

Correlations, causality, and mechanisms between happiness and health

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12. Correlations, causality, and mechanisms between happiness and health

Past research

The earliest studies examining the relationship between happiness and health were conducted during the mid-twentieth century, with a primary focus on understanding how positive emotions may be linked to physical health outcomes. Throughout these studies, researchers have explored a variety of indicators of physical health, including mortality rates, cardiovascular disease, and immune function, and have discovered evidence suggesting that positive emotions are linked to better health outcomes across these domains (Amonoo et al., 2021; Howell et al., 2007; Kim, Hagan, et al., 2017; Krittanawong et al., 2022; Rozanski et al., 2019; Steptoe, 2019). However, early research in this area frequently analyzed the relationship between health and supposed opposites of happiness such as stress (Esch, Benson, et al., 2002; Esch, Stefano, et al., 2002a, 2002b; Segerstrom & Miller, 2004), negative affect (Watson, 1988), and ‘difficult’ personality types (Blumenthal et al., 1978; M. Friedman & Rosenman, 1959; Williams et al., 1980), and did so without uniform definitions of the relevant phenomena.

An early account on the relationship between concepts related to happiness and health was presented in the 1950s by M. Friedman and Rosenman. In their series of studies on ‘Type A’ behavior, which they defined as a pattern of competitive, driven, and impatient behaviors, they found that individuals with Type A personalities were more likely to develop coronary heart disease than those with more relaxed, easygoing personalities (M. Friedman & Rosenman, 1959). This finding has been replicated in many subsequent studies (Blumenthal et al., 1978; Williams et al., 1980), yet researchers have identified hostility to be the main risk factor (Carmelli & Swan, 1996; Carmody et al., 1989). Conversely, positive personality traits such as conscientiousness (in childhood), optimism, extraversion, and agreeableness have been clearly linked to decreased mortality risk (H. S. Friedman et al., 1993; Hampson

et al., 2006) and quicker physical recovery from coronary bypass surgery (Scheier et al., 1989). However, it should be noted that cheerfulness has been found to increase mortality risk (H. S. Friedman et al., 1993), which may be due to a stronger tendency towards risky behavior (Martin et al., 2002).

Another phenomenon that is more closely related to happiness than personality types and has received attention since the 1970s and 1980s is laughter. In his 1978 book *Anatomy of an Illness (as Perceived by the Patient)*, Norman Cousins describes how he was diagnosed with a painful and potentially fatal connective tissue disease and how he used laughter to help alleviate his symptoms. By engaging in activities that made him laugh, Cousins found that he was able to reduce his pain and discomfort. Although Cousins’ experience was anecdotal, it generated a significant amount of interest among researchers and the general public. Based on these early accounts, laughter has also been found to be positively associated with coronary or cardiovascular disease (Clark et al., 2001; Hayashi et al., 2016) and neuroimmune parameters (Bennett et al., 2003; Berk et al., 2001).

Prior to the 1990s, the majority of research focused on correlations between affect and ambiguously defined subjective wellbeing (SWB) rather than on happiness directly. For example, Lubin et al. (1988) found a correlation between positive affect (PA) and self-rated health in a national probability sample that consisted of 1,543 adults, while Watson (1988) found a correlation between negative affect (NA) and level of physical complaints and perceived stress, but not between PA and these health-related outcomes, in 80 psychology students. Subsequent research has repeatedly demonstrated that PA and NA are independent parameters that correlate independently with health outcomes (Steptoe & Wardle, 2011).

With respect to SWB, Okun et al. (1984) and George and Landerman (1984) conducted research syntheses that found positive and significant correlations between self-rated health and SWB indicators. Interestingly, physician-assessed health exhibited weaker and less robust associations with SWB (George & Landerman, 1984). Furthermore, based on an analysis of data included in the World Database of Happiness, it was found that the correlations of happiness with self-rated health are somewhat stronger than the correlations

between happiness and health ratings based on medical examinations (Veenhoven, 2008). These correlations vary between +.10 and +.40 and appear to be largely independent of age, gender, socio-economic status, and personality (Helliwell, 2003; Veenhoven, 2008). Additionally, the correlations tend to be higher in patient populations than among the general public (Veenhoven, 2008).

Despite the methodological and conceptual limitations of early research on happiness and health, these studies provided the basis for later research on this topic. Around the turn of the century, research on happiness and health continued to investigate the link between SWB indicators and physical health outcomes, including causality, as well as potential mechanisms underlying this relationship. In most of these studies, wellbeing, or more frequently, subjective wellbeing, was used as an overarching term that encompassed several phenomena related to happiness, positive affect, eudaimonia, and life satisfaction without further differentiation between these phenomena despite exhibiting different correlations with health outcomes, as described in later reviews (e.g., Howell et al., 2007; Steptoe, 2019).

During the period of consideration, a key hypothesis was that the relationship between SWB and physical health outcomes is bidirectional, such that better physical health can also predict greater SWB. However, despite the hypothesis, as of 2008, only a few studies had been conducted to investigate the effect of early physical health on later happiness (Veenhoven, 2008). Three studies collected data on different groups of adults' self-rated health and conducted a 12-year follow-up collection of their happiness. In all three studies, only small or no correlations were found (Chiriboga, 1982; Hawkins & Booth, 2005; Palmore, 1982). Based on these findings, Veenhoven (2008) suggested that the causal relationship is vice versa, meaning that happiness causally affects health. A number of reviews of the relationship provide a more differentiated picture.

For example, Veenhoven found in a review published in 2008 that happiness does not seem to increase longevity in sick populations, such as patients with spinal cord injuries, but seems to prolong life in healthy populations. According to Veenhoven (2008, p. 455), the estimated additional years are '[...] comparable to the effect of smoking or not', and

these effects manifested most strongly in the long-term. In a meta-analysis, Howell et al. (2007) found that SWB was associated with increased longevity ($r = 0.14$), and SWB was associated with longer survival from chronic illness ($r = 0.10$). Additionally, a meta-analysis of 62 general population studies involving more than 1,250,000 participants revealed a pooled hazard ratio of 0.920 for people with higher SWB at baseline, compared to those with lower wellbeing, indicating that SWB may be a protective force in relation to all-cause mortality (Martín-María et al., 2017). These results are supported by other studies conducted in several countries across the world with follow-up periods ranging from two years to more than 20 years (Steptoe, 2019). Most studies have assessed SWB on a single occasion, but it has also been found that those who report greater SWB on repeated measures over several years have lower mortality than those who report greater SWB on only one occasion (Zaninotto et al., 2016). In general, whether SWB is associated with longevity only in healthy populations or also in sick populations is inconclusive (Diener & Chan, 2011; Pressman & Cohen, 2005; Steptoe, 2019).

Numerous longitudinal studies have examined the association between SWB and the development of disease over time, with results consistently demonstrating that SWB predicts the onset of illness, although findings have been more conclusive in relation to cardiovascular disease than other illnesses (Diener & Chan, 2011). These findings suggest that maintaining a higher level of SWB when in good health may confer benefits, with a positive albeit weaker effect on individuals already experiencing disease (Diener & Chan, 2011). There exists an extensive body of research examining the longitudinal relationship between phenomena related to SWB and later health and longevity, which reveals that individuals who exhibit higher levels of SWB tend to enjoy better health and longer lifespans on average, with a correlation coefficient of 0.18, as reported in (Lyubomirsky et al., 2005). However, establishing causality is challenging, as unmeasured states of health and resources may be the underlying drivers of the relationship between SWB and health outcomes, including mortality, in later life. To understand this relationship, researchers have analyzed the mechanisms through which happiness could affect health outcomes. Recent

reviews have summarized the most prominent mechanisms, as discussed in the following subsection.

Present research

Since the review conducted by Lyubomirsky et al. (2005), a substantial amount of research has provided additional evidence of the positive association between happiness and survival. However, some large-scale studies have failed to confirm this relationship (Liu et al., 2016; Ortega et al., 2010). The reason for the inconsistent findings is not likely due to case selection since most studies have used medical registers to measure mortality outcomes. One other possible explanation is that there may be issues with the measurement of happiness. Hence, in a 2019 literature review on happiness and health, Steptoe (2019) distinguished between three types of SWB, namely affective wellbeing corresponding to, e.g., positive feelings, Type A happiness (Esch, 2022), eudaimonic wellbeing corresponding to, e.g., purpose, meaning, Type C happiness (Esch, 2022), and evaluative wellbeing, corresponding to, e.g., life satisfaction, but a systematic overview of the relationships between each type of SWB and health outcomes does not exist. Inconsistencies in SWB measurement as well as publication bias may explain differences in results, as analyses with null results are less likely to be published. Confounding and reverse causation are also significant threats to the validity of this research area (Steptoe, 2019).

In recent years, there has been a growing body of research that has focused on investigating confounding factors in people's environments, including the role of social relationships. The accumulation of evidence suggests that social connection serves as a potent protective factor against premature death (Holt-Lunstad et al., 2015; Holt-Lunstad et al., 2010), with the strongest evidence linking it to cardiovascular outcomes (Holt-Lunstad, 2021). Several plausible mechanisms have been identified to explain the impact of social connection on physical health outcomes, including psychological factors such as perceived stress and depression, behavioral factors such as sleep, physical activity, and smoking, and biological factors such as inflammation (Diener & Seligman, 2002; Diener et al., 2018; Kok et al., 2013). These pathways are interconnected and not entirely

independent, with several reviews outlining the plausible biological mechanisms that explain how social connection may influence long-term health outcomes (Holt-Lunstad, 2021).

Research in this field has also investigated the influence of socioeconomic status on the connection between SWB and health outcomes. Several studies indicate that a higher socioeconomic status is a predictor of increased longevity, improved health, and greater happiness. Moreover, subjective social status tends to explain the impact of socioeconomic status, while income inequality exacerbates the social disparities in terms of longevity, health, and happiness (Fournier, 2020).

Next to confounding factors, the mechanisms of the happiness-health relationship have been thoroughly investigated, and evidence suggests that there are numerous ways in which SWB can promote better health outcomes, including both behavioral and biological processes.

Empirical research on behavioral processes has shown that individuals with higher levels of SWB tend to engage in healthier behaviors, such as regular exercise (with correlation coefficients ranging from 0.12 to 0.33), not smoking (with a correlation coefficient of -0.24), and consuming less alcohol (with a correlation coefficient of -0.22). Furthermore, a person's wellbeing can affect the functioning of their cardiovascular, immune, and endocrine systems. Since individuals with higher levels of SWB are generally healthier overall, it is expected that they live longer on average (Diener et al., 2017). The relationship between physical activity and SWB has been widely explored, indicating positive associations between different indices of wellbeing and light and moderate/vigorous physical activity among older adults (S. V. Black et al., 2015; Buman et al., 2010). The context in which physical activity occurs is also important, with mental health being positively associated with leisure-time physical activity, but negatively related to occupational activity (Wang et al., 2012). Longitudinal studies have also shown that greater wellbeing predicts maintained or increased activity over time (Baruth et al., 2011; Kim, Kubzansky, et al., 2017) and that changes in physical activity during leisure time predict changes in happiness (White et al., 2017). Physical activity also partly mediates the association between

positive affect and survival (Hoen et al., 2013; Hoogwegt et al., 2013). In a systematic review, however, no firm conclusions regarding the causal relationship between physical activity and happiness could be drawn (Zhang & Chen, 2019). Although there is some evidence to suggest that diet, particularly the consumption of fruits and vegetables, may be linked to SWB (Blanchflower et al., 2013; Mujcic & Oswald, 2016), other health behaviors, such as excessive alcohol consumption, smoking, and failure to use sun protection, have uncertain associations with health outcomes (Grant et al., 2009; Steptoe, 2019).

Numerous studies have explored the relationship between affective wellbeing and biological processes, particularly cortisol output and inflammation. The evidence consistently indicates that individuals reporting greater wellbeing have lower cortisol levels and steeper salivary decline over the day (Adam et al., 2017). However, the evidence linking happiness with lower inflammation has been less consistent, with associations varying across studies and becoming non-significant after controlling for confounding factors such as health behaviors and distress (Steptoe, 2019). Although the evidence on the cardiovascular correlates of affective wellbeing is inconclusive, studies have found associations between different aspects of SWB and metabolic parameters such as plasma cholesterol and glycated hemoglobin, as well as better self-reported sleep (Steptoe, 2019). Several prospective studies have also found that emotional vitality, positive affect, and purpose in life are associated with a lower risk of stroke, diabetes, cardiometabolic illness, hypertension, and arthritis, although the effects are attenuated when health behaviors like smoking, physical activity, and alcohol consumption are taken into account (Steptoe, 2019). Positive affect predicts a reduced vulnerability to upper respiratory illness, even when controlling for relevant covariates in experiments involving the administration of viruses (Steptoe, 2019). Furthermore, it has been argued that the brain's reward system, which is responsible for pleasure and motivation, is closely linked to the immune system and plays a critical role in maintaining physical health (Esch & Stefano, 2004). The authors suggest that promoting healthy behaviors, such as exercise and healthy eating, can activate the reward system and lead to improved health outcomes.

As a consequence of the findings on positive relationships between SWB and health outcomes, in recent years, happiness-promoting interventions have been implemented and assessed. These have focused on promoting behavioral activities that aim at increasing happiness. Different types of interventions could potentially influence happiness and health: positive psychology interventions (including mindfulness interventions) that focus on happiness directly (Bolier et al., 2013), and interventions that foster health behaviors, such as physical activity, that may impact happiness as a primary or secondary outcome (van Zyl & Rothmann, 2014; Zhang & Chen, 2019). Positive psychology interventions have shown small but significant short-term effects on SWB, and some sustained effects up to 3.5 years for those who liked and continued to use them (Steptoe, 2019). Studies have also shown the potential benefits of interventions in reducing psychological distress, improving quality of life, and reducing depressive symptoms, though results have been variable (Steptoe, 2019; van Zyl & Rothmann, 2014). Several studies have shown that interventions such as positive psychology exercises, mindfulness training, and meditation can lead to improvements in physical health outcomes, such as reduced inflammation, improved immune function, and better cardiovascular health (D. S. Black & Slavich, 2016; Crosswell et al., 2017; Sin & Lyubomirsky, 2009). These findings suggest that promoting positive psychological states may be an important component of preventive health care (Fredrickson, 2000), particularly in light of the growing evidence linking SWB indicators to physical health outcomes.

Future

The relationship between SWB indicators and health outcomes has been a topic of intense research over the last few decades. The current state of research on this topic reflects a comprehensive and nuanced approach that includes a focus on contextual factors such as social connection and socioeconomic status. Researchers have also delved into the underlying mechanisms by which SWB and health are related and have identified specific components of happiness that may be particularly relevant to health outcomes.

Despite these advances, the heterogeneity of results across studies suggests that more

evidence is needed before drawing any definitive conclusions. Future research should focus on several specific aspects in order to deepen our understanding of the relationship between SWB and health outcomes.

Firstly, it is important to differentiate between different phenomena related to happiness, such as short- and long-term states, and to carefully consider the specific components of SWB that are most relevant to health outcomes. For example, some studies have found that life satisfaction may be a more reliable predictor of health outcomes than positive affect, especially in older adults (Karwetzky et al., 2022).

Secondly, there is a need to understand the mechanisms by which SWB indicators affect different health outcomes. This requires analyzing neurobiological processes, such as motivation and reward mechanisms (Esch, 2022; Michaelsen & Esch, 2022) as well as neuroendocrine and cardiovascular processes as first discussed by Steptoe et al. (2005).

Third, interventions that aim to promote health by increasing happiness should carefully consider which techniques are most effective in promoting happiness. A cut-off point could be established to delineate which interventions effectively enhance happiness, and only these could be deemed as happiness interventions (as suggested for mindfulness interventions to promote health, Michaelsen et al., 2023). A growing body of research on intervention theory can help to generate successful interventions (Michaelsen & Esch, 2021, 2022).

Finally, it is important to consider aspects of spirituality and culture, including social connection, as determinants of both happiness and health. This requires looking beyond the traditional bio-psycho-social factors related to health and disease (Listopad, Esch, & Michaelsen, 2021; Listopad, Michaelsen, et al., 2021) and taking a broader perspective on the factors that contribute to SWB indicators and health outcomes.

In conclusion, the relationship between SWB and health outcomes is a complex and multifaceted one, and further research is needed to deepen our understanding of this relationship. By focusing on the specific aspects outlined above, researchers can continue to advance our understanding of this important topic and develop interventions

that promote both SWB and better health outcomes.

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