy, which in turn increases life satisfaction (Strobel, Tumasjan, & Spörrle, 2011). Self-efficacy is also considered to be an important protective factor against anxiety about academic performance. For instance, Ghaderi (2010) found that students with low self-efficacy had higher anxiety and suggested that people who feel ineffective at dealing with life’s inevitable problems also felt more anxious at the thought of how they will manage these challenges when they arise. Research also suggests that students who report feeling more anxious about math and science also report less efficacy toward these subjects, as they may interpret anxious feelings as evidence they will be unsuccessful (Griggs, Rimm-Kaufman, Merritt, & Patton, 2013).

#### 1.1.4. Grit

Grit has been defined as a perseverance and passion for long-term goals, whilst working strenuously toward challenges and maintaining effort and interest over years despite failure, adversity, and plateaus in progress (Duckworth, Peterson, Matthews, & Kelly, 2007). People with high levels of grit have a high need for achievement (McClelland, 1961) and have been found to stick to their goals, even in the absence of positive feedback (Duckworth & Quinn, 2009). A study by Dvorak, Lamis, and Malone (2013) found an association between low perseverance and increased depressive symptoms, such as suicide proneness. Grit has been found to be negatively associated with fear and sadness (Singh & Jha, 2008). Overall, research into the relation between grit and anxiety is lacking therefore more research into the possible effects of grit on anxiety is needed. Similarly, while grit was not included in the original Jones et al. (2013) covitality study, a further exploration of the construct by Renshaw et al. (2014) noted that the covitality construct was not conceptually limited to the specific measures used in the original study. It was suggested that various positive internal assets might be used as measures of more general covitality, much as various subscales are used to measure cognitive

abilities. Recent studies that have further expanded on the covitality construct with primary school children (Furlong, You, Renshaw, O'Malley, & Rebelez, 2013) and secondary school students (Furlong, You, Renshaw, Smith, & O'Malley, 2014; You et al., 2013; You, Furlong, Felix, & O'Malley, *in press*) have included a persistence subscale. Following this example, the present investigation included grit as a potential additional covitality indicator.

#### 1.1.5. *Gratitude*

Gratitude has been defined as the quintessential positive psychology trait, involving a life orientation toward the positives in the world (Wood, Maltby, Stewart, & Joseph, 2008). It is a feeling that is associated with thankfulness and appreciation to benefits received that were felt to be undeserved or unexpected (Lau & Cheng, 2011). Gratitude has been found to have one of the highest correlations with well-being of almost any personality characteristic (Wood, Joseph, & Linley, 2007). Lambert, Graham, Fincham, and Stillman (2009) found that gratitude figures prominently among the positive dimensions of the human experience. Gratitude has been found to play a role in promoting physical and psychological health (Emmons & McCullough, 2003), and can undo the after effects of negative emotions (Fredrickson, Mancuso, Branigan, & Tugade, 2000). Lau and Cheng (2011) found that orienting a person's attention toward grateful events in life could reduce death anxiety. Similarly, Krause and Bastida (2012) found that individuals who felt deeply connected to others were more likely to feel gratitude and this helped reduce feelings of death anxiety. This finding may be explained by the evidence that grateful people tend to adopt positive coping strategies, such as positive reframing (Ng & Wong, 2013). In this way, grateful people may be more likely to focus their appreciation on a life that has been lived, instead of on a life that has been lost.

#### 1.1.6. *Subjective life satisfaction*

Subjective life satisfaction is considered to be the cognitive component of subjective well-being (SWB; Pavot & Diener, 1993) and an evaluation of life circumstances in general (Erdogan, Bauer, Truxillo, & Mansfield, 2012). In other words, subjective life satisfaction is a cognitive evaluation of life as a whole, particularly as it relates to health, relationships, jobs, and self-esteem (Diener, 1994). A recent study found that mental health is closely associated with life satisfaction; that is, poor mental health indicators were associated with concurrent life dissatisfaction (Rissanen et al., 2013). Research has also found an association between life satisfaction and physical health in older adults (Gana, Bailly, Saada, Joulain, & Alaphilippe, 2013). A similar study found that subjective life satisfaction was diminished in older adults with generalized anxiety disorder, particularly because anxiety symptoms are thought to inhibit enjoyment of various life domains (Bourland et al., 2000). With the exception of this research, relatively few studies have explored the relation between subjective life satisfaction and well-being.

### 1.2. *Covitality constructs and anxiety*

The relation between positive personality traits and psychiatric disorders has been relatively underexplored (Bromley, Johnson, & Cohen, 2006). In particular, few studies have examined the personality traits that might protect an individual from developing an anxiety disorder. Research suggests that anxiety disorders are relatively common. For example, almost 12% of Australian adults meet criteria for an anxiety disorder in any 12-month period, with one in five meeting criteria at some point in their lifetime (McEvoy, Grove, & Slade, 2011). This frequency is concerning, particularly since anxiety has the potential to be a debilitating condition. For example, Bolton and Robinson (2010) found that 11.5% of suicide attempts were attributable to anxiety disorders in a US sample. Anxiety has also been found to be associated with functional impairments and an increased risk of developing adverse health problems such as cardiac disease, diabetes, and asthma (Sawchuk & Olatunji, 2011). Smoking rates among adults with anxiety disorders have also been found to be substantially higher than among adults without anxiety disorders (Lawrence, Considine, Mitrou, & Zubrick, 2010). Given the profoundly detrimental effects that anxiety disorders can have on an individual, research that attempts to understand the traits that may buffer an individual against

developing an anxiety disorder is invaluable. Such research could assist clinicians to understand the nature of anxiety and to develop interventions that promote the enhancement of these beneficial traits.

Despite the evidence that these six positive psychological traits are related to well-being and decreased negative psychological states (Jones et al., 2013), research has not examined the influence of these six covitality traits, in relation to anxiety, within the same study. Therefore, the degree of influence that each construct has on anxiety has not yet been established, nor do we know how these six covitality traits may interact or overlap with one another. It may be that a combination of these six covitality traits is *more* effective at protecting an individual from experiencing anxiety than any one alone. It could be argued that anxiety might be reduced if a person is likely to expect good outcomes when faced with adversity (optimism), see themselves as being capable (self-efficacy) and determined (grit) to overcome this adversity, whilst maintaining a sense that this adversity can be overcome (hope). Also, the individual might be able to draw upon positive social supports and a sense of meaning (gratitude), in addition to a positive evaluation of their life achievements (life satisfaction), to help buffer against anxious thoughts and feelings when times are difficult.

### 1.3. Self-deception

While it is important to consider the positive traits that might buffer an individual against the feelings of anxiety, it is also valuable to simultaneously consider factors that could influence the self-reporting of these constructs. Self-deception is one such factor, and may be thought of as the mechanism that promotes positive evaluations and feelings, particularly when such a response would seem irrational. In other words, self-deception involves some kind of intentionality in suppressing the conflicting evidence that points to the truth, or being “asleep” on this point (Metcalfe, 1998).

The philosophy of self-deception has a long tradition in applied psychology, particularly within psychodynamic theory. Most notably, Freud argued that powerful psychodynamic barriers stand in the way of self-knowledge (Jopling, 1996). This phenomenon was described as repression—an avoidant information-processing scheme, believed to help protect the individual from the pain associated with threatening information—and allowed individuals to evade the discomfort or pain associated with negative or threatening experiences (Freud, 1915/1957). In other words, repression is a means of nuancing or processing information such that it is rendered less anxiety provoking (McKay, Langdon, & Coltheart, 2007). Using this definition of repression, it is argued that the distinction between repression and self-deception is minimal, and likely (at least in part) the same phenomenon, particularly since the function of self-deception seems to lie in the mind’s ability to diminish anxiety by distorting awareness (Goleman, 1985). Therefore, self-deception has been identified as a coping strategy that is associated with psychological health and well-being (Baumeister, 1993; Scheier & Carver, 1992; Taylor & Brown, 1994).

Research has begun to understand the relation between self-deception and the covitality traits in this study. For example, self-deception appears to be related to gratitude, since individuals who are higher on this trait are more likely to use positive reframing as a way of interpreting negative events, which then helps them to view life as more manageable, comprehensible, and meaningful (Lambert et al., 2009). Overall, life satisfaction and present life satisfaction have been found to correlate with self-deception (Hagedorn, 1996). With relation to grit, a study found that self-deceivers were found to be highly responsive to the availability of information that could be used to soften the impact of negative feedback about performance and help them to perform consistently well (Johnson, 1995). Optimism and self-deception have also found to be positively correlated and it has been suggested that the latter may help to maintain the former (Norem & Chang, 2002). Due to the assumption that people are motivated to maintain a sense of well-being, it could be argued that the tendency to self-deceive when reporting positive psychological traits is likely to occur. As this notion remains largely unexplored, the current study aims to understand the influence of self-deception on the reporting of the aforementioned covitality traits.

#### **1.4. Goals and predictions tested in the present study**

The purpose of this study is to examine whether optimism, hope, grit, self-efficacy, gratitude, and subjective life satisfaction will significantly predict lower levels of anxiety. As mentioned earlier, previous research suggests that these covitality traits are associated with positive coping styles and well-being in general. Therefore, it is expected that these traits will be positively correlated with each other, and negatively correlated with anxiety. It is also predicted that they will significantly predict lower levels of anxiety. In addition, self-deception is also expected to reflect a “coping style” (thinking strategy or mind set) that buffers an individual from experiencing anxiety and influences the way individual’s respond to the covitality measures. Therefore, self-deception is expected to be positively associated with the covitality measures and contribute to an overall reduction in the reporting of anxiety symptoms.

## **2. Method**

### **2.1. Participants**

A total of 268 individuals (203 females and 65 males) between the ages of 18 and 25 years ( $M = 22.2$  years;  $SD = 7.4$  years) took part in the study. The majority of students were first year psychology students ( $n = 186$ ) and the remainder ( $n = 82$ ) were education students. Participants were predominantly undergraduate students from one Queensland, Australia university, with a small number ( $n = 12$ ) being postgraduate students. Participants were recruited either by the QUT SONA system (a web-based research recruitment management system), or via email. The participants completed an online questionnaire that took approximately 30 min to complete. First-year psychology subjects were awarded credit points toward their overall subject grade as an incentive for participation. Participants who did not complete the study for course credit were entered into a draw to win a small financial reward of \$50.

### **2.2. Self-report measures**

Along with a basic demographic questionnaire (age, gender, degree enrolled in, and year of degree) the study included a number of self-report measures.

#### **2.2.1. Self-efficacy**

The general self-efficacy scale (GSE; Schwarzer & Jerusalem, 1995) consists of 10 items that assess an individual’s degree of self-efficacy on a Likert scale from 1 to 4 (1 = *not at all true*, 4 = *exactly true*) with higher scores indicating higher levels of self-efficacy. Sample items include: “I can always manage to solve difficult problems if I try hard enough” and “If I am in trouble, I can usually think of a solution.” The Hebrew version of the GSE yielded an internal consistency of .82 (Zeidner, Schwarzer, & Jerusalem, 1993). Accordingly, this study produced similar results with a Cronbach’s of .82 for all 10 self-efficacy items.

#### **2.2.2. Gratitude**

The gratitude questionnaire (GQ-6; McCullough, Emmons, & Tsang, 2002) is a six-item self-report questionnaire that measures an individual’s grateful disposition using a seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). Sample items include: “I am grateful to a wide variety of people” and “If I had to list everything that I felt grateful for, it would be a very long list.” The GQ-6 has previously demonstrated significant correlations with positive affect ( $r = .31$ ), life satisfaction ( $r = .53$ ), negative affect ( $r = .31$ ), and depression ( $r = .30$ ; Froh et al., 2011) and demonstrated good internal consistency (.82; McCullough et al., 2002). In this study, the GQ-6 also demonstrated acceptable reliability with a Cronbach’s  $\alpha$  of .82.

#### **2.2.3. Optimism**

Life orientation test-revised (LOT-R; Scheier, Carver, & Bridges, 1994) is designed to measure an individual’s expectation of positive versus negative outcomes. The scale consists of 10 items uses a five-point Likert response scale (0 = *strongly disagree*, 4 = *strongly agree*), with three items measuring optimism, three measuring pessimism, and four serving as fillers. The three pessimism items are

reversed and then added to the three optimism items to make a total score. Sample items include: “It’s easy for me to relax” and “I don’t get upset too easily.” The LOT-R has been found to have acceptable discriminate validity with respect to related concepts such as trait anxiety ( $r = -.53$ ), neuroticism ( $r = -.36$ ), and self-esteem ( $r = .50$ ) (McLean, Harvey, Pallant, Bartlett, & Mutimer, 2004). The LOT-R has been found to have a test-retest reliability of .79 and an internal consistency ranging from .67 to .80. (Hirsch, Britton, & Conner, 2010). Cronbach’s  $\alpha$  was found to be .78 in the current study.

#### 2.2.4. Hope

The hope scale (Snyder et al., 1991) consists of eight items plus four fillers rated on an eight-point Likert scale (0 = *definitely false*, 8 = *definitely true*). Higher scores indicate high levels of subjective hope. The questionnaire relates to two components of hope, these being agency (willful sense of determination to meet goals) and pathway (perceived ability to attain a goal; Kortte, Stevenson, Hosey, Castillo, & Wegener 2012). Sample items include: “There are lots of ways around any problem” and “I’ve been pretty successful in life.” Cronbach’s  $\alpha$  for the scale has been found to range between .74 and .84, and the hope scale has test-retest reliability between .89 and .91 (Schrank, Woppmann, Sibitz, & Lauber, 2011). Cronbach’s  $\alpha$  was .83 in the current study.

#### 2.2.5. Subjective life satisfaction

The brief multidimensional student’s life satisfaction scale (BMSLSS; Huebner, 1997) has six items, which asks the respondent to rate their level of life satisfaction on a seven-point Likert scale (1 = *terrible*, 7 = *delighted*). Higher scores indicate a higher satisfaction with life in the five areas pertinent to the experience of youth (Huebner, Suldo, Valois, & Drane, 2006). Sample items include: “My life is going well” and “I have what I want in life.” The BMSLSS is a reduced version of the 40-item multidimensional student’s life satisfaction scale (Huebner, 1994). A coefficient  $\alpha$  of .78 was obtained for the BMSLSS using a sample of college students. The same study found that the BMSLSS had good criterion-related validity, particularly in relation to the mental health items on the health-related quality of life scale (Zullig, Huebner, Gilman, Patton, & Murray, 2005). In this study, the BMSLSS had a Cronbach’s  $\alpha$  of .79.

#### 2.2.6. Grit

The grit scale (GRIT-O; Duckworth et al., 2007) has 12 questions that are answered using a five-point Likert scale (1 = *not like me at all*, 7 = *very much like me*). Sample items include: “Setbacks don’t discourage me” and “I am a hard worker.” The scale has good psychometric properties and has demonstrated an internal reliability coefficient of .80 (Duckworth et al., 2007). The Cronbach’s  $\alpha$  found in this study was .68.

#### 2.2.7. Self-deception

The self-deceptive denial scale (SDD; Paulhus, 1991) is one of three subscales from the balanced inventory of desirable responding scale. The scale consists of 20 items. Sample items include: “I always know why I like things” and “I never regret my decisions.” Participants responded to the SDS on a seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The SDD subscale has previously recorded a Cronbach’s  $\alpha$  of .57 (Gignac, 2013). In contrast, this study found a Cronbach’s  $\alpha$  of .72.

#### 2.2.8. Anxiety

The hospital anxiety and depression scale (HADS; Zigmond & Snaith, 1983) was developed for use with hospital patients suffering from physical illness. It has also been used in primary care and community work (Snaith & Turpin, 1990). The HADS consists of seven items for anxiety (HADS-A) and seven items for depression (HADS-D) rated on a variable four-point (0–3) frequency response scale with 3 indicating higher symptom frequency. Only the HADS-A was used in the current study. An example item from the HADS-A is: “I get sudden feelings of panic (response options: 3 = *very often indeed*, 2 = *quite often*, 1 = *not very often*, 0 = *not at all*). The Cronbach’s  $\alpha$  for the HADS-A has been found to range from .68 to .93 (Bjelland, Dahl, Haug, & Neckelmann, 2002). This study produced similar results with a Cronbach’s  $\alpha$  of .84 for the seven anxiety items.

### 2.3. Procedure

Participants completed a series of self-report measures online. Participation in this study was voluntary and completion and submission of the online questionnaire was deemed to demonstrate participant consent. The self-report measures were presented in the same order as described above. In general, the response categories varied in meaning (e.g. “strongly disagree to strongly agree” or “very often indeed to not all”) and point scales (e.g. “4, 5, 7, and 8 point scales”) which helped prevent any priming effects (SurveyMonkey, 2014). The study was granted approval by the University Ethics Committee. Some students ( $n = 186$ ) received partial course credit for completion of the survey. The survey was accessible via a web-based format powered by SurveyMonkey Audience (SurveyMonkey Inc., 2013).

## 3. Results

### 3.1. Descriptive statistics

Table 1 displays descriptive statistics of the participants’ optimism, hope, grit, self-efficacy, gratitude, subjective life satisfaction, self-deception, and anxiety scores, based on the participant’s gender. An independent  $t$ -test revealed that females scored significantly higher on The Gratitude Questionnaire in comparison to the male participants,  $t(266) = -3.04, p < .005$ . There was a significant difference between male and female scores on the self-deception scale, with females scoring higher on the self-deception measure,  $t(266) = -5.38, p > .000$ . There was also a significant difference between male and female scores on the anxiety (HADS) scale, with females also scoring higher on the anxiety measure,  $t(266) = -3.14, p < .005$ . This is not unexpected as females consistently report higher levels of anxiety than males (McLean, Asnaani, Litz, & Hofmann, 2011). A significant difference was not found for the remaining variables based on gender.

### 3.2. Correlations between the covitality constructs, self-deception, and anxiety items

The correlations for the covitality constructs measures, the SDD, and the anxiety items from the HADS are presented in Table 2. As expected, each covitality construct positively correlated with the other covitality constructs. Hope and self-efficacy had the strongest association ( $r = .70$ ), and gratitude and self-efficacy shared the weakest association ( $r = .23$ ). Overall, these results suggest that while these covitality constructs share similar qualities, they represent separate constructs. Self-deception was also positively associated with all of the other covitality constructs. In contrast, anxiety was negatively associated with all of the covitality constructs. The measures of anxiety and self-deception were also negatively associated.

### 3.3. Multiple regression for the covitality and anxiety constructs

A standard multiple regression was performed with anxiety as the dependent variable and optimism, hope, self-efficacy, grit, gratitude, and subjective life satisfaction as the independent variables. No a priori hypotheses were made to determine the order of entry of the predictor variables. Results of evaluation of assumptions revealed that all assumptions had been met. The singularity assumption was not violated, as the correlation matrix indicated no perfect correlations between the independent variables. The normal probability and scatterplot revealed normally distributed,

**Table 1. Participant’s optimism, hope, grit, self-efficacy, gratitude, subjective life satisfaction, self-deception, and anxiety scores**

	n	Optimism	Hope	Grit	Self-efficacy	Gratitude	Life satisfaction	Self-deception	Anxiety
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Total scores	268	20.51 (4.94)	47.59 (7.22)	35.78 (6.38)	30.53 (3.81)	34.51 (5.15)	44.25 (7.50)	84.34 (14.22)	8.89 (4.52)
Male	65	20.50 (5.06)	47.37 (7.65)	36.08 (6.01)	30.92 (4.15)	32.85 (5.85)	43.61 (7.75)	76.48 (14.28)	7.38 (4.40)
Female	203	20.51 (4.91)	47.66 (7.09)	35.68 (6.50)	30.40 (3.70)	35.90 (4.81)	44.47 (7.42)	86.87 (13.29)	9.37 (4.47)

**Table 2. Correlation between the covitality constructs, self-deception, and anxiety items**

	Self-efficacy	Optimism	Hope	Gratitude	Grit	Life satisfaction	Self-deception
Self-efficacy	–						
Optimism	.49**	–					
Hope	.70**	.53**	–				
Gratitude	.23**	.50**	.39**	–			
Grit	.46**	.31**	.55**	.28**	–		
Life satisfaction	.47**	.57**	.59**	.52**	.38**	–	
Self-deception	.18**	.23**	.27**	.28**	.23**	.35**	–
Anxiety	–.46**	–.39	–.41**	–.28**	–.32**	–.44**	–.21**

\*\* $p < .01$ .

linear, and homoscedastic errors of prediction between predicted and obtained dependent variables score, as well as independence of residuals. Collinearity statistics revealed tolerances above .30 and VIF values below 3.45, indicating that the multicollinearity assumption was met.

Results of the regression analysis model predicting anxiety are presented in Table 3. The overall regression model was significant,  $R^2 = .287$ ,  $F(7, 267) = 17.50$ ,  $p < .000$ , indicating that together, the six covitality variables explain 28.7% of the variance in anxiety scores. This indicated that the covitality measures had a strong inverse relation with the anxiety measure. Furthermore, results indicate that self-efficacy contributed significantly to the prediction of reduction in anxiety,  $t = -3.57$ ,  $p < .000$ . Subjective life satisfaction also made a significant contribution to the reduction in anxiety reporting,  $t = -2.87$ ,  $p = .05$ . The unique variance associated with self-efficacy was 4.7% ( $sr^2 = .047$ ), subjective life satisfaction 2.6% ( $sr^2 = .026$ ), optimism < 1% ( $sr^2 = .008$ ), grit < 1% ( $sr^2 = .005$ ), gratitude < 1% ( $sr^2 = .001$ ), and hope < 1% ( $sr^2 = .000$ ). Therefore, the remaining 19.7% of the variance can be attributed to the combinatorial effect of the variables thereby supporting the concept of covitality.

### 3.4. Hierarchical regression for the covitality, self-deception and anxiety constructs

A hierarchical multiple regression was also employed to predict levels of anxiety, after controlling for the influence of self-deception on the covitality measures (see Table 4). Self-deception was entered at Step 1, explaining 4.5% of the variance in anxiety,  $F(1, 267) = 12.65$ ,  $p < .000$ . After entry of the six covitality traits at step 2, the total variance explained by the model as a whole was 28.9%,  $F(6, 267) = 15.08$ ,  $p < .000$ . Therefore, the six covitality constructs explained an additional 24.4% of the variance in anxiety, after controlling for self-deception. Only two of the individual covitality constructs were statistically significant, with self-efficacy recording a higher  $\beta$  value ( $\beta = -.27$ ,  $p < .000$ ) than subjective life satisfaction ( $\beta = -.20$ ,  $p < .05$ ).

**Table 3. Standard multiple regression for the anxiety and covitality constructs**

Variables	B	B	$sr^2$ (unique)	R	$R^2$	Adjusted $R^2$
Model 1				.54	.287***	.27***
Optimism	–.094	–.103	<.01			
Hope	.010	.016	<.01			
Self-efficacy	–.325	–.274	.05***			
Grit	–.052	–.073	<.01			
Gratitude	–.028	–.032	<.01			
Life satisfaction	–.120	–.199	.03**			

Note:  $sr^2$  = the squared semipartial correlations indicate the unique variance predicted by the independent variable.

\*\* $p < .01$ .

\*\*\* $p < .001$ .

**Table 4. Summary of hierarchical regression analysis for variables predicting anxiety**

Variable	Model 1			Model 2		
	B	SE B	$\beta$	B	SE B	$\beta$
Self-deception	-.07	.02	-.21	-.02	.02	-.05
Self-efficacy				-.33	.09	-.27**
Optimism				-.09	.07	-.10
Life satisfaction				-.12	.05	-.20**
Gratitude				-.03	.06	-.03
Hope				.01	.05	.02
Grit				-.05	.05	.07
R <sup>2</sup>		.045			.289	
F for change in R <sup>2</sup>		12.65***			14.83***	

\*\* $p < .01$ .

\*\*\* $p < .001$ .

**Table 5. Differences between the covitality constructs and anxiety items in relation to low and high self-deception**

	n	Optimism	Hope	Grit	Self-efficacy	Gratitude	Life satisfaction	Anxiety
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Low self-deception	67	18.66 (4.63)	45.46 (7.21)	34.10 (6.36)	29.65 (3.62)	32.83 (5.22)	40.61 (6.74)	16.75 (4.62)
High self-deception	68	22.20 (4.89)	50.70 (6.12)	37.62 (5.90)	31.78 (3.36)	36.88 (3.89)	48.29 (6.54)	14.38 (4.06)

### 3.5. Multiple regression for the high and low self-deception scores predicting anxiety

To explore these findings further, a multiple regression was employed to examine the influence of high (scored within the top 25% of all participants) and low (scored within the bottom 25% of all participants) levels of self-deception on the two significant predictors of anxiety from the previous multiple regression, namely self-efficacy and subjective life satisfaction (see Table 5). The overall regression model was significant,  $R^2 = .34$ ,  $F(3, 63) = 11.09$ ,  $p < .000$ , indicating that the self-efficacy and subjective life satisfaction measures account for 34% of the variance in anxiety scores when controlling for low levels of self-deception. This suggests that these two covitality measures have a strong negative relation with the anxiety measure if an individual also scores lower on the self-deception measure. The results indicate that self-efficacy contributed significantly to the prediction of reduced anxiety scores,  $t = -3.21$ ,  $p < .002$ , as did subjective life satisfaction,  $t = -3.06$ ,  $p < .003$ . The unique variance associated with the self-efficacy measure was 14% ( $sr^2 = .14$ ) and 13% ( $sr^2 = .13$ ) for the subjective-life satisfaction measure.

A regression analysis for high self-deception predicting anxiety was generated and the overall regression model was significant,  $R^2 = .13$ ,  $F(3, 63) = 3.10$ ,  $p < .05$ . This indicates that the self-efficacy and subjective life satisfaction measures account for 13% of the variance in anxiety scores, when controlling for high levels of self-deception. This suggests that these two covitality measures have a significant negative relation with the anxiety measure; however, this association is not as strong in comparison to the low self-deception regression model. The results indicate that self-efficacy did not contribute significantly to the reduction in anxiety scores,  $t = 0.65$ ,  $p > .05$ . In contrast, subjective life satisfaction significantly predicted reduced anxiety reporting,  $t = -3.06$ ,  $p < .003$ . The unique variance associated with the life satisfaction measure was 8%.

## 4. Discussion

The aim of the current study was to understand the association between optimism, subjective life satisfaction, gratitude, grit, hope, and self-efficacy in relation to anxiety. In addition, the role self-deception in the reporting of positive psychological constructs was explored. The assumption that all

six of the positive psychology constructs would be associated with lower levels of anxiety was supported by a correlational analysis. The hope, self-efficacy, optimism, gratitude, grit, and subjective life satisfaction measures all shared a negative and moderate correlation with the anxiety measure. A standard regression analysis found that these six psychological constructs accounted for 28.7% of the variance in reported anxiety symptoms. Adding each constructs individual contribution resulted in a total of 9.3% of variance being accounted for, meaning that the combined effect of the constructs accounted for 19.7% of the variance. This suggests that when combined, these psychological variables have a significant role to play in the reduction in reported anxiety.

The regression analysis also revealed that self-efficacy was the most significant predictor of lower anxiety scores. This finding is supported by previous research by Bandura (1986) who identified that anxiety has an inverse correlation with an individual's perceived level of self-efficacy. Research in health, education, and social psychology has continued to demonstrate this association (Fentz et al., 2013; Goldin et al., 2012; Griggs et al., 2013). Importantly, previous research does not appear to suggest that people with higher self-efficacy do not experience anxiety. Instead, it appears that those individuals who are higher in self-efficacy handle anxiety differently to those who are lower in self-efficacy (Ghaderi, 2010). In particular, it appears as though self-efficacy allows individuals to feel some sense of control over their anxiety symptoms and may enable people to feel like they have the resources to deal with whatever uncertainty their future brings.

Subjective life satisfaction was also found to have a significant effect on anxiety reporting. This finding is not surprising considering that life satisfaction is widely considered to be a central aspect of human welfare and well-being (Ghubach et al., 2010), and an indicator of overall life quality and positive mental health (George, 2010). In addition, research has found a negative correlation between life satisfaction and depression (Stankov, 2013) and negative affect (Abbott, Do, & Byrne, 2012). Low levels of life satisfaction have been found to be associated with a diagnosis of an anxiety disorder (Ghubach et al., 2010) and anxiety symptoms in the general population (Daig, Herschbach, Lehmann, Knoll, & Decker, 2009). The association between anxiety and subjective life satisfaction is also supported by research that found anxiety symptoms had a strong negative association with life satisfaction in individuals with cystic fibrosis (Besier & Goldbeck, 2012) and within a nursing home population (Queen & Freitag, 1978). Older adults with higher life satisfaction were also found to be less anxious about death, possibly because purposefulness in life seems to act as a buffer against concerns about death (Given & Range, 1990). With the exception of the research mentioned, few studies have directly examined the relation between subjective life satisfaction and anxiety. The research available appears to suggest that life satisfaction plays an important role in protecting against anxiety due to its relationship to general well-being and the sense of meaning and purposefulness associated with having a satisfied life. Future research would likely provide valuable insight into the relation between these two constructs.

When examining self-deception, the results of the current study showed that self-deception correlated with each of the covitality measures. These findings support research by Taylor and Brown (1994), which suggests that people are mentally healthier if their sense of reality is biased in a positive direction. In other words, too much realistic self-knowledge is argued to be psychologically maladaptive (Jopling, 1996). As a result, self-deception has been found to be an important component of SWB (Diener, Sandvik, Pavot, & Gallagher, 1991), mental health (Baumeister, 1993), and self-esteem and happiness (Johnson, 1995). Self-deception has also been found to be an important coping mechanism that reduces suicide risk (Pompili et al., 2011). Therefore, it appears that self-deception and these covitality traits are likely to be related due to the mind's ability to cordon off negative information and create positive perceptions (Taylor, 1989). To elaborate, it could be argued that people are motivated to maintain a sense of well-being and this is likely to be reflected in their responses to the covitality measures. Indeed, the findings reported in this paper suggest that self-deception itself could be viewed as another variable to be included in the covitality construct, as small amounts of self-deception result in the adoption of more positive psychological states. More importantly, when measuring levels of the

covitality variables, it might also be prudent to include a measure such as self-deception to discern possible respondents who are possibly not being totally honest in their responses due to higher levels of self-deception.

A hierarchical regression analysis employed to examine the influence of the covitality measures on anxiety scores, after controlling for self-deception, found that self-deception accounted for 4.5% of the unique variance in this model. In addition a quartile split revealed that individuals who were higher in self-deception had reduced anxiety scores, while those who were lower in self-deception had higher anxiety scores. The quartile split also revealed that higher scores on the self-deception measure were associated with significantly higher scores on all of the covitality measures.

These results indicate that self-deception plays a role in reducing the reporting of anxiety symptoms. One explanation for this influence could be based on the fact that anxiety is often related to uncertainty about the future, and this uncertainty is based on a fuzzy reality of possibilities. Schneider (2001) suggests that the fuzziness of reality might provide gray areas and it is within these gray areas that self-deception can occur. That is, due to the ambiguity about future possibilities, individuals might be motivated to view the future in a positive way. Research supports this view, as it has been found that most people appear to be optimists when perceiving the future and overestimate the likelihood that positive events will happen and negative events will not happen (Robinson & Ryff, 1999). Therefore, self-deception may be thought of as a mechanism that allows these covitality constructs to flourish within the fuzziness of reality and protect against feelings of anxiety.

It would appear, however, that this relation does reach a point where too much self-deception reduces an individual's ability to use the covitality constructs as a way of coping with anxiety. This was supported by the multiple regression controlling for high and low levels of self-deception, in relation to self-efficacy and subjective life satisfaction. The low self-deception model explained 34% of the covitality constructs influence on anxiety scores, whereas the high self-deception model only explained 13% of the variance. It could be argued that this occurs because individuals who are higher in self-deception are less likely to report that they are experiencing anxious feelings, even if this may be the case. That is, a person's ability to access the covitality constructs to help cope with anxiety is impeded when levels of self-deception are too high.

Overall, it would appear that the covitality constructs together play an important role in the moderation of anxiety. However, it also appears that a small amount of self-deception is beneficial and can lead to a strengthening of this defense. This notion is consistent with the dual-factor model of mental health (Greenspoon & Saklofske, 2001), which suggests that mental health should incorporate both indicators of positive SWB and measures of psychopathological symptoms to comprehensively determine an individual's psychological adjustment (Antaramian, Huebner, Hills, & Valois, 2010). In other words, mental health and well-being in general may be viewed as a balance of both positive and negative psychological traits, rather than the complete absence of these negative traits.

## 5. Limitations

This study consisted mainly of female students from a university located in the inner Brisbane region of Australia. As stated earlier, females consistently report higher levels of anxiety than males, and as this study had three times the number of females to males, this may well have affected the results (McLean et al., 2011). However, it should be noted that these numbers reflect the feminization of both the psychology (Graduate Careers Australia, 2014) and education professions (Kelleher, 2011). Nevertheless, it may be difficult to extend these findings to the general population. Future research could improve the understanding of possible differences between females and males in relation to covitality, anxiety, and self-deception by including more equal numbers of both genders. In addition, anxiety is a complicated psychological phenomenon that presents in different ways. It is likely that the short anxiety measure used in this study did not fully capture the range of emotions

and thoughts that are associated with anxiety. Future research would benefit from examining the relation between the covitality traits using more specific measures of anxiety, for example, social anxiety. Similarly, future research would benefit from examining the relation between positive psychological traits and other mental health disorders, including depression and substance use.

## 6. Conclusion and implications

This study found that individuals, who score higher on self-deception, also report higher scores on all of the positive measures. This finding illustrates the importance of considering the role that self-deception has on the reporting of positive psychology variables. This idea is supported by research, which found that self-deceptive individuals show contradictory responses between self-report, and physiological or behavioral reactions (Hui-Jing, 2012). Therefore, interpretation of positive psychological self-report responses should be done with added caution. Future research in the positive psychology domain might benefit from including a measure like self-deception in any collection of positive strength measures, as this will ensure that responses are reliable and not inflated by self-deceptive responses. In addition, a range of other positive psychological traits (such as resilience, persistence and self-efficacy) should be examined to determine the impact they may have on the overarching construct of covitality.

Previous research has traditionally explored the relation between individual positive psychological traits in relation to anxiety. However, few studies have attempted to understand the relation between a combination of positive traits and anxiety within the same study. Research that continues to understand the positive psychology traits that are most important in protecting an individual from anxiety could help to understand the nature of anxiety and ways to help people manage it. For instance, anxiety may be understood as not just having the presence of a mental health disorder, but also the absence of certain positive psychological traits.

The findings from this study support previous research that suggests a moderate degree of self-deception is beneficial for mental health in general (Robinson, Moeller, & Goetz, 2009). Therefore self-examination, and the reduction of self-deception, may not always be desirable or possible in therapy (Lettieri, 1983). Self-deception could be considered a healthy psychological defense mechanism that enhances the effectiveness of these covitality psychological traits by allowing one to maintain a sense of well-being when confronted by the uncertainties of the future. Furthermore, as stated above, higher levels of self-deception may also confound the reporting of the covitality psychological traits and therefore make it difficult to assume these self-reports are truly reflective of a person's actual levels of positivity. Future research that attempts to understand the positive effects that self-deception has on well-being should also take into account the possible negative effects of high self-deception. This may assist researchers to more fully understand positive psychological well-being and ultimately develop more effective treatment for psychological disorders.

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