



# **Happiness as a Determining Factor for Health and Illness A Literature Review**

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## Resumo

Os níveis de felicidade da população portuguesa estão abaixo dos níveis da maioria dos países europeus. Além disso, as doenças crónicas, incluindo doenças mentais e cardiometabólicas, são altamente prevalentes. Contudo, a evidência científica tem relacionado a presença de felicidade e bem-estar com: menor risco de mortalidade e um melhor estado de saúde física e mental. No entanto, os mecanismos envolvidos com esses efeitos ainda não são claros.

Assim, os objetivos desta dissertação são: rever a literatura quanto às principais vias que relacionam a felicidade e a saúde, compilar estratégias para aumentar a felicidade e o bem-estar, e discutir as implicações e abordagens para incorporar a promoção da felicidade como um objetivo nacional em Portugal.

Para tal, foi realizada uma pesquisa bibliográfica nas bases de dados *MEDLINE*, *EMBASE*, *ISI Web of Science* e *Cochrane Library*, utilizando palavras-chave como: “*happiness*”, “*health*”, “*disease*”, “*well-being*”, “*subjective well-being*”, “*measurements*”, “*interventions*” e “Portugal”.

Após uma breve introdução, os conceitos e definições associados a saúde, doença, felicidade e bem-estar foram discutidos, assim como as conceções relacionadas com bem-estar. Além disso, as metodologias disponíveis para avaliar a felicidade e o bem-estar e respetivas limitações foram analisadas. De seguida, os processos através dos quais o stress e as emoções negativas condicionam a doença foram sumariados e, depois, foram discutidas as vias que ligam o bem-estar mental ao bem-estar físico, incluindo: 1) processos neurobiológicos, 2) efeito indireto nos comportamentos, 3) promoção de recursos psicossociais protetores e 4) amortecimento dos efeitos relacionados com o stress. Finalmente, foram avaliadas as estratégias para aumentar a felicidade e o bem-estar a nível individual e populacional, que foram posteriormente adaptadas para o caso de Portugal.

Apesar de os mecanismos que ligam a felicidade à saúde ainda não estarem completamente revelados, a investigação preliminar é promissora e bem fundamentada. Assim, uma vez que a felicidade e a saúde da população portuguesa estão longe de atingir o seu verdadeiro potencial, é pertinente considerar o aumento da felicidade como uma ferramenta para a promoção da saúde em Portugal.

## **Palavras-chave**

Bem estar; Bem estar subjetivo; Saúde; Doença; Intervenções; Portugal

## Resumo Alargado

Os níveis de felicidade da população portuguesa estão abaixo dos níveis da maioria dos países europeus. Além disso, as doenças crónicas, incluindo doenças mentais e cardiometabólicas, são altamente prevalentes. Tal como aconteceu em muitos outros países, em Portugal, a atual pandemia de COVID-19 teve um impacto socioeconómico considerável e levou ainda ao agravamento da saúde da população. No entanto, a evidência científica tem relacionado a presença de felicidade e bem-estar com: menor risco de mortalidade tanto na população saudável como na população previamente doente, melhores resultados clínicos, e a um melhor estado de saúde física e mental. Todavia, os mecanismos envolvidos com esses efeitos ainda não são claros.

Assim, os objetivos desta dissertação são: rever a literatura quanto às principais vias que relacionam a felicidade e a saúde, compilar estratégias para aumentar a felicidade e o bem-estar, e discutir as implicações e abordagens para incorporar a promoção da felicidade como um objetivo nacional em Portugal.

Para tal, foi realizada uma pesquisa bibliográfica nas bases de dados *MEDLINE*, *EMBASE*, *ISI Web of Science* e *Cochrane Library*, utilizando palavras-chave como: “*happiness*”, “*health*”, “*disease*”, “*well-being*”, “*subjective well-being*”, “*measurements*”, “*interventions*” e “Portugal”. Apenas os artigos escritos em língua inglesa ou portuguesa foram incluídos e as bibliografias de todos os artigos elegíveis foram analisadas de modo a identificar e incluir estudos adicionais.

Após uma breve introdução, os conceitos e definições associados a saúde, doença, bem-estar e felicidade foram discutidos, assim como um modelo de bem-estar recentemente desenvolvido. Além disso, as metodologias disponíveis para avaliar a felicidade e o bem-estar e respetivas limitações foram analisadas. De seguida, os processos através dos quais o stress e as emoções negativas condicionam a doença foram sumariados e, depois, foram discutidas as vias que ligam o bem-estar mental ao bem-estar físico, incluindo: 1) processos neurobiológicos, 2) efeito indireto nos comportamentos, 3) promoção de recursos psicossociais protetores e 4) amortecimento dos efeitos relacionados com o stress. Finalmente, foram avaliadas as estratégias para aumentar a felicidade e o bem-estar a nível individual (*i.e.*, *mindfulness* e intervenções psicológicas positivas) e a nível populacional (por exemplo, através de investimento na educação, na investigação da felicidade e nos serviços de saúde, através da promoção de uma boa governação e de boas condições de

trabalho, fortalecimento de ligações sociais e apoio das populações mais vulneráveis), que foram posteriormente adaptadas para o caso de Portugal.

A pandemia de COVID-19 abalou o mundo de uma forma sem precedentes, no entanto, esta situação também se apresenta como uma oportunidade para repensar e reconstruir a sociedade e os serviços de saúde. Assim, apesar de os mecanismos que ligam a felicidade à saúde ainda não estarem completamente revelados, a investigação preliminar é promissora e bem fundamentada. Deste modo, uma vez que a felicidade e a saúde da população portuguesa estão longe de atingir o seu verdadeiro potencial, é pertinente considerar o aumento da felicidade como uma ferramenta para a promoção da saúde em Portugal.

## **Palavras-chave**

Bem-estar; Bem-estar subjetivo; Saúde; Doença; Intervenções; Portugal



## Abstract

The population's level of happiness in Portugal is below the levels of most European countries. Besides, chronic health conditions, including cardiometabolic and mental health disorders, are also highly prevalent. However, recent years saw a significant body of research independently associating the presence of happiness and well-being with a lower mortality risk, and with an improved physical and mental health status. Nonetheless, the mechanisms involved with such effect are still unclear.

The aims of this dissertation are: to review the literature regarding the main pathways that link happiness to health, to compile strategies to improve populations' happiness and well-being, and to discuss the implications and approaches to incorporate the enhancement of happiness as a national goal for Portugal.

To do so, MEDLINE, EMBASE, ISI Web of Science, and the Cochrane Library databases were queried using a combination of key words, such as: "*happiness*", "*health*", "*disease*", "*well-being*", "*subjective well-being*", "*measurements*", "*interventions*", and "*Portugal*".

Following a short introduction, the concepts and definitions associated with health, illness, happiness, and well-being were discussed, then common constructs related to the latter were considered. Additionally, the available methods to measure happiness and well-being, and its limitations, were analysed. Afterwards, the processes through which stress and negative emotions lead to illness were summarised; and then the main pathways that link mental to physical well-being were discussed, including: 1) neurobiological processes, 2) the indirect impact on health behaviours, 3) the promotion of protective psychosocial resources, 4) and stress buffering effects. Subsequently, strategies to enhance happiness and well-being at the individual and population level were examined and transposed to suit the case of Portugal.

Even though the exact mechanisms that link happiness to health are not yet fully uncovered, preliminary research on the topic is well funded and promising. Thus, given that the happiness and health of the Portuguese population is far from reaching its full potential, it is important to consider the enhancement of happiness as a health promoting tool in Portugal.

## **Keywords**

Well-being; Subjective well-being; Health; Illness; Interventions; Portugal

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## List of Acronyms

COVID-19	Coronavirus Disease 2019
CRP	C-Reactive Protein
GENIAL	Genomics, Environment, vagus Nerve, social Interaction, Allostatic regulation, and Longevity
HIV	Human Immunodeficiency Virus
NCDs	Non-communicable diseases
PPIs	Positive Psychological Interventions
SNS	Sympathetic Nervous System
SWB	Subjective well-being
UK	United Kingdom



# 1. Introduction

Portugal ranks number 58 out of 149 countries in the World Happiness Report, presenting a mean happiness score of 5.929 out of 10, referring to the 2018-2020 period (1). Thus, falling below countries such as Brazil and Serbia. This happiness score is based on subjective well-being, which encompasses measures of life evaluation, positive and negative emotions (further discussed in section 3.1.3.). Similarly, regarding the life evaluation score, its average declined in 2020, with a mean score of 5.768 out of 10, in comparison to 5.911 between 2017-2019. Besides, the levels of positive emotions of the Portuguese population have also declined, while the levels of negative emotions increased in the same period. (1)

Intimately related to the previous topic, as will be explored throughout this dissertation, non-communicable diseases (NCDs) are responsible for 86% of total deaths and for 11% of premature deaths in Portugal (2). These illnesses are accountable for major socioeconomic impacts, since, quantitatively, for every 10% rise in mortality arising from NCDs, there is a 0.5% drop in the yearly economic growth (3,4).

Furthermore, multimorbidity, *i.e.*, “*any combination of chronic disease with at least one other disease (acute or chronic) or biopsychosocial factor (associated or not) or somatic risk factor*” (5,6), represents the standard pattern of these patients, and a major challenge to Portuguese primary healthcare services (7). Crucially, it is estimated that primary care attendants present on average 3.4 chronic health conditions, with the most common being cardiometabolic and mental disorders (8).

Alike other NCDs, the mental health of the Portuguese population is also particularly vulnerable, with a pre-COVID-19 prevalence of mental disorders being of 22.9%, one of the highest in Europe (9). However, despite the possibility for these to be appropriately managed in primary healthcare services, the levels of minimal adequate treatment to major depressive sufferers is among the lowest throughout high-income countries (10), and only a small proportion of patients have access to public specialised mental health services (11).

As many other countries, Portugal was also not left unharmed by the pandemic. Worldwide, the COVID-19 outbreak has led to a massive impact on the prevalence and burden imposed by mental illnesses, with a 27.6% increase in major depressive disorder cases, and a 25.6% rise in anxiety disorders in 2020 (12).

Likewise, the economic effects of the pandemic have led to increasing unemployment and poverty, and with the imposition of social distancing and restrictive interpersonal contact measures, individuals had to confine their social interactions to relationships within the

household, thus leading to high levels of psychological distress and, consequently, to the further deterioration of the mental health of the Portuguese population (11,13–15).

On the other hand, the pandemic has also aggravated the general health of the Portuguese society, given that non-COVID-19 excess mortality rates estimations (between March 16 and October 16, 2020) were 66.1-67% above the average of deaths in the last 5 years, which could have potentially resulted from unmet health needs (16).

Consequently, in order to prevent NCDs' upsurge and to counteract the already expected loom in mental disorders (1,15), it is necessary to promote public health. Thus, to achieve such a feat, it is important to address the social and environmental determinants of health, especially during developmental sensitive periods, and to manage both physical and mental disorders using an integrated approach, as these are strongly correlated and tend to co-occur (17,18).

In this sense, happiness appears to have a positive impact on both physical and mental health, however, its average levels in the Portuguese population are, again, well below the levels in most European countries (1), therefore, it is important to consider whether the promotion of happiness and well-being in Portugal also constitutes a means towards health promotion.

Over the past decades, the positive psychology movement, has focused on the study of human flourishing and, in recent years considerable scientific work addressing the effects of happiness and well-being on health has been developed, albeit, with mixed results (19–21).

For instance, a longitudinal study, that accounted for 719 671 women living in the UK, has found no robust evidence of the direct impact of happiness or unhappiness on mortality, as their effects were fully mediated by self-rated health (22). These results have been further replicated and extended to both American men and women (23).

Notwithstanding, another study has revealed that higher subjective well-being is independently associated with: improved health, lower prevalence of chronic health conditions and lower mortality risk, whereas negative affect is correlated to a higher mortality hazard (24). Additionally, a meta-analysis found that positive psychological well-being is independently associated with: a 19% and 29% reduction in the risk ratio for all-cause and cardiovascular mortality in healthy populations, respectively; as well as with a 23% and 24% decrease in mortality in patients with renal failure and with HIV, respectively. (25)

On the other hand, given that the number of preventable hospitalisations is also a relevant outcome (*i.e.*, most chronic conditions can be appropriately managed in primary care services), life satisfaction has also been associated with a decreased occurrence of preventable hospitalisations, whereas individuals with lower life satisfaction have 3 times higher likelihood of being hospitalised. (26)

Conversely, regarding mental health, evidence suggests that the absence of psychological well-being represents a risk factor and a strong predictor of depression, and so, individuals with slightly impaired or with low psychological well-being are, respectively, 2.3 and 7.16 times more likely to become depressed (27), whereas mentally ill individuals who gain or maintain moderate to high levels of positive mental health are more likely to recover from their illness (28).

Therefore, considering the preceding discussion, in the following chapters we will explore in more detail the impacts of happiness on health and its implications for public health and Portugal. Thus, the aims of this work are: to review the literature regarding the pathways through which happiness improves health, to comprehensively compile strategies to improve populations' happiness and well-being, and to establish Portugal's progress on the said topic. We will start by exploring some concepts, definitions, and relevant measurements. Then we will focus on the pathways to health and illness, and lastly, we will discuss approaches to incorporate the enhancement of happiness as a national goal.



## **2. Methodology**

To write this review, MEDLINE, EMBASE, ISI Web of Science, and the Cochrane Library databases were queried using a combination of key words. Search terms included: “*happiness*”, “*health*”, “*disease*”, “*well-being*”, “*subjective well-being*”, “*measurements*”, “*interventions*”, and “*Portugal*”. Only the papers written in English or Portuguese were included, and no restrictions regarding the date of publishing or type of publication were deemed. Nevertheless, relevance and later date of publishing were considered in the selection process, and only full-text articles were included. The bibliographies of all eligible papers were also regarded to identify and include additional possible studies that were not found with the searches employed.





## 3. Happiness and Well-being

### 3.1. Concepts and Definitions

Having contextualised and described the methodology pertaining to this dissertation, a common ground must be built before starting with discussion itself. To do so, it is important to clarify some concepts and definitions regarding health, illness, happiness, and well-being.

#### 3.1.1. Health

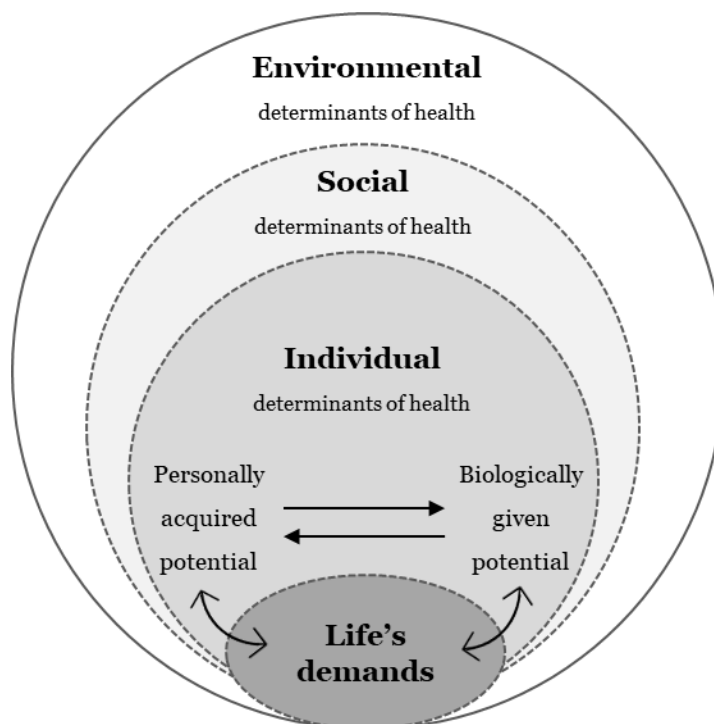
First of all, the concept of health, which has evolved and changed throughout time, along with the development of societies, health systems and healthcare services, is extremely important for management and for the creation and monitoring of policies (29). However, defining health presents quite a challenge, and a formal, universally accepted, and practical definition has yet to emerge.

One of the most used and widely known attempt to define health was introduced in 1948 at the Constitution of the World Health Organization. It was asserted as a fundamental human right and as a “*state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*” (30). However, this definition has been a target of criticism ever since its conception (29).

Consequently, new suggestions have been made that account for health determinants and that recognise health as an important dimension of quality of life (29,31), with one of the most relevant and recent being the Meikirch Model of Health (Figure 1)— which postulates it as “*a state of wellbeing emergent from conducive interactions between individuals’ potentials, life’s demands, and social and environmental determinants*” (32). In this model, life’s demands comprise both physiological, psychosocial, and environmental factors, which can vary among individuals and contexts. Nevertheless, it suggests that an inadequate response between one’s potentials and life’s demands leads to disease (32).

Despite the wide variety of health definitions, most of which are not included here for sake of concision, these generally share some common features— health as fundamental human right and a subjective experience, portrayed as a continuum and a dynamic state that results from the balance between physical, psychological, and social experiences, as well as the ability to adapt to these changes; it is applicable to both individuals and populations, it

results from the action of numerous health determinants, and it stands as an outcome and a resource, necessary for a good quality of life and to achieve one's full potential. (33–35)



**Figure 1** – The Meikirch Model of Health. Reproduced from (32).

### 3.1.2. Disease and Illness

Even though most people recognise certain concepts tacitly, defining disease and illness, similarly to defining health, presents as a complex challenge and, therefore, an open debate is still on. (36)

The broader term “*malady*” is often used as a generic term which encompasses: disease, illness, sickness, and injury, among others (36). On the other hand, the empiric term “*disease*” usually incorporates three dimensions of malady, namely disease, illness and sickness (36). Hence, disease refers to the professional perspective, that is, the physiological, mental, genetic, and environmental events that result in an imbalance of homeostasis; whereas illness describes a personal perspective of subjective experiences of emotions, suffering and pain; lastly, sickness conveys the social dimension of expectations, policies, and norms, established by social institutions and laws (36). These three dimensions usually represent negative perceptions, and, despite being interrelated and partially interdependent, they are neither mutually exclusive, nor extensive (36). Nevertheless, and even though these definitions are broadly used, some argue it's validity.

In this review we will use the definition of illness proposed by Miettinen and Flegel, since it is a comprehensive and widely accepted notion. These authors propose illness as “*any somatic anomaly with present or potential future manifestation(s) to the affected person*” (37). This definition represents a state of unwellness and the overall concept of ill-health, it is coherent with its colloquial meaning, and distinguishes the illness, *i.e.*, the somatic anomaly, from its manifestations and consequences (37–39). Table 1 lists some of the concepts and definitions proposed by Miettinen and Flegel.

**Table 1** – Concepts and definitions associated with illness.

Concept	Definition
<i>Disease</i>	Subtype of illness, that encompasses an anomalous somatic process. (38,39)
<i>Sickness</i>	The manifestations of an illness, which include both symptoms, and signs. (40)
<i>Suffering</i>	Subjective experience resultant from challenges that threaten the intactness of a person as a social and psychological individual. (38)

### 3.1.3. Happiness, Well-being, and Related Concepts

*Happiness*, is a broad term, often used colloquially, that may comprise different meanings to different people. Therefore, it is usually not a scientific term of choice (41,42). However, it is a widely known concept, and related notions have been used and enquired since ancient times. In this sense and using a comprehensive approach, happiness can be defined as “*a desirable mental experience*”, *i.e.*, a non-permanent condition or circumstance, that varies in duration, and which is a valued, pursued, and a desirable feel, that may include emotions, beliefs, and dispositions. Accordingly, *well-being* can be broadly defined as “*including all the manifold ways in which human beings can be, do, and live well*” (43). Table 2 summarises some of the most common concepts related to happiness and well-being.

**Table 2** – Concepts and definitions related to happiness and well-being. Adapted from (42).

<b>Concept</b>	<b>Definition</b>
<i>Flourishing</i>	Optimal range of human functioning, that includes both feeling good and doing good. It comprises: happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue, and close social relationships. (21,44)
<i>Happiness</i>	A desirable mental experience (43). It may include: mean positive feelings at one moment, long-term satisfaction, well-being, and the causes of subjective well-being. (42)
<i>Well-being</i>	Generic term, that encompasses how individuals are doing in life. (42)
<i>Hedonic well-being</i>	Maximisation of pleasure and attainment of goals and valued outcomes, in detriment of negative and unpleasant feelings or experiences of pain or displeasure. It is usually operationalised through subjective well-being. (20,45,46)
<i>Subjective well-being (SWB)</i>	Comprises subjective evaluations of one’s life, including cognitive evaluations and affective feelings. It is a subtype of well-being that reflects how someone evaluates its life, from its own perspective. It includes affect balance and life satisfaction. (42,45)
<i>Positive affect</i>	General positive emotions that can persist for long periods of time and characterise an individual’s disposition (trait), or may be transient moments of emotion, lasting minutes to days (state). (47)
<i>Negative affect</i>	Negative, unpleasant, and undesirable emotional feelings and moods. (42)
<i>Affect balance</i>	Preponderance of positive over negative affect. (42)
<i>Life satisfaction</i>	Individual’s explicit and conscious evaluations of its own life. (42)
<i>Eudaimonic well-being</i>	The fulfilment of one’s true potential. It is related to a sense of meaning and purpose in life. (20,48)

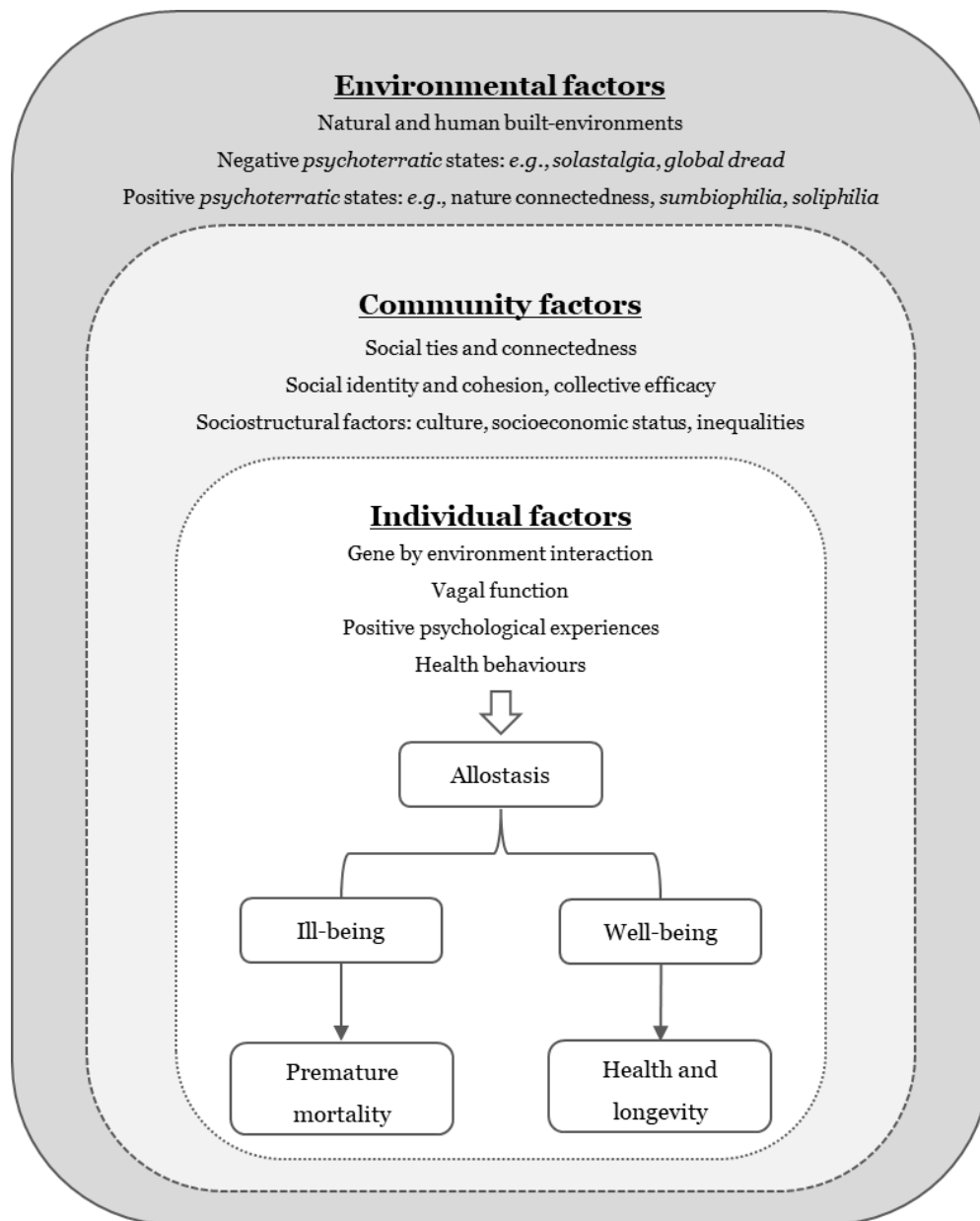
**Table 2** (Continued)

Concept	Definition
<i>Psychological well-being</i>	Reflects the full functioning of a person. It includes: autonomy, personal growth, self-acceptance, life purpose, mastery and positive relatedness. It may also be used as an alternative phrasing for mental health. (45,46,49)
<i>Quality of life</i>	Refers to an individual's overall circumstances (environmental, social, societal, material, among others) that affect how positive and desirable one's life is. (42)

Historically, the study of well-being has been dominated by two distinct, yet complementary perspectives: hedonism and eudaimonism (45). Nonetheless, this dichotomy between hedonic and eudaimonic well-being may be impractical, as evidence suggests that these two elements are actually part of a wider central construct of well-being (46).

So, considering what has been discussed thus far, well-being can be conceptualised as a complex system that results from the interaction between the individual and its community, environment, and socioeconomic context, as was done by Mead, Fisher and Kemp, who postulate well-being as a “*positive psychological experience promoted by connections to self, community and environment, supported by healthy vagal function, all of which are impacted by socio-contextual factors that lie beyond the control of the individual*” (50).

Consequently, reflecting the former definition and the bidirectional relationship between health and well-being, a new life-course framework has been created— the GENIAL model (19) (Genomics, Environment, vagus Nerve, social Interaction, Allostatic regulation, and Longevity)— which provides a theoretical context for understanding the main elements that determine the pathways to health and well-being (see section 4.2.1.) (19,51). Recently, improvements on this model have also highlighted the individual's, community and environmental contributors to well-being (Figure 2) (51).



**Figure 2** – The GENIAL model 2.0. Reproduced from (51).

Notwithstanding, and considering the relevance of the GENIAL framework, the pathways that lead to well-being may also lead to health and vice-versa. In chapter 4, we will explore in more detail the trails through which happiness and well-being lead to healthy states, but first some of the scales and methods utilised to assess and measure these concepts shall be discussed.

### 3.2. Measurements and Scales

Eudaimonic well-being is associated with a wide conceptual diversity, and so, there is yet little consensus to what instruments should be used (52). Nonetheless, phenomenological methods, such as open-ended interviews, ethnographic approaches, or autobiographical techniques may prove to be useful instruments (48); however, more research on eudaimonic indicators is needed (52). In contrast, both affective and cognitive components of hedonic well-being (see section 3.1.3.), are usually assessed through surveys of self-rated reports (52).

There are as much as 99 self-report measures of well-being (a detailed description goes beyond the scope of this work, for further insight see (49)), and thus, to choose an appropriate instrument, some precautions must be taken. First, its selection must be guided by the underlying conceptual framework of well-being (52,53), however, existing theories are both contradictory and overlapping (Table 3) (54). Additionally, it is important to consider its time frame, since, for instance, the evaluation of state affect is useful for assessing factors related to one specific moment, whereas, to evaluate distant outcomes, such as health related outcomes in the far future, trait affect could be the best choice, as it takes into account well-being's influence on behaviours, physiology, and social relationships over time (53). Furthermore, most instruments include several dimensions of well-being, namely: mental, social, and physical, as well as personal circumstances, activities, and functioning (Table 4). So, despite the wide variety of well-being measurements, the most appropriate also depends on the dimension of interest (49).

Nonetheless, and even though there are well-designed and validated self-report measurements, these alas still present some limitations— failures in recall, biases, or differences in response styles. As such, the use of non-self-report measurements should be considered. (20,53)

Some examples of non-self-report measurements include: day reconstruction method, recall of life events, facial measures, smile intensity, patterns of online behaviours, and ecological momentary assessments (41,42,53). However, these instruments may be weak indicators of the underlying well-being construct, and are also more laborious and difficult to scale (41,42).

**Table 3** – Main conceptual frameworks and theories of subjective well-being. Adapted from (54).

<b>Conceptual framework</b>	<b>Description</b>	<b>Observations</b>
<i>Fulfilment and engagement theories</i>	Aim at describing the influences of goals, needs, and activities on SWB.	There is no clear definition of universal needs and goals, and there is a lack of a systematic formulation of these theories.
<i>Personal orientation theories</i>	Explain the influence of temperament on SWB.	There is little agreement on what aspects of personality should be assessed. These theories do not consider the effect of the environment on personality.
<i>Evaluative theories</i>	Explore the cognitive component of SWB, and how it is related to the process of fulfilment and emotions.	The standards of comparison are not fully understood. These theories may also be influenced by the personal orientation and by a tendency to compare upwards or downwards.
<i>Emotion theories</i>	Explore the affective component of SWB, and how it is related to the process of fulfilment, engagement, and evaluations.	Do not consider the impact of personality on the influence of emotions on SWB.

On the other hand, as previously described, well-being is a multidimensional construct, that is also dependent upon more objective socioeconomic and cultural factors (Table 5), such as: the ability to satisfy basic needs, adequacy of financial income, educational level, or the family system, to name but a few. However, most instruments do not emphasise these indicators (52,55).

Thus, despite the wide variety of instruments to quantify happiness and well-being, there is no universally accepted measure for these constructs, which results from: the lack of a consensual definition, the inexistence of an agreed criteria to what an instrument should comprise, as well as due to the scattering of instruments across different disciplines (49,54), hence, more research is still needed.



**Table 4** – Dimensions of well-being most utilised in self-report measures. Adapted from (49)

<b>Conceptual framework</b>	<b>Definition</b>	<b>Assessed in (n) instruments</b>
<i>Global well-being</i>	Well-being measured as an overall construct.	13
<i>Mental well-being</i>	Thoughts and feelings that one has of its own life, and its experience of happiness. It includes the psychological, cognitive, and emotional quality of a person's life.	89
<i>Social well-being</i>	How well one is connected to others in its local and wider social community.	48
<i>Physical well-being</i>	Quality and performance of bodily functioning. It involves: having the energy to live well, the ability to sense the external environment, and experiences of pain and comfort.	41
<i>Spiritual well-being</i>	Feeling of connection to something greater than oneself.	28
<i>Activities and functioning</i>	Daily life activities and the ability to undertake them.	40
<i>Personal circumstances</i>	External conditions, including socioeconomic and environmental factors.	24

**Table 5** – Main determinants and correlates of subjective well-being. Adapted from (54).

<b>Determinants and correlates</b>	<b>Description</b>	<b>Component of SWB</b>
<i>Basic demographics</i>	Gender, age, and race/ethnicity.	Cognitive
<i>Socioeconomic status</i>	Income, education, employment, family structure, and immigration status.	Cognitive
<i>Health and functioning</i>	General and self-reported health and illnesses.	Cognitive
<i>Personality</i>	Big Five personality traits and nuanced traits.	Cognitive + affective
<i>Social support</i>	Number and quality of contacts, friends, and family; family and social satisfaction; and discrimination.	Cognitive + affective
<i>Religion and culture</i>	Religiosity and visits to houses of worship. Conceptualization of SWB, comparison standards.	Cognitive
<i>Geography and infrastructure</i>	Nation, region, community, neighbourhood, and home. Access to infrastructures ( <i>e.g.</i> , food, water, etc.).	Cognitive

In the next chapter we will discuss the pathways through which happiness and well-being influence health.

## 4. Theoretical foundations

It is clear that a dysregulation of allostasis, *i.e.*, the ability to maintain homeostasis, ultimately leads to ill-health (19). However, the mechanisms by which health and longevity are attained, are far less understood. Several pathways linking happiness to health have been proposed. Mental well-being may lead to physical well-being *via* four pathways: 1) the direct effects of neurobiological processes; 2) the indirect impact on health behaviours and lifestyles; 3) the promotion of other health protective psychosocial resources; 4) and *via* a stress buffering effect (20,53,56). In this chapter we will begin by briefly summarising some of the processes that lead to illness and then we will focus on the main described pathways that conduct to healthy states.

### 4.1. Pathways to Illness

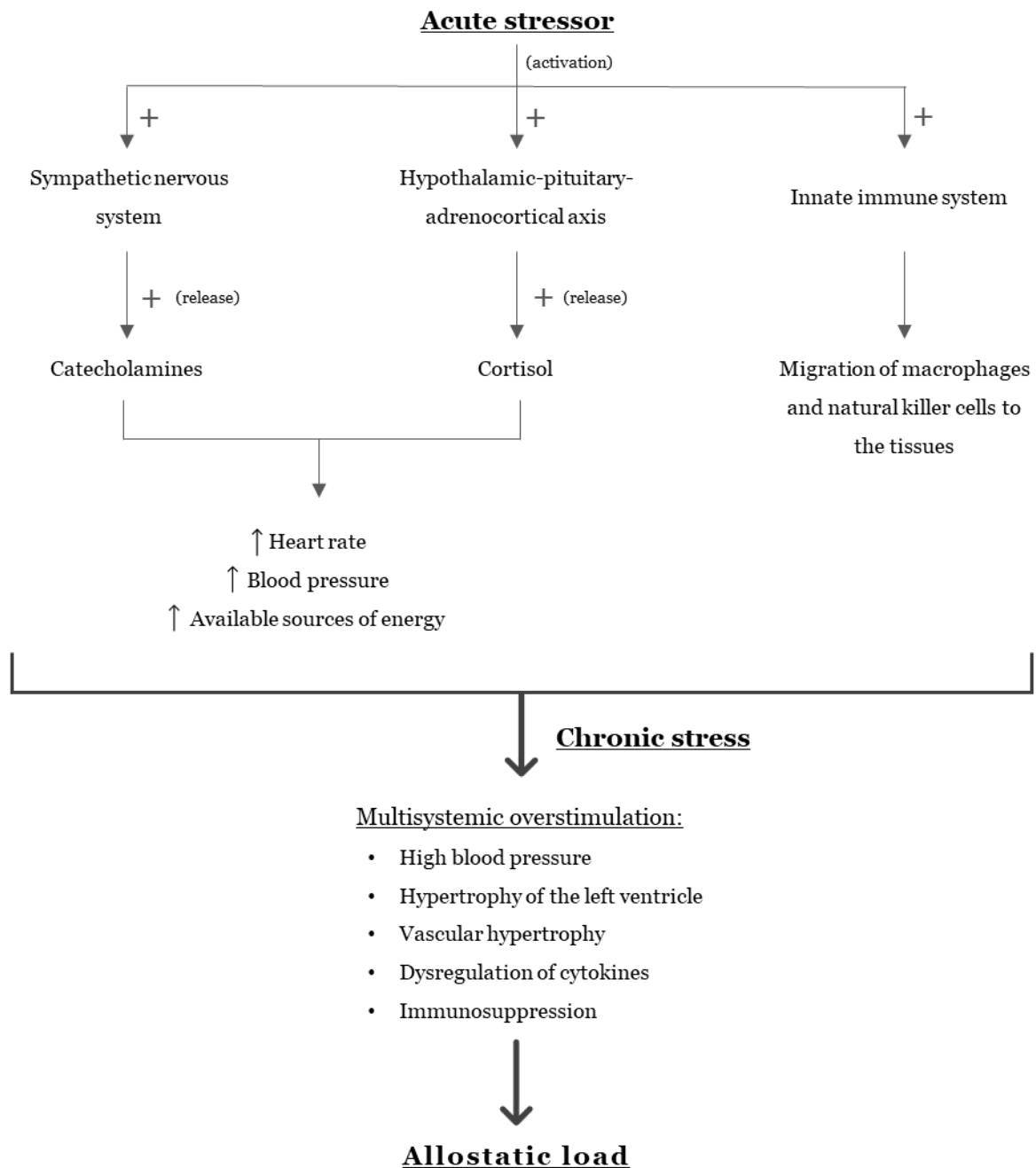
There is accumulating evidence suggesting that psychological distress and negative affect are correlated with adverse health outcomes, both directly, by altering physiological processes, as well as indirectly, through health risk behaviours (57).

Stress represents an actual or a perceived threat to an organism, that can seriously compromise homeostasis. A situation is perceived as stressful when individuals realise that the external demands exceed one's resources and ability to cope. (58,59)

During an acute stressful event, an adaptive and short-term response is generated (Figure 3), leading to a cascade of nervous, cardiovascular, endocrine, and immune alterations. Initially, the sympathetic nervous system (SNS) stimulates the adrenal medulla to produce catecholamines (*e.g.* epinephrine), and the hypothalamic-pituitary-adrenocortical axis is activated, leading to the secretion of cortisol (an anti-inflammatory glucocorticoid) (58,60). These two types of hormones, catecholamines and cortisol, act in combination to increase the available sources of energy. Simultaneous to the nervous, cardiovascular, and endocrine changes, induced by cortisol and catecholamines, the activation of the innate immune system also occurs, leading to the migration of macrophages and natural killer cells towards tissues that might be damaged (*e.g.*, the skin). (58)

If the acute stress response does not subside or keeps being re-activated, it can become a maladaptive process (Figure 3). In this context, the chronic stimulation of the cardiovascular system can lead to: high levels of blood pressure, hypertrophy of the left ventricle, vascular hypertrophy and to damaged arteries. Conversely, excess of stress

hormones leads to the dysregulation of cytokines, suppressing humoral and cellular immunity. Coupled to the same immunosuppressive effects, there can be an exacerbation of the pathophysiology and symptomatology associated with inflammatory conditions, such as autoimmune disorders and coronary heart disease (58). In this sense, chronic psychological stress leads to a multisystemic overstimulation and to accumulating “wear and tear”, i.e., *allostatic load* (19,59).



**Figure 3** – Schematic representation of the mechanisms involved in the response to acute stress and the effects of its chronic stimulation.

Foreseeably, several studies have established a link between negative affect, namely: stress, depression, hunger, and hostility, with an increased cardiovascular risk through which likely constitutes a multifactorial mechanism (57,61–63). In particular, it is estimated that high perceived stress is correlated with a 27% increase in coronary heart disease (equitable to a 50 mg/dL rise in low-density lipoprotein) (61). Other studies also indicate a positive association between depression and an upsurge in inflammatory markers, such as C-Reactive Protein (CRP) which is related to a higher cardiovascular risk (63).

On a molecular level, persistent psychological stress is linked to the accelerated shortening of telomeres, DNA-protein complexes that cap chromosomal ends and that are physiologically reduced with cellular replication. This, in turn, results in premature cellular senescence and, consequently, in hastened cell ageing (59,64). Nonetheless, these events are not exclusive of adults, and are, too, present in childhood (65,66).

In addition, considering a developmental sense, the exposure to intense or chronic stressors during childhood and adolescence has long-lasting neurobiological effects, that increase the risk of: structural changes in the central nervous system, hypo-immune dysfunction, anxiety, mood and aggressive disorders (58). These effects are attained through analogous hormonal and molecular routes as the ones found in adults. Additionally, social surroundings and, in particular, the exposure to family instability, also lead to these nefarious effects. (65,66)

Therefore, considering what is discussed above, from a psychosomatic standpoint— *i.e.*, the multidisciplinary field which addresses the interaction between biological, psychological, and social factors in the regulation of health and illness— an illness results from the interplay of several processes at the level of the individual, its body, and its surroundings, and it is pinpointed by the same mechanisms previously described. (67)

Conversely, negative affect and mental ill-being are related with a higher probability of engaging in health-risk behaviours, such as: smoking, physical inactivity, an unhealthy diet, and alcohol consumption, lower medication adherence and reduced compliance, despite high levels of distress being usually accompanied by an increased utilisation of healthcare services. (20,59,68)

Notwithstanding the evidence pointing towards the overwhelming hazards of stress on health, its absence, on a physiological level, does not necessarily involve the presence of mental health, happiness, or well-being. Hence, these are independent factors, with separate biological and health correlations (69).

## 4.2. Pathways to Health and Longevity

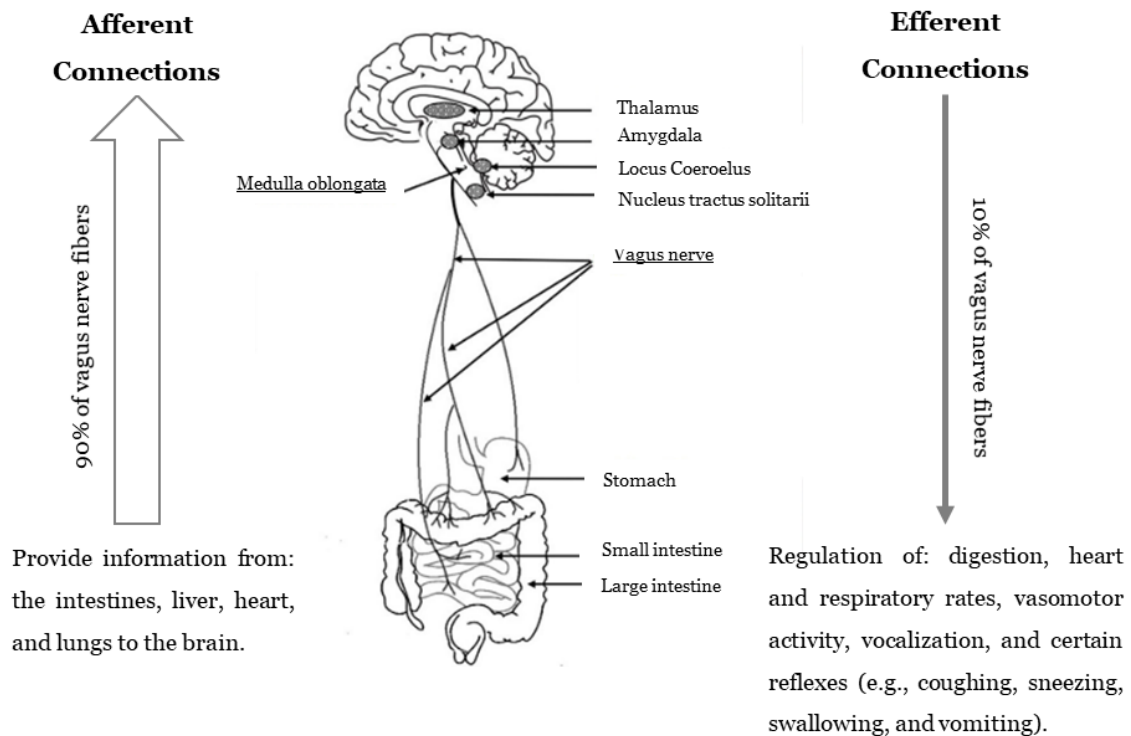
### 4.2.1. Neurobiological Processes

Evidence suggests that happiness and well-being have a neurobiological basis, and several brain regions appear to be implicated (*e.g.*, the anterior and posterior cingulate cortexes, the superior temporal gyrus, orbitofrontal cortex, and the thalamus), as they are involved in the ability to integrate personally meaningful internal and external information. Hence, well-being may represent a way towards the maintenance of equilibrium through the integration of both external and internal stimuli. (70)

Complementing this link between the body and the mind, the vagus nerve (Figure 4) plays a regulatory role over downstream pathways, supporting quick physiological reactions to environmental changes and facilitating engagement with others (19). The tenth cranial nerve is one of the main components of the autonomic nervous system, its activation leads to the release of acetylcholine in synaptic junctions, amongst a vast variety of biological tissues (19,50,51,60). A healthy vagal function is associated to: positive emotions and their regulation, to resilience and positive health behaviours, as well as connection to self, to others, and nature (19,50,51).

Vagal function regulates allostasis *via* three routes: 1) regulation of prefrontal-vagal pathways, which enable the response to environmental changes; 2) containment of the SNS, that leads to the stabilisation of physiological arousal; 3) and through the cholinergic anti-inflammatory reflex, which is responsible for the detection, regulation and control of the immune function and proinflammatory responses. (19)

Nonetheless, even though, vagal tone is usually a stable parameter, it can, in fact, be improved through sustained enhancements in one's emotions and social perceptions (71). Vagal function is directly influenced by genetic and environmental factors, conversely, positive emotions and social ties influence and are supported by vagal function, representing a self-sustaining upward spiral. Neuropeptides related with social bonding, for *e.g.*, oxytocin, dopamine, and  $\beta$ -endorphin, may lead to individual differences in vagal function, which ultimately induce individuals to engage and maintain social ties. Additionally, individual differences in resting vagal function account for the ability to regulate psychological and physiological mechanisms, which have an impact over social ties, well-being, and health. (19)



**Figure 4** – Basic anatomy and functions of the Vagus Nerve. Adapted from (60).

In turn, the aforementioned mechanisms, ultimately influence processes at a molecular level, and there is a growing body of research linking those to happiness and health (20,53).

Inflammation has been implicated in the aetiology of numerous illnesses, including in the onset and progression of arthritis (72). However, increases in well-being, over time, have been correlated with a decline in inflammatory markers, such as: CRP, fibrinogen and white blood cell count, independently of mental ill-health (73). In this sense, higher levels of well-being are correlated with a reduced risk of developing arthritis, and this correlation is partly mediated by CRP, which accounts for 12% of the risk association. (72)

On the other hand, sphingolipids— signalling molecules that regulate several cellular functions and metabolic pathways— are also implicated in inflammation and apoptosis. In particular, ceramides are involved in the regulation of aging and cellular senescence, and are associated with multiple disorders, namely: obesity, diabetes, cancer, Alzheimer’s disease, and depression (74). A recent study has found that higher levels of well-being are correlated with lower serum levels of sphingolipids, and that persistent high levels of eudaimonic well-being are predictive of lower concentration of ceramides. Thus, these molecules may represent a biological intermediary between well-being and health. (74)

Alternatively, higher levels of positive affect are correlated with reduced allostatic load, resulting in improved levels of: CRP, systolic and diastolic blood pressure, heart rate, total cholesterol, triglycerides, low- and high-density lipids, albumin, glucose, haemoglobin A1c, and waist circumference, even after adjusting for negative affect, age, and sex (75). However, the combination of central obesity, hypertension, lipid dysregulation and insulin resistance, constitutes the metabolic syndrome, which is associated with an increased risk of cardiovascular diseases and diabetes. Nonetheless, hedonic and eudaimonic well-being are significant predictors of a lower risk for this syndrome and, even though well-being accounts for only 1-2% of the variance in metabolic syndrome outcomes, it has a similar magnitude of other well known risk factors, such as age and educational level. (76)

Likewise, other factors that are involved in cardiovascular pathogenesis include: intima media thickness of the carotid arteries (a marker of subclinical atherosclerotic disease), to which psychological well-being has been independently and inversely correlated and, thereby, associated with a lower cardiovascular risk (77); and aortic stiffness, to which eudaimonic well-being has been linked with a lower atherosclerotic risk in men (78).

All things considered, the neurobiological pathways to health include some of the most compelling and coherent evidence of the impact of happiness and well-being on health (53). Nonetheless, considering the cross-sectional nature of some of the studies presented, causal links may not be established and, thus, more research is still needed.

#### **4.2.2. Psychosocial Resources, Stress Buffering Effects, and Health Behaviours**

Emotions are a vital component of individual well-being, and represent a learned propensity to react consistently to a given object (59,79). They can encompass both a transitory state to a specific situation, as well as a tendency to experience a certain emotion (59).

While negative emotions tend to narrow one's response, positive emotions are believed to broaden one's range of thought and action tendencies, thereby building enduring physical, intellectual, social, and psychological resources— the *broaden and build theory* (44,59,79). These personal resources, in turn, outlast the emotions that led to their acquisition, and they act as reserves, which can be drawn on later to manage future threats and in different emotional states (44,59,79). Additionally, positive emotions can undue or reduce the deleterious consequences of negative emotions— the *undoing hypothesis* (53,79)— thereby, reducing stress levels and the likelihood of experiencing it, accelerating its recovery, and



weakening its relationship with health-related behaviours, thus, buffering stress's harmful effects (53,59,80).

Nonetheless, as is the case with negative emotions, too much positive emotions are not necessarily good, and thus, high levels of positive emotions may lead to impaired memory, judgments, and interpersonal strategies (44,81). Hence, mental health and well-being do not come from the absence of negative emotions, nor from excessive positive emotions, but rather from the balance between these—the so-called, *emotion regulation*—which involves the monitoring and management of one's emotional experiences and responses (59,82).

Moreover, emotion regulation is built through personal experience and socialisation over time. Accordingly there is a wide range of individual differences amongst the use of these strategies, which can vary from adaptive to less adaptive skills (59,81,83). Consequently, the use of adaptive strategies, namely, positive reappraisal, is associated with enhanced mental well-being, but also with the downregulation of negative reactivity, leading to more adaptive and flexible patterns of cardiovascular, and neuroendocrine responses to stressful events (81,83,84).

Finally, on par with what has been discussed on the effect of family context-induced stress on one's development (see section 4.1.), the same rationale can be transposed to emotions. In this sense, evidence suggests that social disadvantaged families are less likely to offer the adequate social experiences for children to grow and to learn how to regulate their behaviours and emotions, leading to a higher tendency to come across more acute and chronic stressors, as well as to difficulties in sustaining supportive social networks. (59)

Moving on to health behaviours, these represent another major pathway linking happiness and well-being to health. In this sense, smoking, physical inactivity and an unhealthy diet, to name but a few, represent major risk factors for NCDs (4) and thus, shall be now covered.

Taking into account that well-being is partially determined by the social context, which provides opportunities for shared behaviours, if individuals belong to more cohesive and supportive groups with shared norms of health-promoting behaviours, these healthy choices will more likely be followed (59). Additionally, evidence suggests that individuals with a higher sense of purpose and engagement in life, and with more quality connections with others are more likely to also adopt and maintain healthy behaviours (48).

Considering the case of physical activity, which represents an important health behaviour, engagement in the recommended levels is linked to improved physiological functioning, and to numerous health benefits at any stage in life. Thus, greater well-being has been associated

with an increased likelihood of individuals to become more active and conversely, with a decreased probability of declining the levels of physical activity in already active individuals (85). Furthermore, regarding other health-risk behaviours, positive emotions and well-being are also associated with: a lower risk of smoking, and with a higher probability of having a good sleep hygiene and consuming a healthy diet (53,56,59). Hence, even though behaviour change represents a major challenge, if its determinants are taken into account, it also implies a great opportunity for health-promoting interventions (59).

All things considered, emotions, fundamental drivers of behaviours, as well as emotion regulation skills, social relationships, and support, are core dimensions of happiness and well-being, which in turn, are ultimately determined by the interaction between the individual and its environment (51,53).

## 5. How to Enhance Happiness and its Effects

Having described the main pathways through which happiness and well-being impact on health, we must now try to unveil whether increasing those mental states is associated with an improved health status (53).

Happiness and well-being have been historically seen as a generally stable trait, with only slight fluctuations throughout the day (86). However, albeit this trait has a substantial genetic and heritable component, at least 60% of its variability is influenced by lifestyle, volitional and environmental factors (41,87). Similarly, evidence suggests that the neurobiological circuits related to happiness and well-being present a developmental basis, in such a way that the associated brain regions continue to develop well after puberty and beyond (86). This characteristic, in turn, allows for enriching lifestyle activities to enhance the connectivity and density of neural networks, thereby altering one's average levels of happiness and well-being (86). Consequently, these positively associated interventions, generally used to enhance happiness and well-being, can be broadly subdivided into individual- and population-based strategies which shall be covered in depth below (59).

### 5.1. Individual-based Strategies

The most common individual-based interventions used to enhance happiness and well-being include mindfulness-based programs and positive psychological interventions (PPIs) (56).

Mindfulness, a conscious non-judgmental awareness to the present moment, has gained significant attention over recent years (88,89). This practice promotes an increased attentional control and decreased reactivity, allowing people to focus their attention on behaviours that align with oneself (88).

In this context, several mindfulness techniques, have been developed, such as: mindfulness-based cognitive therapy, muscle relaxation, and loving kindness meditation, to name but a few (56,89). The observed changes in well-being following mindfulness programs appear to be the result of modifications in the morphometry of the grey matter among several brain regions (locus coeruleus, nucleus raphe, sensory portion of the trigeminal nucleus, and pontine tegmentum), which stand as primary production sites of neurotransmitters and are also responsible for the modulation of sleep, appetite, and mood-arousal, thereby, leading to an improved physiological functioning and well-being. (90)

The other main tool used in this context, PPIs, encompasses all the interventions, that aim at enhancing positive constructs, while decreasing depressive symptoms. Some of these interventions may include: practicing kindness, gratitude and optimism, savouring positive events, and improving personal strengths (20,53,56,89). These strategies, in turn, are feasible and easy to deliver, they are generally well accepted and do not require an extensive provider training (56).

Nonetheless, PPIs do not usually focus on maladaptive behaviours and thoughts, and so, we must also take into account the effects of other types of interventions that target those attitudes such as: cognitive therapy, cognitive behavioural therapy, acceptance and commitment therapy, and the combination of multiple PPIs (91).

Hence, considering the wide scope of individual and psychological interventions and their potential benefits, a recent systematic review and meta-analysis, which accounted for 393 studies ( $N = 53\ 288$ ) was conducted (91). In summary, the interventions which presented a greater impact on the well-being of the general population with considerable quality of evidence were: mindfulness-based interventions, PPIs and multi-component PPIs, albeit with only small to moderate effects. Additionally, it was demonstrated that in the general population, higher intensity interventions usually led to higher effect sizes. (91)

As for physically ill populations, mindfulness-based interventions revealed a significant small-to-moderate effect at increasing well-being. In this group, no difference between moderate and high-intensity interventions was observed, nonetheless, the highest effect size was achieved in individual format interventions. (91)

In the context of physically ill populations, it is also noteworthy that other studies have revealed compelling evidence about the efficacy of happiness and well-being interventions at decreasing depressive and anxiety symptoms, and at improving health behaviours and clinical outcomes for diabetes and other cardiovascular disorders due to improvements in glycosylated haemoglobin, reduced systolic blood pressure, and increased physical activity, to name but a few. (68,92)

Lastly, the meta-analysis identified that cognitive and cognitive-behavioural therapies have a significant small-to-moderate impact at improving the well-being of mentally ill populations. In contrast, in this group, higher intensity and group-based interventions usually led to higher effect sizes. (91)

All in all, mindfulness-based interventions and PPIs are beneficial for both clinical and non-clinical populations. However, not all PPIs are equivalent and so, more studies are needed

to identify which singular PPIs should be included in multi-component interventions. Moreover, other types of interventions, namely acceptance and commitment therapy and cognitive behavioural therapy, may also have an important role at improving happiness and reducing the burden imposed by mental illnesses. (91)

Consequently, the incorporation of evidence-based interventions within traditional models of care presents as an innovative and cost-effective option, that can be delivered in flexible formats to enhance the promotion of health for the general population, while improving the chances of recovery and better clinical outcomes for ill populations. (91)

In this sense, physician appointments present as excellent opportunities to assess and promote patients' well-being (56,68). Nevertheless, the most common interventions regarding mental health, in clinical settings, usually involve the diagnosis and treatment or referral of mental health disorders. Thus, even though the promotion of happiness and well-being goes in line with the family medicine philosophy, it is not yet fully incorporated in everyday practice (93). To combat this, a brief and structured interview, with a small number of targeted questions, could be implemented to achieve a patient-centred approach and, thereby, to identify the patient's sources and resources of well-being, to provide information about the benefits of happiness and to indicate other specific resources and available activities (56). This type of structured approach focuses on enhancing individual's strengths while engaging and rewarding patients. Additionally, through specific statements, related to the personal circumstances of the individual, clinicians can give customised recommendations, which are a powerful tool (56,68). These interventions can then be further explored by other caregivers, such as psychologists and psychiatrists, with more expertise on the respective field. (56,68)

As an example, Table 6 shows a stepwise approach to a structured interview used in the context of cardiovascular health prevention and rehabilitation programs (56) which can be used more broadly in other clinical settings, such as in family medicine appointments.

**Table 6** – Example of a stepwise structured interview. Adapted from (56)

Steps	Description
Step 1	<p>Brief assessment of psychological distress symptoms (<i>e.g.</i>, anxiety, depression).</p> <p>Introduction to the idea that well-being, and not simply the absence of distress, is important to health.</p>
Step 2	<p>Assessment of psychological well-being through specific questions focused on patient’s personal strengths, optimism and gratitude, positive affect, life satisfaction and purpose, and social support. Some examples include:</p> <p><i>“What are your greatest strengths and skills, and how have applied them to improve your health?”</i></p> <p><i>“Do you expect that good things will happen for you in the future?”</i></p> <p><i>“What, if anything, do you have to feel grateful for in your life?”</i></p> <p><i>“How often do you experience pleasure or happiness in your life?”</i></p> <p><i>“Are you satisfied with how your life has gone and how you have lived it?”</i></p> <p>Based upon individual’s circumstances, offer statements that support well-being.</p>
Step 3	<p>Give tailored recommendations and suggestions of specific structured activities, <i>e.g.</i>, prescription of gratitude exercises, sharing good news, meditation programs. (56,93)</p> <p>Share information about community programs and other resources that promote well-being and/or increase social support (<i>e.g.</i>, community centres, support groups, hobbies, volunteering).</p>

Notwithstanding the previous example, it also important to consider other types of interventions that target the promotion of well-being, such as: practising physical activity, having a healthy diet and a good sleep hygiene, to name but a few (51). As discussed throughout this review (sections 3.1.3 and 4.2.2.), happiness and well-being are both dependent and affected by behaviours, in such a way that individuals who maintain healthy habits usually exhibit higher levels of well-being and vice-versa. Hence, programs pointing at improving well-being may be complemented by other existing interventions that aim at supporting a healthy lifestyle, thus representing a pertinent strategy to enhance, simultaneously, both mental and physical well-being. (51,56)

Nonetheless, despite its promising results, more research is still needed to optimise individual interventions (59,91). Furthermore, it must also be acknowledged that this type of approach is mainly centred upon the individual factors of well-being, and it does not consider all its determinants and dimensions, previously described. Consequently, it is of utmost importance to shift our attention to the upstream determinants of health and well-being and to focus on larger systems-level interventions (53,59).

## **5.2. Population-based Strategies**

Psychosocial interventions are a systematic effort to modify the social and psychological factors known to have an impact on health and health-related behaviours. As already mentioned throughout this review, these psychosocial processes represent one of the links between macro-structural factors and health, and they occur in a multilevel manner, that encompasses: the family, the social network, workplace, community, and the population level. (59)

The Health-in-All-Policies strategy, which incorporates health as a central outcome in all social departments, allows for a collaborative approach across different sectors, thereby maximising health policies and enhancing population's health more efficiently. (87)

In this sense, to incorporate happiness and well-being as national initiatives, it is crucial to tackle some key components (94). First, it is necessary to monitor the levels of happiness and well-being across the nation, and to identify its determinants. It is essential to build partnerships with diverse community stakeholders in all sectors, to study community's strengths and needs, and to disseminate existing initiatives (87,94). It is also important to adapt, disseminate, implement, and evaluate scalable evidence-based interventions in diverse and multi-level settings; to engage the public with effective messaging regarding happiness and well-being; and lastly, to identify and address the disparities in the pertaining topics (94).

Conversely, there are some cost-effective, one-size-fits-all, policy recommendations that a recent Delphi study revealed (Table 7) to yield greater happiness (as overall life satisfaction) to a greater number of citizens, and which presented higher effectiveness and feasibility average ratings (95).

**Table 7** – Policies to greater happiness for a greater number of citizens: Results from a Delphi study. Adapted from (95).

<b>Approach</b>	<b>Specific strategies</b>
<i>Investment in happiness research</i>	Understand what works for whom Monitor happiness in nations over time Assess how much of the things regarded as beneficial for happiness are optimal
<i>Investment in good governance</i>	Institutional quality (in the country and in civil services) Empower and involve citizens
<i>Work</i>	Improve working conditions Reduce unemployment
<i>Support of vulnerable people</i>	Focus on the least happy Reduce loneliness Combat discrimination Provide minimum income security Support families
<i>Strengthen social bonds</i>	Promote voluntary work Increase support for non-profit organizations Support local fairs and festivals
<i>Investment in healthcare</i>	Free health care Prioritise prevention Encourage healthy living Invest in mental health
<i>Investment in education</i>	Foster freedom of choice Introduce life skills into school curriculums



All things considered, even though it is more difficult to plan and to execute population-based interventions, these hold a large potential for public health impact. Therefore, a paradigm shift must be undergone towards health promotion in the population, community, worksite, and organizations, that considers happiness and well-being. (59)

### **5.3. Implications for Portugal and Future Perspectives**

In the previous sections we have discussed some individual- and population-based strategies that have shown to yield great potential for enhancing individuals' happiness and well-being. Herein, we transpose these rationales and shapeshift them to better suit the case of Portugal.

Regarding primary healthcare services, family doctors reveal a generalised feeling of short consultation times to appropriately manage the most abundant attendants—multimorbid. Additionally, there is a scarcity of multidisciplinary healthcare professionals, *e.g.*, psychologists, to whom referral after the application of the aforementioned structured interview, that would address patients' happiness (section 5.1) (7). Alike primary care services, the current mental health budget is insufficient to reduce the clinical and socioeconomic burden associated with mental illnesses and its related inequities found in the Portuguese society (11,18,96,97).

Notwithstanding, similarly to what happened in previous economic crisis, the current pandemic could also lead to cost containments in the Portuguese health system (11). Nonetheless, these cuts must be taken with extreme caution, since this pandemic has further heightened the pre-existing services' vulnerabilities as well as the social inequalities in Portugal and so, public health cannot be accomplished without first addressing those health and well-being disparities (11,13,17).

On the other hand, it is vital to integrate mental well-being as an essential mental health outcome in healthcare services, apart from mental illnesses. To do so, it is important to consider psychological interventions that contemplate both the barriers as well as the available resources to build psychosocial adaptation processes, that focus on the maintenance and promotion of well-being despite the presence of stressful life events. In this sense, positive psychotherapy is an approach that aims at strengthening patients' positive resources, while undoing or decreasing mental illness. (98)

Considering this positive psychotherapy approach, a study conducted one month after the beginning of the confinement period identified the main coping strategies utilised by the participants to deal with the impact of the COVID-19 outbreak. It has also revealed that the use of less adaptive coping strategies highly predicted anxiety, depression, and negative emotions, whereas the use of positive reframing skills, for instance, was a strong predictor of less negative emotions and a protective factor against stress and depression. Accordingly, these data may constitute an early guide for the development and implementation of PPIs in Portugal. (14)

Alternatively, digital mental health also presents as a highly flexible, adaptable, scalable and low delivery cost opportunity to provide individual-based strategies, for the enhancement of mental health and well-being, that is not yet fully disseminated in Portugal (15,99,100). Digital mental health offers not only a solution to mitigate the impacts of the COVID-19 pandemic, but also to broadly promote health and well-being (15,101).

Altogether, through a life course perspective that addresses the happiness and well-being of the Portuguese population— by investing in education, happiness research and healthcare services, through the promotion of good governance and working conditions, strengthening of social bonds, and support of vulnerable people (95)— it is possible to focus on the upstream determinants of health and, thereby, to improve population's health status (59,94,95).

## 6. Conclusion

This review aimed at exploring the impacts of happiness on health and to discuss some of the interventions used to enhance individuals and populations' happiness and well-being, subsequently transposing those foundations and its further implications to the Portuguese society.

Andrew Steptoe wrote that “*Enhancing populations well-being is a laudable societal aim, whether this translates into improvements in health has yet to be proven.*” (20). Even though the exact mechanisms that link happiness and well-being to health are not yet fully uncovered, and despite the fact that there might be some publication bias, making it difficult to draw firm conclusions, preliminary research on the topic is well funded, replicated and extended (25,53).

Nevertheless, the distinction between health and well-being is unclear, and so many measurements of well-being are parallel to multidimensional measures of health. Therefore, it is necessary to create a firm separation between these constructs. Additionally, due to the inability to establish an agreed and fully operationalizable definition of happiness and well-being, perhaps it would be beneficial to use these concepts as more generic and comprehensive terms, that reflect multiple dimensions (49). Furthermore, it is also important to consider that striving for happiness is not free from harm, and that it may lead to feelings of guilt or failure if the desired outcome is not achieved (20).

Notwithstanding, this is a non-systematic review, and so, the work presented must be taken with caution. However, it adds up to the vast literature of happiness studies and introduces its potential benefits as a health promoting tool in Portugal.

The COVID-19 pandemic has disrupted the world in an unprecedented manner; however, it also presents as an excellent opportunity to rethink and rebuild society and health systems. It is clear that the focus on health promotion and illness prevention is, in the long run, one of the most cost-effective health strategies (4). And so, even though the promotion of safe and structured environments and societies, in which people can strive and achieve their full potential is an admirable societal aim (20), it is also a feasible outcome with significant impacts on health. Consequently, given that the happiness and health of the Portuguese population is far from being the best (1,2), it is important to consider them in an integrated approach and to incorporate the enhancement of happiness and well-being as a national goal.



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