

# Psychological Well-being: Evidence Regarding its Causes and Consequences†

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This review focuses on positive aspects of well-being, or flourishing. It examines evidence for the causes of positive well-being and also its consequences, including beneficial effects for many aspects of cognitive functioning, health, and social relationships. The neurobiological basis of psychological well-being is examined, and recent data on brain activation and neurochemical pathways are presented. Individuals vary widely in their habitual level of psychological well-being, and there is evidence for a seminal role of social factors and the early environment in this process. It is often assumed that the drivers of well-being are the same as (but in the opposite direction to) the drivers of ill-being, but while this is true for some drivers, others have more selective effects. Future developments in the science of well-being and its application require a fresh approach—beyond targeting the alleviation of disorder to a focus on personal and interpersonal flourishing. A universal intervention approach is outlined which may both increase population flourishing and reduce common mental health problems.

Keywords: happiness, intervention, mental health, population, review, well-being

## INTRODUCTION

Psychological well-being is about lives going well. It is the combination of feeling good and functioning effectively. Sustainable well-being does not require individuals to feel good all the time; the experience of painful emotions (e.g. disappointment, failure, grief) is a normal part of life, and being able to manage these negative or painful emotions is essential for long-term well-being. Psychological well-being is, however, compromised when negative emotions are extreme or very long lasting and interfere with a person's ability to function in his or her daily life.

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The concept of feeling good incorporates not only the positive emotions of happiness and contentment, but also such emotions as interest, engagement, confidence, and affection. The concept of functioning effectively (in a psychological sense) involves the development of one's potential, having some control over one's life, having a sense of purpose (e.g. working towards valued goals), and experiencing positive relationships.

Recent years have witnessed an exhilarating shift in the research literature from an emphasis on disorder and dysfunction to a focus on well-being and positive mental health. This paradigm shift has been especially prominent in current psychological research (e.g. Argyle, 1987; Diener, 1984; Kahneman, 1999; Ryff & Singer, 1998a; Seligman, 1991, 2002). But it has also captured the attention of epidemiologists, social scientists, economists, and policy makers (e.g. Huppert, 2005; Layard, 2005; Marks & Shah, 2005; Marmot, Ryff, Bumpass, Shipley, & Marks, 1997; Mulgan, 2006). This positive perspective is also enshrined in the constitution of the World Health Organisation, where health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). More recently, the WHO has defined positive mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2001).

This recent flowering of research on mental well-being has come about for a number of reasons, chief amongst them being:

1. the recognition that, since well-being is more than the absence of ill-being, it needs to be studied in its own right;
2. the need to distinguish between these approaches to improving psychological well-being: (a) treating disorder when it is present; (b) preventing disorder from occurring; and (c) enhancing well-being (i.e. increasing flourishing);
3. evidence that many of the drivers of well-being are not the same as the drivers of ill-being;
4. the strong possibility that, by increasing flourishing in the population, we might do more to reduce common mental and behavioural problems than by focusing exclusively on the treatment and prevention of disorder.

This review summarises what we know about the factors determining an individual's level of psychological well-being, and the effects of well-being on our perceptions, thoughts, and behaviours, and on our physiology and health. It also explores how this knowledge may be utilised to improve well-being in individuals and in populations.

## RELATIONSHIP BETWEEN POSITIVE EMOTIONS AND COGNITIVE PROCESSES

An impressive body of cross-sectional survey data shows that happy people: tend to function better in life than less happy people; are typically more productive and more socially engaged; and tend to have higher incomes (Diener, 2000; Judge, Thoresen, Bono, & Patton, 2001). Ryan and Deci (2001) pointed out that people high in happiness or subjective well-being tend to have attributional styles that are more self-enhancing and more enabling than those low in subjective well-being, suggesting that positive emotions can lead to positive cognitions which, in turn, contribute to further positive emotions.

Observational studies, particularly cross-sectional research, cannot of course establish the causal direction of the relationship between positive emotions and cognition. The most persuasive evidence comes from experimental studies. Research using mood induction techniques demonstrates unequivocally that positive mood states can enhance attention and other cognitive processes. Compared with individuals in negative or neutral mood states, subjects in a positive mood state have a broader focus of attention (“see the bigger picture”) (Fredrickson & Branigan, 2005; Gasper & Clore, 2000), generate more ideas (Fredrickson & Branigan, 2005), and are more creative and flexible in their thinking (Ashby, Isen, & Turken, 1999; Bless, Mackie, & Schwarz, 1992; Murray, Sujan, Hirt, & Sujan, 1990).

Experimental social psychology is full of examples showing that positive emotional experiences have beneficial effects on the way people perceive and interpret social behaviours and how they initiate social interactions (e.g. Forgas, 2001; Isen, 1987). It has also been found that people experiencing positive emotions evaluate themselves and others more positively, make more lenient attributions, and behave in a more confident, optimistic, and generous way in interpersonal situations (Forgas, 2002, 2006; Sedikides, 1995).

Positive emotions can be the *consequence* of certain cognitive or behavioural processes as well as their cause. Extensive research, both experimental and observational, on goal pursuit showed that enhanced subjective well-being is associated with: goals being intrinsic, i.e. self-generated (e.g. Kasser & Ryan, 1996); progress towards a valued goal (Sheldon & Kasser, 1998); the pursuit of approach goals rather than avoidance goals (Elliot, Sheldon, & Church, 1997); and the pursuit of goals congruent with personal values (Brunstein, Schultheiss, & Grassman, 1998; Sheldon & Elliot, 1999). In addition, a large body of work showed that active participation in social activities and involvement in one’s community is associated with higher levels of happiness and life satisfaction (Argyle, 1987; Helliwell, 2003; Helliwell & Putnam, 2005; Putnam, 2000).

Taken together, the findings suggest that positive emotions lead to positive cognitions, positive behaviours, and increased cognitive capability, and that positive cognitions, behaviours, and capabilities in turn fuel positive emotions (Fredrickson & Joiner, 2002).

Positive emotions are not, however, beneficial for all cognitive processes. There is evidence that people in negative mood states are better at taking in the details of a situation, and that people who are sad, anxious, or fearful are more conforming and less likely to break rules (e.g. Forgas 1998, 1999; Huppert, 2006). Bless and Fiedler (2006) suggested that the different cognitive styles engendered by positive and negative emotions are adaptive. That is, externally driven behaviour or “accommodation” (e.g. checking, conforming) is an appropriate response to perceived threat, whereas internally driven behaviour or “assimilation” (e.g. flexible or strategic thinking) is an appropriate response to perceived opportunity.

## NEUROSCIENCE OF PSYCHOLOGICAL WELL-BEING

### Patterns of Brain Activation

The emotion circuitry of the brain is complex, involving primarily structures in the prefrontal cortex, amygdala, hippocampus, anterior cingulate cortex, and insular cortex. These structures normally work together to process and generate emotional information and emotional behaviour. Research has particularly focused on the prefrontal cortex which, unlike most other brain regions involved in emotion processing, shows asymmetric activation in relation to positive and negative emotions.

Davidson and his colleagues have reported large individual differences in baseline levels of asymmetric activation in prefrontal cortex, related to a person’s typical emotional style. Individuals with a positive emotional style show higher levels of left than right prefrontal activation at rest (using EEG or fMRI), while those with a negative emotional style tend to show higher levels of right than left prefrontal activation at rest (Davidson, 1992; Tomarken, Davidson, Wheeler, & Doss, 1992; Urry et al., 2004). Davidson and colleagues have also reported that, independent of emotional style, induced negative mood increases relative right-sided activation, whereas induced positive mood increases relative left-sided activation (Davidson, 2005; Davidson, Chapman, Chapman, & Henriques, 1990).

Important links between child development and the appearance of individual differences in patterns of brain activation have also been reported. Although measures of baseline prefrontal asymmetry are stable in adults, they are not stable during early childhood (Davidson & Rickman, 1999). In a cohort of around 65 children, Davidson and Rickman examined prefrontal activation asymmetry over an 8-year period from 3 to 11 years of age, and

found little evidence of stability. This is a period during which high levels of plasticity are likely to occur in the brain's emotional and cognitive circuitry, particularly in the prefrontal cortex which continues to undergo important developmental changes until puberty (Huttenlocher, 1990). Life events, parental influences, and other environmental factors are likely to play a crucial role during this formative period in establishing or shifting patterns of prefrontal activation.

Of particular interest in the context of positive emotions and cognition is the neurobiological evidence that left and right frontal lobes play different roles in the processing of information. Spontaneous strategy production appears to depend critically on left prefrontal cortex, while error detection and checking processes appear to depend on right prefrontal cortex (Shallice, 2004, 2006). Evidence supporting this differentiation, which is strikingly parallel to the processes of assimilation and accommodation referred to earlier, also comes from lesion studies and brain activation studies in normal adults (Reverberi, Lavaroni, Gigli, Skrap, & Shallice, 2005; Rossi et al., 2001).

Brain activation studies have tended to focus either on emotion or on cognition. Where research is integrated, it is usually concerned with emotional disorders such as depression and anxiety. Future research will need to integrate more fully the neuroscience of cognition and emotion, and develop a more detailed understanding of the relationship between emotional and cognitive processes in distinct regions of the prefrontal cortex (dorsolateral, ventromedial, orbitofrontal), as well as other brain areas.

## Neurochemical Effects

Exposure to stressors activates the hypothalamic-pituitary-adrenal (HPA) axis, as evidenced by increased secretion of the stress hormone cortisol. However, individual differences in psychological well-being (including self-esteem and emotional style) can modulate stress-induced elevations in cortisol (Jacobs et al., 2007; Polk, Skoner, Kirschbaum, Cohen, & Doyle, 2005; Pruessner, Hellhammer, & Kirschbaum, 1999; Smyth et al., 1998).

Levels of cortisol secretion vary markedly throughout the day. A healthy pattern involves a post-awakening peak and a 20-fold decrease later in the day (Clow, 2004). Several studies have found that this healthy pattern is associated with high scores on measures of well-being (positive affect, optimism, psychological well-being), but not with scores on measures of ill-being (negative affect, pessimism, anxiety, and fear) (Lai et al., 2005; Ryff et al., 2006; Steptoe, Gibson, Hamer, & Wardle, 2007; Steptoe & Wardle, 2005). Thus, the association between well-being and the cortisol cycle has been demonstrated not to be the inverse of the known association with stress or

distress. Both positive and negative states are associated with the cortisol response, but independently of each other.

Another neurochemical associated with mental states is serotonin (5HT). Serotonin levels are reduced in depression, and most modern anti-depressant drugs, known as serotonin reuptake inhibitors (SSRIs), act by increasing the amount of serotonin available to brain cells. But what is the relationship between serotonin and positive mental states? In a study of 254 healthy adults who made daily ratings of their mood, Flory, Manuck, Matthews, and Muldoon (2004) found that serotonin level was related to positive mood averaged across seven days, but not to negative mood, although it *was* related to a measure of neuroticism. The authors conclude that deficiencies in serotonergic function may reflect the relative absence of positive mood—a suggestion which warrants further investigation. Together, these findings support the idea that mental well-being and ill-being have different neurobiological as well as behavioural effects.

Attempts to establish whether there is a specific hormone which increases in states of positive well-being have mainly focused on the mammalian hormone oxytocin. Oxytocin has long been known for its important role in childbirth and lactation, but experimental studies have also shown an independent effect on mother–infant bonding. After giving birth, animals to whom oxytocin antagonists have been administered do not exhibit typical maternal behaviour. By contrast, virgin females show maternal behaviour following administration of oxytocin (Kendrick, 2004).

Oxytocin is secreted by both males and females, and has been associated with the formation of monogamous pair bonds in prairie voles (Insel, Winslow, Wang, Young, & Hulihan, 1995; Wang & Aragona, 2004). In humans, oxytocin is released during orgasm. One recent study shows that nasally administered oxytocin leads to a high degree of trust in a risky investment game (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). Thus, there is some limited evidence that oxytocin may play a role in social bonding—an important component of overall well-being.

## THE DEVELOPMENT OF PSYCHOLOGICAL WELL-BEING

### Social Factors and Brain Development

People vary widely in their typical emotional style, that is whether they tend to feel generally positive or generally negative. The key to understanding individual differences in emotional style is the extraordinarily protracted period of human brain development. Unlike the other major organs of the body, our brain undergoes most of its development postnatally, and is exquisitely designed to respond to the environmental conditions in which a child happens to grow up. There appears to be a sensitive period in brain devel-

opment up to around age 2 (e.g. Dawson, Ashman, & Carver, 2000), but major changes and reorganisation continue until puberty (Huttenlocher, 1990). Moreover, the development of our frontal lobes, which are responsible for such high-level processes as planning and emotional control, continues until early adulthood (Keverne, 2005, 2008).

In all mammalian species, later emotional well-being and cognitive capability are profoundly influenced by the early social environment. Of particular importance is the closeness of the bond between mother and infant. The body of research on human infants undertaken by Ainsworth and later investigators (e.g. Ainsworth & Bell, 1970; Maccoby & Martin, 1983) provides evidence that, even in infancy, positive emotions are associated with positive cognitive and social behaviour that may provide a basis for resilience throughout life. This has been amply confirmed in an elegant series of experimental studies of rodents by Meaney and colleagues (Meaney, 2001), in which the underlying neurobiological mechanisms have been identified. High levels of maternal care (from either a biological or adoptive mother) produce a permanent increase in the concentration of glucocorticoid receptors in the hippocampus and prefrontal cortex of the brain (Liu et al., 1997; Liu, Diorio, Day, Francis, & Meaney, 2000), and are associated with resilience in stressful situations and high levels of learning and memory throughout life. In addition, good maternal care leads to the increased survival of hippocampal neurones (Bredy, Grant, Champagne, & Meaney, 2003), which is associated with the maintenance of cognitive function into old age.

These studies have also shown that prolonged maternal separation leads to a lower density of sites for the neurotransmitter dopamine, and lasting changes in the responsiveness of dopamine neurones to stress and psycho-stimulus (Brake, Zhang, Diorio, Meaney, & Gratton, 2004). Animals experiencing early maternal separation become readily addicted to psycho-stimulants which do not produce addiction in a normally reared comparison group. This suggests a possible neurobiological basis for human individual differences in vulnerability to compulsive drug taking.

Is recovery from an adverse early environment possible? Francis, Diorio, Plotsky, and Meaney (2002) showed that providing a socially stimulating environment during the peri-pubertal period in rodents completely reverses the effects of maternal separation on both endocrine and behavioural responses to stress, and eliminates the differences in hippocampal function and cognitive performance (Bredy et al., 2003; Bredy, Zhang, Grant, Diorio, & Meaney, 2004). These findings provide support for the powerful effect of environmental factors both in setting enduring levels of emotional responsiveness and cognitive ability during the critical post-natal period, and in providing opportunities for remediation at a later stage in the life course.

Studies of both humans and primates have shown that the role of the father as well as the mother is important in the development of well-being. Having

an absent, abusive, or authoritarian father is associated with an increased risk of mental health problems in adolescence and early adulthood (e.g. Amato & Sobolewski, 2001), while a few studies have also shown the benefits of a positive fathering style (e.g. paternal warmth) on a child's well-being (e.g. Furnham & Cheng, 2000; Flouri & Buchanan, 2003).

On the other hand, Jorm, Dear, Rodgers, and Christensen (2003) found that mental health outcomes were poor when the father showed a high level of affection but the mother showed a low level. A recent population-based study of women in mid-adult life (Huppert et al., submitted) found that the experience of paternal warmth and respect at an early age is associated with high levels of psychological well-being on most dimensions of the Ryff scale (Ryff, 1989) and that the influence of the father's parenting style was greater than the mother's.

## Genetic Factors

There can be no doubt that an individual's genotype also has an influence on the development of psychological well-being and resilience to stress. Recent research has shown that the short allele variant of the serotonin transporter (5-HTT) gene confers vulnerability to depression, but only when there are appropriate environmental triggers, while the long allele variant acts as a resilience or protective factor (Caspi et al., 2003; Kendler, Kuhn, Vittum, Prescott, & Riley, 2005). More recently this gene has been found to affect brain activation in those regions involved in processing emotion. In a study of healthy volunteers, half homozygous for the short allele and half homozygous for the long allele, the former group showed significantly increased resting cerebral blood flow in the amygdala and decreased blood flow in the ventromedial prefrontal cortex (Rao et al., 2007). The two groups had no psychiatric disorder and were similar in age, gender, and personality. The observed effect on brain function may mediate a genetic susceptibility for mood disorders.

While research is advancing rapidly on genes which confer increased risk of psychological disorders, research is also needed to identify whether there are genes which increase the probability of psychological flourishing.

## ARE DRIVERS OF WELL-BEING THE SAME AS DRIVERS OF ILL-BEING?

Many risk factors and vulnerability factors for mental ill-being have been identified, some operating at the individual level (e.g. genotype, mother-infant attachment, parenting style, adverse life events), others at the social level (e.g. poverty, unemployment, discrimination) (Jenkins et al., 2008). An important question is whether the principal drivers of psychological well-

being are the opposite of these risk and vulnerability factors, or whether well-being has different drivers. Several sources of evidence suggest that while some drivers are the same, others are not.

## Personality

One of the strongest predictors (drivers) of our usual emotional style is personality, particularly the dimensions of extraversion and neuroticism. Extraversion (sociability) is strongly associated with a positive emotional style, while neuroticism is associated with a negative emotional style (e.g. Argyle & Lu, 1990; Diener, Suh, Lucas, & Smith, 1999). These mainly cross-sectional findings were confirmed in a 10-year longitudinal study by Costa and McCrae (1980). A number of longitudinal studies of mental ill-being have established the link between childhood or adolescent neuroticism and psychological distress later in life (Caspi, Moffitt, Newman, & Silva, 1996; Kendler, Gatz, Gardner, & Pedersen, 2006; Rodgers, 1990; van Os, Park, & Jones, 2001). On the other hand, the dimension of extraversion is not causally linked to psychological ill-being (e.g. Clarke, Watson, & Mineka, 1994; Neeleman, Ormel, & Bijl, 2001; van Os et al., 2001). Thus, neuroticism appears to drive negative mood and common mental disorders, whereas extraversion drives positive emotional characteristics. Personality is related not only to how we feel but also to how well we function psychologically. The most widely used measure of positive psychological functioning is Ryff's scales of Psychological Well-Being (Ryff, 1989) which cover the dimensions of autonomy, environmental mastery, personal growth, personal relations with others, purpose in life, and self-acceptance. Cross-sectional studies have shown strong associations between psychological well-being and both extraversion and neuroticism (DeNeve & Cooper, 1998; Ruini et al, 2003; Vitterso & Nilsen, 2002). However, a recent longitudinal study using the Ryff scale, in which personality was measured three decades before the assessment of psychological well-being, shows a much larger effect of extraversion than of neuroticism (Abbott et al., 2008). Indeed, the effect of neuroticism on well-being was mediated entirely through psychological distress; its effect on well-being entirely disappeared once psychological distress was controlled for.

## Demographic Factors

Demographic characteristics also show some differential effects for well-being and ill-being. Women have substantially higher rates of symptoms (or diagnosis) of common mental disorders such as anxiety and depression than men, but the effect of gender is much less clear when it comes to mental well-being. Most large surveys showed little evidence of gender differences

(e.g. Donovan & Halpern, 2002; Helliwell, 2003). Some showed higher scores for men (e.g. Stephens, Dulberg, & Joubert, 1999), while others showed higher scores for women on some sub-scales such as those assessing social functioning (e.g. Huppert, Walters, Day, & Elliott, 1989; Ryff & Singer, 1998b).

The association between age and mental well-being is also complex. Large surveys using single-item measures of well-being (e.g. overall rating of life satisfaction) usually find a U-shaped relationship with age: younger and older people tend to have higher well-being scores than the middle aged, although there may be a decline in well-being among the very old (e.g. Blanchflower & Oswald, 2008; Clark & Oswald, 1994). Middle-aged adults also have the highest prevalence of common mental disorders (Singleton, Bumpstead, O'Brien, Lee, & Meltzer, 2001). Blanchflower and Oswald (2008) have shown that the U-shaped relationship holds across different cohorts and in many nations.

But a more complex picture emerges when well-being is assessed using more refined measures rather than a global single-item measure. For example, well-being improves with advancing age on measures such as sense of coherence (Stephens et al., 1999) and two of the Ryff scales (autonomy, environmental mastery) (Ryff & Singer, 1998b), although in the latter study individuals over 75 years were not included.

Interactions between age and gender have also been reported. Data from the British Health and Lifestyle Survey show that, compared to middle-aged and younger men, older men have the lowest number of symptoms of psychological distress, but also the lowest scores on a measure of positive psychological well-being. On the other hand, compared to other age groups, older women have the highest score on symptoms of psychological distress and also the lowest scores on positive well-being (Huppert & Whittington, 2003).

Being married is usually associated with higher life satisfaction and lower rates of psychological ill health (see review by Dolan, Peasgood, & White, 2008). But the direction of causation is not clear, since individuals with high levels of psychological well-being are more likely to get married (Diener, 2000). Some longitudinal studies have found that, while getting married is good for one's psychological well-being, *being* married may not be (e.g. Zimmermann & Easterlin, 2006). Two recent studies have shown that one dimension of well-being, autonomy, is higher among women who have been divorced or separated, compared with married or never-married women (Lindfors, Berntsson, & Lundberg, 2006). There is also evidence, from both the US and the UK, that having children living in the household is not good for women's happiness (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004), and that women have higher psychological well-being if children over the age of 16 have left home (Abbott et al., under review).

## Socioeconomic Factors

Major socioeconomic factors tend to have comparable effects on mental well-being and mental ill-being. In general, there is a social gradient whereby higher levels of income and socioeconomic status are associated with higher levels of well-being and lower rates of disorder (e.g. Dolan et al., 2008; Ryff & Singer, 1998b), although this effect diminishes at progressively higher levels of income.

While most studies find higher educational qualifications protective against poor mental health, a few have found a reverse gradient for education (see Dolan et al., 2008; Fagg et al., 2008). For example, Chevalier and Feinstein (2006) found that men with a high level of education were more likely to be depressed than those with less education. They suggest that the increase in depression associated with the highest level of education may be an indication of the job-related stress of occupations requiring a degree. The reverse gradient for education could also reflect the role of education in raising expectations which may not have been fulfilled. Thus, raising educational attainment does not of itself guarantee that well-being will be improved.

Income inequality is associated with both well-being and psychological disorder. Higher national income inequality is linked to a higher prevalence of mental illness (e.g. Pickett, James, & Wilkinson, 2006) and lower scores on well-being measures (e.g. Alesina, Di Tella, & MacCulloch, 2004). The recent UNICEF report (2007) found that children's well-being across a range of measures was worst in the most unequal countries (UK and US). It should be noted that income inequality is at a historically high level in the UK (Orton & Rowlingson, 2007), with no evidence that this situation is changing. On the other hand, the causal mechanisms are not well understood; the most unequal countries also appear to be the most materialistic and to have the most individualistic (rather than communitarian) values, and these characteristics are known to be associated with lower psychological well-being (Kasser, 2002).

Unemployment has long been associated with the presence of mental health problems (e.g. Evans & Repper, 2000) and lower levels of life satisfaction (e.g. Winkelmann & Winkelmann, 1998). In many studies, the direction of causality cannot be ascertained, but data from some longitudinal studies demonstrate that people who started out relatively happy became unhappy after they were unemployed (e.g. Lucas, Clark, Georgellis, & Diener, 2004). Contextual factors also influence the relationship between unemployment and well-being; where unemployment is normative (that is, in areas of high unemployment) the impact on individuals appears to be less (e.g. Clark, 2003; Shields & Wheatley Price, 2005), although the social impact may be very serious.

However, data from the British Health and Lifestyle Survey suggest that we may need a more nuanced approach to measuring the impact of unemployment. Survey measures of psychological distress usually combine responses to items about symptoms and about positive mood or functioning, the latter being reverse scored. In a study which looked separately at responses to these two types of items, it was found that unemployment was more strongly associated with the absence of positive well-being than with the presence of symptoms of psychological distress (Huppert & Whittington, 2003). In other words, unemployed people do not on average show evidence of mental health problems such as depression or anxiety; rather, they fail to flourish.

## Other Drivers

While demographic and socioeconomic factors are significant drivers of psychological well-being, they appear to account for only around 10 per cent of the variation in psychological well-being between individuals (Andrew & Withey, 1976; Argyle, 1999), at least in economically developed countries such as the UK and the US. Personality factors (extraversion and neuroticism) account for around twice as much of the variation between individuals (Abbott et al., 2008; Gutierrez, Jimenez, Hernandez, & Puente, 2005).

Lyubomirsky and her colleagues suggested that intentional activities, that is activities over which we have control, are also very important drivers of psychological well-being (Lyubomirsky, King, & Diener, 2005; Sheldon & Lyubomirsky, 2006). These researchers divide intentional activities into three broad groups: (a) behaviours—such as taking regular exercise or being kind to others; (b) cognitions—such as interpreting events in a positive light or feeling gratitude; and (c) motivations—such as striving towards goals which reflect deeply held values rather than being driven by external rewards. Lyubomirsky and her colleagues provided evidence of how such activities increase levels of happiness, although the amount of variation in psychological well-being explained by intentional activities has not thus far been quantified.

There may well be substantial leverage in developing interventions which change our behaviours, cognitions, and motivations, as a method of improving psychological well-being. This is, after all, the basis for cognitive behaviour therapy (CBT) which has hitherto been used very successfully to reduce symptoms in individuals with mental health problems. Adapting such remediation techniques in the service of enhancing well-being for the majority of the population might also prove successful.

An illustration of this broader approach is the Pennsylvania Resiliency Program, based in large part on CBT techniques, which was developed for primary school children (Gillham & Reivich, 1999; Gillham et al., 2007).

Starting in September 2007, this programme was applied to school children in three counties of the UK as part of the Young Foundation's Local Well-Being Project. Training in the mindful awareness of sensations, thoughts, and feelings ("mindfulness meditation") is another technique shown to have substantial benefits for both reducing distress and enhancing well-being in a range of groups, including people with a range of physical health disorders, and in medical students and prison populations (see Grossman, Niemann, Schmidt, & Walach, 2004, for a review and meta-analysis). The benefits of relatively short, CBT-based or mindfulness interventions (8 to 12 weeks) have been shown to persist for several years (Freres, Gilham, Reivich, & Shatté, 2001; Gillham et al., 2007; Miller, Fletcher, & Kabat-Zinn, 1995), so these may prove to be cost-effective interventions.

### PSYCHOLOGICAL WELL-BEING LEADS TO BETTER PHYSICAL HEALTH

It has long been known that negative emotions are related to a higher prevalence of disease, but how strong is the evidence for a link between positive mental states and health? Evidence from both longitudinal and experimental studies shows that a positive emotional style has a beneficial effect on physical health and survival. In a famous longitudinal study, the Nun Study, it was discovered that the ageing nuns had all written brief autobiographies when they had entered the convent (generally around age 20), and these autobiographies were categorised according to the number of positive statements they contained. Danner, Snowdon, and Friesen (2001) reported that nuns in the lower half of the distribution of positive statements died on average 9 years sooner than those in the top category of positive statements. This finding is particularly remarkable because, from their early twenties, the lives of the nuns were as similar as human lives can be, so the difference in survival was not related to their lifestyle or circumstances in the intervening period, but to their positive emotions six decades earlier. Other longitudinal studies have confirmed the benefit of positive emotions for health and survival (Huppert & Whittington, 2003; Ostir, Markides, Peek, & Goodwin, 2001).

An important physiological mediator underlying the relationship between positive emotions, health, and survival is likely to be the functioning of the immune system. This has been confirmed in experimental studies, such as those by Cohen and his colleagues. In one study, several hundred healthy volunteers were administered nasal drops containing a common cold virus, and monitored in quarantine. The investigators found that the more positive the participant's emotional style, the lower their risk of developing a cold. Negative emotional style, though, was not associated with developing a cold (e.g. Cohen, Doyle, Turner, Alper, & Skoner, 2003a). Another study found that sociability was linearly related to decreased probability of developing a

cold—an effect not accounted for by sociability related differences in immunity (Cohen, Doyle, Turner, Alper, & Skoner, 2003b). A study by Marsland, Cohen, Rabin, and Manuck (2006) examined the relationship between emotional style and antibody response to the Hepatitis B vaccine. Participants with high scores on trait positive affect produced significantly more antibodies to the vaccine. There was no relationship between antibody response and either trait negative affect or depression.

The above studies assessed the emotional style of the participants but did not try to alter it. It is therefore difficult to be sure whether the individuals' positive characteristics were causally related to the outcome or whether there might be a common cause of both the characteristics and the outcome.

The direction of causality is much clearer in the classic study by Davidson et al. (2003). Using an intervention which increases positive mental states (mindfulness meditation), they reported that the meditation group produced a significantly greater antibody response than the control group to a subsequent influenza vaccine, measured some months later. Positive mood has also been shown to influence the cardiovascular response to stress. Fredrickson, Mancuso, Branigan, and Tugade (2000) exposed volunteers to a stressful task followed by a mood induction procedure. Subjects in a positive mood state showed much more rapid cardiovascular recovery from stress than those in a negative or neutral mood state. Prolonged reactivity to stress is harmful to immune function and to other physiological processes, while a rapid recovery from stress is beneficial for health. A study by Lai et al. (2005) directly investigated the effect of affect and optimism on the secretion of the stress hormone cortisol. Positive affect and optimism had somewhat different effects on the diurnal pattern of salivary cortisol secretion, but both were associated with a healthy pattern, compared to negative affect and pessimism.

In a recent review of well-designed prospective and experimental studies, Pressman and Cohen (2006) conclude that there is firm evidence for a beneficial effect of positive emotions on physical health and survival, and that this effect may be independent of the level of negative emotion. Indeed, some of the studies cited above suggest that, in the general population, positive affect (or the lack of it) may exert a more powerful effect on health and physiology than the presence of negative affect. This startling conclusion may have hitherto been obscured by the focus on pathology which has dominated biomedical science. Pathology-oriented research used measures which fail to differentiate between the presence of negative experiences and the absence of positive experiences.

There are a number of pathways through which positive emotions can exert their beneficial effects on health. Evidence cited above supports the view that positive mental states can have direct effects on physiological, hormonal, and immune function which, in turn, influences health outcomes. Behavioural and social factors may also mediate the link between positive emotions

and health. Happier people tend to have healthier lifestyles (Watson, 1988), more friends, and also more positive interpersonal experiences (Diener et al., 1999). Thus, the health benefits of positive emotional states may not be directly attributable to positive feelings, but to health practices or social factors that are known to have beneficial effects on health and life expectancy.

The social factor which has been most studied in relation to health is that of receiving social support—well known to moderate or protect against physical and mental health problems (e.g. Brugha et al., 2005; House, Landis, & Umberson, 1988). More recent evidence has identified the powerful role of providing support to others. In a prospective study of hundreds of elderly couples, Brown and her colleagues (Brown, Nesse, Vinokur, & Smith, 2003) found that mortality was greatly reduced in individuals who reported providing instrumental or emotional support, compared to those who did not, and this effect remained after adjustment for a host of potential health, behavioural, and socio-demographic confounders. The investigators also found that receiving support had no significant effect on mortality once giving support was taken into account.

There is evidence from surveys that giving support in the form of volunteering may be associated with higher levels of psychological well-being. For instance, a study by Greenfield and Marks (2004) found that in older people, volunteering was associated with more positive affect and more meaning in life, but not with less negative affect. Policies which encourage people to give support to others (for example, in the form of volunteering or mentoring) are likely to have health benefits as well as personal and societal benefits.

## THE POPULATION PERSPECTIVE ON MENTAL WELL-BEING

According to the most recent available national survey, 16.4 per cent of the UK population has some form of mental health problem (Singleton et al., 2001). But what percentage are mentally flourishing, that is enjoying a high level of psychological well-being? According to Keyes (2002a), “flourishing individuals have enthusiasm for life and are actively and productively engaged with others and in social institutions” (p. 262). Data from the US suggest that only around 17 per cent of adults are flourishing, while 11 per cent are “languishing” (Keyes, 2002b). The term languishing refers to a condition in which a person’s life seems empty or stagnant, “a life of quiet despair”, although they do not have mental illness (Keyes, 2002a, p. 210). Keyes (2004) has shown that “languishers” are at greatly increased risk of depression and physical disorders including cardiovascular disease. He has suggested that languishing may be highly prevalent among young people, many of whom are seeking ways to fill the void of their lives. Sex, drugs, and alcohol are often used in this way, but these only deepen the void and make

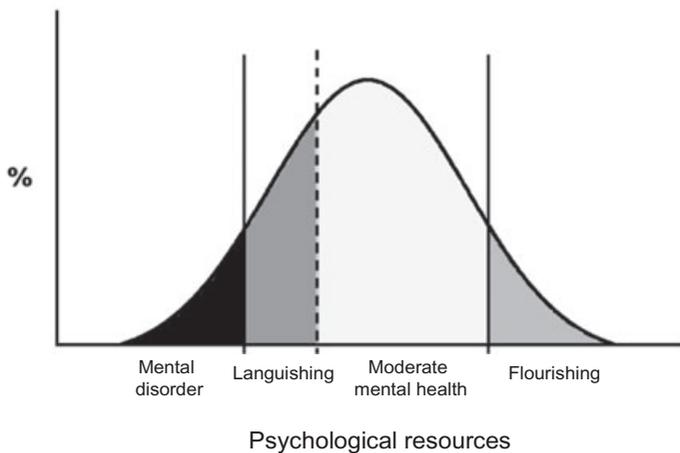


FIGURE 1. The mental health spectrum.

Based on: Huppert et al., 2005.

the person more dysfunctional. There are no UK data at present on the prevalence of flourishing or languishing. A schematic version of the mental health spectrum, from mental disorder to flourishing, is depicted in Figure 1.

Current mental health practice focuses on intervening only in the group with mental disorder. Some efforts may also go into trying to prevent disorder in those who are at high risk (the “languishing” group). However, evidence from epidemiology suggests that, if we use only this targeted approach, there will always be plenty of new cases of disorder, since the majority who develop disorder come from the general population; only a small percentage of the total who develop disorder are from the high risk group (Rose, 1992, 2008). While treatment and prevention have a crucial role to play in the short term, the Rose model suggests that the way to reduce the prevalence of common mental disorder in the long term is to intervene at the general population level (Huppert, 2005).

In support of this approach, there is evidence that the prevalence of any common disorder (hypertension, heart disease, depression, alcohol abuse and so on) is related to the average level of the risk factors or symptoms in the population. The higher the average, the greater the number of people with a disorder, i.e. who meet the criteria for diagnosis (Academy of Medical Sciences, 2004; Anderson, Huppert, & Rose, 1993; Puska, Vartiainen, Tuomilehto, Salomaa, & Nissinen, 1998). As stated by Anderson et al. (1993), “Populations thus carry a collective responsibility for their own mental health and well-being. This implies that explanations for the differing

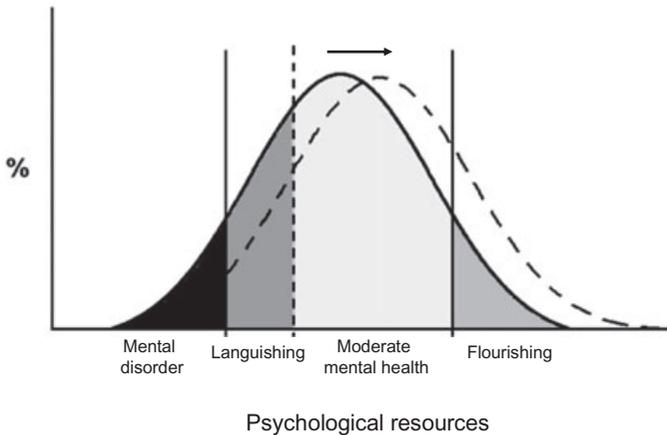


FIGURE 2. The effect of shifting the mean of the mental health spectrum.

Based on: Huppert et al., 2005.

prevalence rates of psychiatric morbidity must be sought in the characteristics of their parent populations; and control measures are unlikely to succeed if they do not involve population-wide changes” (p. 475).

Some of the strongest evidence for a relationship between the population mean and the prevalence of disorder comes from research on alcohol abuse. Using data from over 32,000 adults who participated in the Health Survey for England, Colhoun, Ben-Shlomo, Dong, Bost, and Marmot (1997) showed that, across all the regions in England, mean alcohol consumption (excluding heavy or problem drinkers) was strongly correlated with the prevalence of problem drinking. Similar data have been reported across 52 population samples from 32 countries (Rose, 1992). We can conclude, therefore, that a small reduction in the mean consumption of alcohol among light or moderate drinkers will result in a substantial decrease in the prevalence of problem drinking. Moreover, this appears to be a more effective strategy than the commonly used approach of targeting binge and problem drinkers (see Academy of Medical Sciences, 2004). Put simply, a small change in drinking culture such that most people have one or two drinks fewer each week will do more to reduce problem drinking than targeting the problem drinkers and trying to persuade them to change their habits.

Figure 2 shows how a small change in the average level of symptoms or psychological resources in the population can produce a large decrease in the percentage with disorder and in the percentage who are languishing. At the same time, a small shift could produce a large increase in the percentage who are flourishing. There is some evidence for a reduction in the prevalence of

psychiatric morbidity being associated with a small decrease in population mean scores on a psychological symptom measure. This comes from a large observational study, the seven-year follow-up of the UK Health and Lifestyle Survey, in which a one point decrease on the symptom scale was associated with a 6 per cent reduction in clinically significant disorder (Whittington & Huppert, 1996). What is needed now is to move from observational to intervention studies, to test whether interventions which produce small improvements in the population mean on measures of well-being will lead to substantial reductions in the number of people with mental health problems, as well as large increases in the number who are flourishing.

This model and its predictions apply where well-being and ill-being share the same drivers, and this review has shown that there are indeed many common drivers, ranging from parental warmth to societal levels of income inequality. On the other hand, well-being has some distinct drivers not shared with ill-being. These include personality traits such as extraversion, positive styles of thinking, and intrinsic motivation. To the extent that these beneficial characteristics can be learned or taught at the population level (e.g. through school-based programmes or workplace initiatives) they represent additional ways to increase flourishing across the population, with resulting benefits for capability, productivity, relationships, and health.

## CONCLUSIONS

On the basis of the evidence reviewed here, including experimental research, survey data, and longitudinal studies of representative population samples, the following conclusions may be drawn.

1. Psychological well-being is associated with flexible and creative thinking, pro-social behaviour, and good physical health.
2. An individual's level of mental capital and psychological well-being is powerfully influenced by her/his early environment, particularly maternal care.
3. While an adverse early environment can produce lifelong impairments in behaviour and neurobiology, compensation is possible at later stages in the life course.
4. External circumstances affect our well-being, but our actions and attitudes may have a greater influence. Interventions which encourage positive actions and attitudes have an important role to play in enhancing well-being.
5. Targeting interventions to those with a disorder or at high risk may alleviate misery in the short term, but a universal approach could enhance the lives of ordinary people, not just those with pathology. A

universal approach may also reduce the total number of people in the long term with common mental disorders.

6. The science of well-being which focuses on what makes people flourish, on human assets rather than deficits, is a promising new area of research. Advances in understanding the behavioural, biological, and social pathways to well-being will benefit individuals, organisations, and society.

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