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Abstract

Different philosophical strands have developed distinct well-being conceptions, which are nevertheless strongly linked. For instance, many typical well-being components in eudaimonic philosophies correlate with subjective life assessment measures. Existing empirical research also provides many insights into which factors determine human well-being, such as health and the quality of relationships. However, the causal ordering of these factors is often not explicitly considered, although doing so would be crucial for the identification of intervention points and a correct estimation of effect sizes in empirical studies. In response to these two observations, we propose a unified causal framework of the main pathways determining human well-being in its different conceptions, with a focus on those prominent in sustainability research and the subjective well-being community. The framework considers environmental, economic, societal, political, social, and psychological factors and shows how they interact. It combines insights from theories of human needs, the capabilities approach, and research on subjective indicators. We illustrate the use of the framework with examples of societal interventions on well-being, environmental impacts, and sustainable well-being policies.

Keywords: well-being, causality, eudaimonic, hedonic, sustainability, subjective

1 Introduction

Many scientific disciplines work on a better understanding of human well-being and its determinants. In recent decades, research on subjective well-being (SWB) – how people experience their lives affectively and cognitively (Ed Diener 1984) – has produced substantial empirical advances on the predictors of different well-being measures (Ed Diener et al. 2018).

Well-being is also an important concept in sustainability research, our own field, which analyses how to enable human well-being while limiting ecological impact (Dietz 2023; Rogers et al. 2012) and how ecological degradation impacts well-being (Adger et al. 2022; Schrijver et al. 2025). To do so effectively, it depends on a thorough understanding of what well-being is, how it can be measured, and what influences it. While the sustainability literature often refers to empirical research results from the SWB community, it is also characterised by a larger diversity both in terms of considered well-being theories and in terms of assessment methods (Brand-Correa and Steinberger 2017; Lamb and Steinberger 2017). For instance, while SWB

research is by definition only interested in subjective assessments, objective well-being indicators are common in sustainability research.

In this diverse research landscape, we make two observations.

First, although different philosophical strands have developed distinct definitions of well-being, the different conceptions have strong causal links with each other, and should be seen as components of a common system. We summarise the different philosophical conceptions of well-being most prominent in the SWB and the sustainability communities in section 2, while also explaining some terminological inconsistencies between these communities that might cause misunderstandings in interdisciplinary research settings.

Second, existing empirical research provides many insights into which factors determine human well-being, especially subjective life assessments (Clark et al. 2018; Deeming 2013; Ed Diener et al. 2018; Dolan et al. 2008; Helliwell et al. 2015; Huppert 2009; Veenhoven 2010). However, the causal ordering of these determinants is generally not explicitly considered. Instead, they are often presented as lists, which is not incorrect, but incomplete. To give a small example, consider the variables ‘gender’ and ‘time spent with family members’. Both influence well-being and are therefore determinants of well-being. At the same time, in a patriarchal society, one’s gender also influences how much time one spends with family members. i.e., gender is also a determinant of time spent with family members. Part of the effect of gender on well-being can be explained by this differing time use. Therefore, important information is lost by simply listing the two variables as determinants of well-being. In section 3, we explain why taking into account the causal structure of determinants is crucial for the identification of intervention points and a correct estimation of effect sizes in empirical studies.

In response to these two observations, we propose a unified causal framework of the main pathways that determine human well-being in its various conceptions, with a focus on those prominent in sustainability research and the SWB community. The framework considers environmental, economic, societal, political, social, and psychological determinants of well-being and shows how they interact. We explain the framework in section 4 and present several application examples regarding societal interventions, environmental impacts, and sustainable well-being in section 5.

Our article makes several contributions. Most importantly, our well-being framework goes beyond existing attempts to “sort” the complexity of different conceptions of well-being and their determinants. While there have been proposals for well-being frameworks in the literature, these existing ones typically only consist of theorised components of (subjective) well-being, not their determinants (Durayappah 2011; Rauschmayer et al. 2010; White 2010). Two frameworks come closer to what we are proposing in this paper. First, Juster et al. (1981) have proposed an economic accounting framework that can be understood as an implicit causal model. However, it is restricted to causal links from production systems towards households (without any feedbacks) and limited to an understanding of well-being as ‘utility’. Headey (1993) has adapted this accounting framework for the determinants of life satisfaction. Second, the Centre for Well-being of the new economics foundation uses a framework that makes a distinction between functionings and feelings on the well-being side as well as between external conditions and personal resources on the determinant side (Abdallah 2011; Michaelson 2014; Thompson and Marks 2008). Compared to this existing work, our framework further differentiates determinant categories, integrates more conceptions of well-being, and considers additional determinants and causal links.

In addition to this main contribution, the article is also relevant for readers interested in different approaches to modelling the causal determinants of well-being. Moreover, section 2 provides a clarification of the different uses of well-being terminology in the SWB and the

sustainability literature.

2 Different philosophical conceptions of well-being

Different philosophical schools have developed distinct conceptions of the term ‘well-being’ that can be categorized as hedonic, eudaimonic, and preferences based (Crisp 2021; E. Diener et al. 2018; Dodds 1997; Dolan et al. 2006; Lamb and Steinberger 2017). While for this article we take an agnostic stance on the choice of well-being conceptualisation, we here summarise the existing conceptions, as we will later see how they occupy different categories of a causal network.

2.1 Hedonic well-being

According to the hedonic conception, well-being means the presence of pleasure and the absence of pain. It is based on the works of Aristippus and, in a more nuanced form, Epicure (Honderich 2005). Epicurean hedonism has sometimes been framed as the philosophical basis for the goal of economic growth (Brand-Correa and Steinberger 2017; Lamb and Steinberger 2017). However, one should keep in mind that Epicure centred many of his concepts around the idea of satisfiable and unsatisfiable desires, and claimed that following the latter will always lead to unhappiness (Mitsis 1988). Therefore, Epicure himself should be understood as an advocate for sufficiency (O’Neill 2006) – not as an end in itself, but as a means to achieve pleasure and avoid pain in the long run. However, hedonism is insofar linked to utility maximisation (which is often used to justify growth) as hedonic well-being is the object of interest in classical utilitarianism. Utilitarianism in general is a normative ethical theory claiming that “the morally right action is the action that produces the most [overall] good” (Driver 2022). This ‘good’ could in principle be many different things, but the “Classical Utilitarians, Jeremy Bentham and John Stuart Mill, identified the good with pleasure, so, like Epicurus, were hedonists about value” (Driver 2022).

2.2 Eudaimonic well-being

The eudaimonic conception of well-being goes back to Aristotle¹, who claimed that a good life means living “in accordance with virtue” (Aristotle 2014), which is often understood as living up to one’s full potential (Ryff 1989). Eudaimonic well-being has been interpreted differently in the sustainability and SWB literature.

The sustainability literature gives little attention to the meaning of “virtue”. Instead, it identifies as the central property of eudaimonism the claim that there are objective constituents of well-being, which are ends in themselves and not just means for more positive and less negative feelings (Crisp 2021; Haybron 2020): “Indeed, we feel good about fostering such goods because we believe they are of value. We do not just value being in the right subjective states.” (O’Neill 2006). This interpretation results in classifying theories of basic human needs (Doyal and Gough 1984; Max-Neef et al. 1991) and the capabilities approach (Nussbaum 2015; Nussbaum and Sen 1993; Sen 2008) as eudaimonic well-being theories (Brand-Correa and Steinberger 2017;

¹ Aristotle was not the only Ancient Greek philosopher concerned with the concept of ‘eudaimonia’ (which can in fact be translated as well-being). Rather, different streams in Ancient Greek philosophy proposed different definitions of the term. In this logic, Epicurean hedonism would also have to be understood as a eudaimonic theory, but one that equates eudaimonia with pleasure (Broadie 2015). However, in the two well-being literature fields that we are focusing on here, eudaimonic well-being is usually understood as Aristotelian (Abdallah 2011; Deci and Ryan 2008; O’Neill 2006). Throughout the article, we therefore use the term in this narrower interpretation.

Lamb and Steinberger 2017; O'Neill 2006). Proponents of human needs theories claim that while there are infinitely many different strategies to satisfy human needs, the needs themselves are finite, few, and universal (Max-Neef et al. 1991). Moreover, the satisfaction of one need cannot substitute the satisfaction of another (Brand-Correa and Steinberger 2017; O'Neill 2010). The capabilities approach, in contrast, claims that it is not need satisfaction itself that counts (or, in the terminology of the capabilities approach, functionings), but what people *can* do if they want to (i.e., what capabilities they have). Nussbaum (2000) has proposed a list of “central human capabilities”, which she considers as a “moral basis of central constitutional guarantees” (Nussbaum 2000). Despite the philosophical difference between human needs and capabilities, this list of central human capabilities can be quite straightforwardly mapped to lists of human needs (Brand-Correa et al. 2020).

In the SWB literature, well-being conceptions providing ‘objective lists’ are usually seen as a distinct category from eudaimonic well-being (Abdallah and Mahoney 2024; Dolan et al. 2006). Instead, eudaimonia is interpreted closer to the Aristotelian ideals of virtue and fulfilment of potential, often called “flourishing”. The concrete theories differ in whether they localise flourishing in the personal traits (motivations and orientations), behaviour, or feelings of a person (Abdallah and Mahoney 2024). The two interpretations of eudaimonia overlap insofar as many operational definitions in the SWB literature provide lists of elements very similar to human needs, especially when the definitions are focused on behaviour or functionings. Theories that explicitly use the term ‘needs’ are, for example, Self-Determination Theory (Ryan and Deci 2000; Ryan and Deci 2001) and the theory of Humanistic Well-being (Vittersø 2025). However, given the SWB perspective, they usually only consider subjective assessments and/or focus on “psychological” needs.

2.3 Preference-based well-being

The preference-based conception of well-being, standard in welfare economics (Crisp 2021), refrains from defining well-being components, be it emotions or others. Instead, it proposes that the only thing that counts for the well-being of a person is the fulfilment of their individual preferences (or desires) independent of their nature. Usually (although not necessarily), this conception of well-being goes hand in hand with the assumption that, all else staying equal, more consumption is always better (Fleurbaey 2009), although marginal returns might shrink. For a good summary of the criticisms of preference-based well-being, and especially the assumption that preferences can be revealed in a meaningful way via market decisions, see Dodds (1997). In the past, there have been attempts to reconcile preference-based conceptions of well-being with the fact that preferences can adapt to circumstances (Weizsäcker 2024).

2.4 Subjective and objective well-being

Throughout the literature, there are inconsistent uses of the terms subjective and objective well-being. In the sustainability literature, hedonic well-being is sometimes called subjective well-being and eudaimonic well-being objective well-being (O'Neill 2006) due to the interpretation as objective components. However, this is misleading insofar as subjective/objective can also refer to the type of assessment one might choose to determine a person's well-being. Here, subjective means self-reported assessment, and objective means an external assessment that follows a scientific method, making it (ideally) independent of who is performing the assessment. Well-being according to all three philosophies discussed above can be assessed both subjectively and objectively (Brand-Correa and Steinberger 2017). Examples for all six cases can be found in

Assessment Philosophy	subjective	objective
hedonic	ask person how they feel	measure person's endorphine levels, brain activity, ...
eudaimonic		
sustainability literature: objective components	ask person if they have enough food, are in good health, ...	measure person's calory intake, blood pressure level, ...
SWB literature: flourishing	ask person if they have meaning in their life, try to be a good person, ...	observe person's behaviour
preference-based	ask person what they prefer	observe choices (typically in a market)

Table 1: Examples for subjective and objective measurements of hedonic, eudaimonic, and preference-based well-being. Inspired by Brand-Correa and Steinberger (2017) and Gasper (2007), extended to preference-based well-being and SWB accounts of eudaimonia.

table 1. Therefore, we use ‘subjective’ and ‘objective’ for the mode of assessment rather than the underlying philosophy of well-being. This is also supported by the fact that Ancient Greek philosophers did not use this distinction, which only developed in the 18th century² (Karskens 1992).

In the SWB literature, the term “subjective well-being” usually refers specifically to the trio of (subjectively assessed) “frequent positive affect, infrequent negative affect, and cognitive evaluations such as life satisfaction” (Ed Diener 1984), sometimes extended by eudaimonia (in the flourishing interpretation discussed above). Life satisfaction (or, more broadly, life assessment) is not listed in table 1. Self-reported life assessments are obviously subjective assessments. However, their philosophical classification is controversial. Some authors classify them as hedonic (Disabato et al. 2016; Lamb and Steinberger 2017). In contrast, Deci and Ryan (2008) point out that life satisfaction is not a strictly hedonic measure as “it involves the cognitive evaluation of the conditions of one’s life”. Similarly, O’Neill (2006) argues that respondents to life assessment surveys are more likely to try to aggregate the state of different ‘objective’ well-being constituents rather than summarise their feelings. In this logic, life assessments are subjective and aggregated measures of eudaimonic well-being in the objective components interpretation, with an unknown weighting of the different components. This weighting seems to be influenced by the exact question formulation. For instance, the Cantril Ladder question³

²This point can also be seen as a major argument against the objective components interpretation of Aristotle’s eudaimonia. Only from a modern philosophy viewpoint, one can even ask whether Aristotle was concerned by objective criteria for well-being.

³“Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?”

differs from the standard life satisfaction question⁴: Nilsson et al. (2024) found that the Cantril Ladder is more strongly associated with ideas of power and wealth due to the ladder motive. Independent of this question of final weighting, people could also use their personal preferences as a measure stick for different aspects of their lives. While there is initial evidence that human preferences coincide with eudaimonic well-being components (Benjamin et al. 2025), they conceptually do not have to. Due to the unclear philosophical rootedness of life assessments, some authors put them in their own category, “evaluative well-being” (Abdallah and Mahoney 2024; Ed Diener 1984; Dolan et al. 2006; Layard and De Neve 2023).

We argue that life assessments (and subjective indicators in general) are worth studying independently of the chosen well-being philosophy. They carry an important signal that can reveal potential blind spots of objective measures, regardless of how exactly people form their responses to life assessment questions. For example, in a situation of apparently good performance on objective indicators, persisting low levels of life assessment in a population could indicate that an important well-being component (or, following the hedonic perspective, an important source of pleasure or pain) has been overlooked when selecting these objective indicators.

At the same time, research on subjective indicators has shown important psychological biases that must be taken into account when interpreting the results. For instance, numerical scales used to measure life satisfaction are known to induce a simplification of the scale to “focal values”, especially among respondents with a low numeric literacy (Barrington-Leigh 2024). Moreover, changes in objective living conditions often have only short-term effects on emotional experiences and life assessments, a phenomenon called “hedonic treadmill” (Kahneman and Krueger 2006). From a eudaimonic perspective (in the objective components sense), subjective well-being indicators can therefore only be a complement to objective ones, although we think an important one.

3 Why the causal structure of well-being determinants matters

Studying the determinants of well-being implies searching for factors that have a *causal effect* on well-being. The importance of causality is recognized in the literature on the determinants of well-being, for instance when stressing the difference between correlation and causation. Despite this, the field usually presents the results of well-being research in the form of lists of determinants (for examples, see table 2 based on Clark et al. (2018), Deeming (2013), Ed Diener et al. (2018), Dolan et al. (2008), Helliwell et al. (2015), Huppert (2009), and Veenhoven (2010)). Such a presentation ignores the fact that these determinants are inter-related, and indeed situated at different levels of an ordered causal network⁵.

Identifying the causal structure of social systems is inherently difficult, but it is usually the ultimate motivation for researching these systems. This is because knowing the causal setup of a system enables effective *interventions* (Tay and Kuykendall 2013), as well as a correct estimation of their effects.

The question of interventions is closely linked to the fact that causal structure carries information that goes beyond the concept of “determinants”. In colloquial terms, a variable is one of

⁴“All things considered, how satisfied are you with your life as a whole these days? Use a 0 to 10 scale, where 0 is dissatisfied and 10 is satisfied.”

⁵Clark et al. (2018) do present an ordering of variables into different time periods, which they also understand as a causal ordering. However, they do not present a full causal network taking into account influences inside of a time period, or additional confounders.

Determinant	Huppert (2009)	Diener (2018)	Dolan (2008)	Clark (2018)	Helliwell (2023)	Veenhoven (2010)	Deeming (2013)
Health	*	x	x	x	x	x	x
Income	x	x	x	x	x	x	x
Socio-economic position	x					x	x
Unemployment	x	x	x	x		x	x
Genes	x	x					
Parental care	x			x			
Parent's mental health				x			
Education				x		x	x
Community	x		x			x	
Relationship(s)	*	x	x	x	x	x	x
Age	x	x					x
Values	x				x	x	
Personality	x	x				x	
Meaningful goals	x	x					
Freedom					x	x	
Corruption		x			x		
Equality	x	x				x	
Rule of law						x	
Good citizenship						x	
Cultural pluriformity						x	
Modernity						x	
Political freedom		x					
Green space		x					

Table 2: Determinants of Subjective Well-being listed in some influential reviews

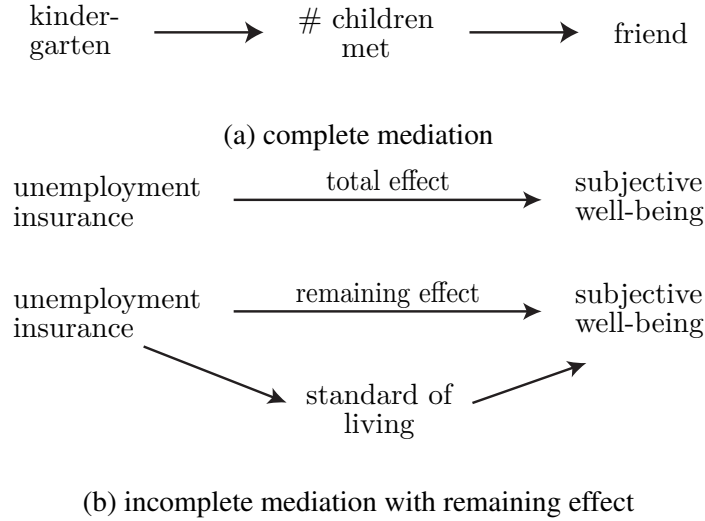


Figure 1: Illustrations of examples for causal mediation

the determinants of another variable if intervening on the former (and not on any other variable) causes the latter to change. In causality theory, a term more commonly used than ‘determinant’ is ‘cause’. For a mathematically more sound definition of causal effects, see Peters et al. (2017). Here, we stick to ‘determinant’ as the term most often used in the well-being literature. The causal effect of a determinant does not have to be direct, and can be mediated via other variables, which are then also determinants. For instance, both going to kindergarten and meeting many other children make it more likely for a child to find a friend. However, the effect of going to kindergarten could be fully mediated by meeting many other children (Fig. 1a). In this case, holding constant the number of other children a child meets makes it irrelevant whether the child also goes to kindergarten or not. Simply listing both ‘kindergarten attendance’ and ‘number of children regularly met’ as determinants of ‘finding a friend’ omits the fact that sending the child to kindergarten would, at least in our hypothetical example, only have an effect on the child finding a friend if there is no other intervention on whether it meets many other children.

Causal structure is also particularly relevant for the selection of control variables when trying to measure the effect size of a determinant, for instance in regression models. For example, for a person losing their job, having unemployment insurance will have a positive total effect on their life satisfaction compared to a counterfactual world without the insurance. A big part of this effect can be explained (is mediated) by the insurance payments allowing the person to maintain their standard of life (Fig. 1b). However, being insured is also likely to have an effect beyond the maintained standard of living, for instance, by sparing the individual from the potentially humiliating process of having to ask for social aid. In this example, it is clear that the insurance, the standard of living, and the avoided confrontation with the social welfare office are not at the same level of the causal chain. This means that neither standard of living nor meetings with the social welfare office should be selected as control variables if one is interested in the full effect of the insurance on life satisfaction. Consider a model regressing the life satisfaction of a freshly unemployed person on the existence of unemployment insurance. If one wants to assess the total effect of the insurance, controlling for the standard of living would lead to an underestimation of the effect and should therefore be refrained from. One would only control for the standard of living if one is interested in the remaining effect of the insurance beyond the fact that it allows one to maintain the standard of living. In any case, one should control for *confounders* (i. e., variables that influence both the dependent and independent variables, in this case well-being

and the standard of living), such as pre-unemployment income⁶.

An inherent problem in well-being research is that conclusions must mostly be drawn from observational data, which imposes certain limitations on causal claims. However, these limitations do not excuse researchers from thinking about causality and selecting control variables, based on the principles outlined above and their domain knowledge. Failing to do so (for instance, by simply controlling for any variable available) unnecessarily obscures the analysis.

The arguments on causal structure above, and especially the illustrations in Fig. 1, are implicitly based on causal inference theory in the tradition of Judea Pearl (Pearl 2000). While being powerful, this causality framework has an important limitation: Usually, variables are either defined at one single point in time or have no notion of time (Peters et al. 2017, p. 10). A main assumption is acyclicity, i. e., that no variable can have a causal influence on itself, be it directly or via other variables. This is contrasted by the vast field of dynamical systems, in which the change over time of variables is explicitly modelled, allowing for feedback loops between system components. Most real-world systems, from biology to economics, are dynamically evolving and substantially driven by feedback loops (Meadows 2008). This is also the case for the system of well-being determinants. For instance, a good relationship with a friend causes positive emotions, which then increase the motivation to take care of this friendship. Such feedback structures are typically represented by causal loop or stock-and-flow diagrams⁷. When interested in modelling the development of well-being and its determinants over time, it is usually better to use the dynamical systems approach. However, one can also often find a “static” formulation that allows using insights from causality theories based on the assumption of acyclicity. The latter is the standard approach in most studies on well-being determinants. For instance, feedback loops do not have to be explicitly taken into account when studying the effect of educational interventions on life satisfaction a month after the intervention, or the effect of need satisfaction during childhood on skills as an adult, because the variables are defined at specific points in time. In both approaches, dynamic and static, it is crucial to reflect on a) the choice of considered time scales (for instance, some effects need time to proliferate) and b) the timing of interventions (as humans have a limited lifespan with specific phases).

We are not the first to point out the importance of causal structure in well-being research. For instance, Gough and Thomas (1994) highlighted the interconnectedness of factors influencing basic human needs satisfaction. Also, the concept of mediation will not come as a surprise to social scientists and psychologists trained in quantitative methods and has been used in studies on well-being (De Neve and Oswald 2012; Ed Diener and Tay 2017; Ed Diener et al. 2013; Godoy et al. 2006; Kaiser and Trinh 2021; Newman et al. 2014; Reyes-García et al. 2016; Tay et al. 2018). However, both the presentation of well-being determinants and the development of quantitative models often ignore causal structure and interdependencies between determinants.

4 The framework

We propose a unified framework (Fig. 2) that addresses both the close interconnectedness of measures derived from different philosophical conceptions of well-being, as well as the need for a causal structure approach to their determinants. Our framework builds on several concepts

⁶For a more detailed discussion of how to choose control variables (in causality called “adjustment sets”), see for instance Peters et al. (2017).

⁷Recently, there have been efforts in the causality field to extend its mathematical theories to the realm of dynamical systems (Blom et al. 2020; Bongers et al. 2022; Iwasaki and Simon 1994; Mooij et al. 2013; Peters et al. 2022; Rubenstein et al. 2018). However, most contributions so far focus on the asymptotic behaviour of dynamical systems, which is not really helpful for the dynamics of human well-being.

developed in the well-being literature.

First of all, we differentiate between the influence of the environment a person lives in (as well as their position in it) and the influence of a person's individual characteristics on their well-being. Veenhoven (2010) names these two categories *livability* and *life-ability*, respectively. In her capabilities approach, Nussbaum (2011) makes a very similar distinction between *external circumstances* and *internal capabilities*, where she defines internal capabilities as "characteristics of a person (personality traits, intellectual and emotional capacities, states of bodily fitness and health, internalized learning, skills of perception and movement)" (Nussbaum 2011). It has also been stressed in the well-being framework of the Centre for Well-being (Abdallah 2011; Michaelson 2014).

Secondly, we include the satisfaction of human needs (in the understanding of Max-Neef et al. (1991)) as a central pathway for the influence of any variable on affect and life assessments (Tamberg et al. 2024). We make a differentiation between needs, which are supposed to be universal, and satisfiers, which may vary between different socio-economic systems (Doyal and Gough 1991; Max-Neef et al. 1991). According to Max-Neef et al. (1991), there are nine universal human needs: subsistence, protection, understanding, participation, leisure, creation, identity, and freedom.

Thirdly, we take into account that humans have the ability to perceive and evaluate all kinds of aspects of their lives, such as the general setup of the socio-economic system or their individual position in it, and not only their level of need satisfaction. These factors certainly influence life assessments *via their effect on need satisfaction*, but they may also be *directly evaluated* by this same person based on their values and expectations (which in turn are influenced by society). For instance, income might determine how well one can satisfy one's needs in a market-based society, but it may also influence one's life assessments because of the belief that a high income is something good in itself. Such an effect of income on life assessments beyond need satisfaction was, for instance, found by Ed Diener et al. (1995), Ed Diener et al. (2010), Tamberg et al. (2024), and Tay and Ed Diener (2011).

While our framework (Fig. 2) is motivated by the need for a causal perspective on the determinants of well-being (see section 3), it is not entirely consistent with the common graphical presentations of either causal networks (usually represented by directed acyclic graphs) or dynamical systems (usually represented by causal loop diagrams)⁸. Instead, it can be used as a template when developing a causal loop diagram or DAG for a specific research question involving concrete indicators.

In the following, we will explain the framework components, which are categories of variables, and their links in more detail.

Variable categories

⁸Most evidently, the boxes in Fig. 2 represent categories of variables instead of single variables. Also, the framework includes links that lead to cycles. As discussed in section 3, this is normal in causal loop diagrams but not in DAGs.

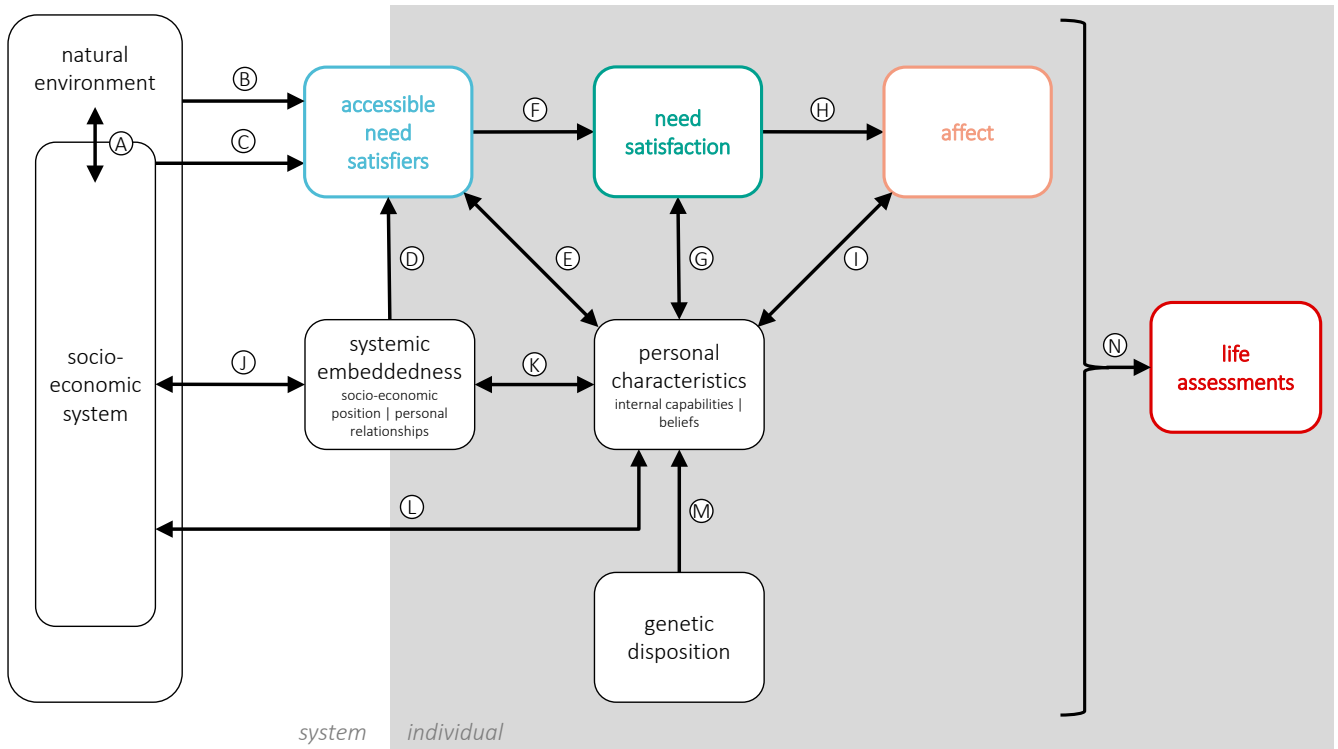


Figure 2: Framework of well-being determinants for one individual. Boxes represent categories of variables. The different background tones indicate whether the categories are located at the systemic or individual level, or at the interface between the two. In the case of systemic embeddedness and personal characteristics, there are two sub-categories. The term ‘internal capabilities’ (Nussbaum 2011) summarizes concepts such as skills or personality. ‘Beliefs’ is an umbrella term for ideology, preferences, etc. (see Table 3 for more details). Arrows from one box to another depict direct causal links between the variables represented by the parent and child boxes. An arrow with two arrowheads means that there are causal links in both directions.

Category	Examples
natural environment	climate and weather, biodiversity, natural resources, ...
socio-economic system	political system, societal values, economic production, social movements, laws, culture ...
systemic embeddedness	
socio-economic position	relative income, level of power associated with job, privileges/discrimination, ...
personal relationships	quantity and quality of relationships with friends, family members, romantic partners, ...
personal characteristics	
internal capabilities	“personality traits, intellectual and emotional capacities, states of bodily fitness and health, internalized learning, skills of perception and movement” (Nussbaum 2011), critical understanding, social skills, ...
beliefs	ideological orientation, political opinions, personal values, preferences, expectations, ...
accessible need satisfiers	work conditions, political rights, economic goods ^a such as food, meetings with friends, festivities, clean air ...
need satisfaction	following Max-Neef et al. (1991): subsistence, protection, affection, understanding, participation, idleness, creation, identity, and freedom
affect	emotions and moods
life assessment	life satisfaction: “All things considered, how satisfied are you with your life as a whole these days? Use a 0 to 10 scale, where 0 is dissatisfied and 10 is satisfied.”, life evaluation (Cantril Ladder): “Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?”, ...

Table 3: Variable categories of the framework

^aWhile Max-Neef makes an explicit differentiation between need satisfiers and economic goods, we argue that economic goods can be treated as a sub-category of need satisfiers without a loss of analytical power.

Links

In the following, we discuss the incoming causal links of each variable category. Given the conceptual nature of the framework, we do not make any assumption on the functional form of the dependencies (which can also differ between different variables represented by the same box).

It may also involve the interaction of variables (i.e., the effect of one variable depends on the state of the other, and vice versa). Such an interaction can be described as a moderation of one variable's effect by another. Moreover, the dependency can also be such that the parent category defines the dimensions, types, or range of the variables in the child category. In some cases, there is an overlap between the variables represented by two different boxes. Take, for instance, physical health: It is both an important component of the need for subsistence (Max-Neef et al. 1991) but also a personal characteristic that defines many abilities. In such a case, where a variable could be assigned to two categories depending on its role, we propose to read the causal link between the two boxes as an identity function. We would also like to stress that while we summarise many variables in categories, these variables also have causal links between each other that are not discussed here. For instance, personality is known to impact ideological orientation (De Neve 2015).

Direct links to accessible need satisfiers

- (C) The types, quantities, and qualities of need satisfiers strongly depend on the socio-economic system.
- (D) The extent to which the individual has access to these need satisfiers provided by the socio-economic system is moderated by their socio-economic position (a sub-category of systemic embeddedness). For instance, in a society where goods and services are dominantly purchased with money, a higher relative monetary income guarantees a higher share of the provisioning systems' outputs (in the form of income), which serve as more or less effective satisfiers for human needs. Beyond income, one's socio-economic position can also have an influence on, for instance, the level of political participation or access to nature.
Variables summarised under systemic embeddedness can also directly serve as need satisfiers themselves. For instance, personal relationships are satisfiers for many needs, most importantly affection and participation. A powerful position in society can serve (on the individual level) as a satisfier for identity or security needs.
- (E) Personal skills determine whether a person can actually use potential need satisfiers provided by society. For instance, a society may provide high-quality bike lanes and bikes, but this does not turn into an accessible need satisfier for a person who does not know how to bike.
- (B) Some need satisfiers are also directly influenced by the natural environment (instead of indirectly via the socio-economic system), such as in the case of climatic conditions needed for subsistence.

Direct links to need satisfaction

- (F) Accessible need satisfiers can, in principle, be translated into actual need satisfaction.
- (G) The translation of need satisfiers to need satisfaction is influenced by one's personal characteristics. This includes the choice to use a certain need satisfier or not. For instance, a person might have the skills to ride a bike, own a bike, and be surrounded by adequate biking infrastructure. Nevertheless, depending on their attitude towards biking, they could still decide not to bike, preventing them from satisfying different needs via the increased mobility.

Direct links to affect

- (H) The (missing) satisfaction of human needs impacts the person's emotions and moods.
- (I) The translation of need satisfaction to affect is directly moderated by the individual's personality and mental health (which are part of personal characteristics, which themselves are strongly influenced by societal factors, as we will see later). For instance, a person might "swing" more or less than others, suffer from specific emotional vulnerabilities due to trauma, or learned how to focus their attention during pleasant moments. Also, a person's personality might influence their mood "base level".

Direct links to systemic embeddedness

- (J) The socio-economic system defines the "landscape" of systemic embeddedness: How socio-economic position is determined (for instance via income, or power) and the spectrum of possible positions (i.e., the shape of the distribution). The broad scope of what we term the "socio-economic system" also shapes the social relations people can have. For instance, family structures are influenced by marital rules, themselves a legal encoding of historical patriarchal norms.
- (K) One's systemic embeddedness is, to a large extent, determined by pure chance, such as the family one is born into. However, it can also be influenced by some personal characteristics. For instance, certain skills will provide higher chances of acquiring a well-paid job, or someone with social charisma will be well-regarded and therefore have more friends.

Direct links to personal characteristics

- (E) The nature of accessible need satisfiers affects personal characteristics, especially skills and beliefs. For instance, depending on the accessibility of cars and bikes and their associated infrastructures, a person will more strongly improve their ability to drive a car or to ride a bike. Also, the social practices (Shove et al. 2012) developing around certain need satisfiers influence the attitudes a person holds towards them, such as in our example, the two modes of transport. For instance, in a strongly car-dependent world, it becomes "normal" to use the car for every trip.
- (G) Certain personal characteristics are also influenced by the actual level of need satisfaction (not only the type). For instance, the satisfaction of subsistence needs leads to improved health and therefore more physical strength, and a missing satisfaction of the need for affection can lead to reduced social skills.
- (I) Moreover, affect also has an impact, as emotions are an important determinant of motivation and learning.
- (L) The values, ideology, and political opinions a person holds are influenced by the socio-economic system.
- (K) The relationship between the socio-economic system and one's beliefs is moderated by one's systemic embeddedness. For instance, certain values are held more often by certain social classes, and people tend to adopt attitudes of their peers.

- (M) Genetic dispositions influence personal characteristics in many ways: by defining a potential range (such as for certain personality traits), directly causing characteristics (for instance some diseases), and by interacting with environmental influences (for instance in the case of talents that get activated by training).

Direct links to the socio-economic system

- (A) Given that the socio-economic system is embedded in the natural environment, the two interact in manifold ways. While listing all of them goes far beyond the scope of this article, we will discuss some examples in section 5.2.
- (L) There is feedback from the personal characteristics of individuals to the socio-economic system. For instance, each individual's values influence the values in society in general. Via collective organising, individuals can influence the setup of the socio-economic system based on their political opinions. The stronger their collective organising skills, the better they can do so. Another feedback is that the skills of individuals define what can be produced (and how).

When focusing on the individual, the feedback from the individual to the socio-economic system is weak for most individuals compared to the total effect of the socio-economic system on the individual via all potential pathways. The backwards link becomes important when looking at large numbers of individuals and their aggregated effect on society.

- (I) The link from personal characteristics, especially from values and political opinions, to the socio-economic system is moderated by the systemic embeddedness of the individual: The more powerful the individual is, and the more powerful social relations they have, the stronger the influence.

Life assessments

- (N) When trying to form an overall life assessment, individuals potentially take into account their affective experience, their level of need satisfaction, the need satisfiers accessible to them, their systemic embeddedness, their personal characteristics, the social-economic system as a whole as well as the natural environment it is part of. All these aspects are perceived and evaluated in a way depending on personal characteristics such as values, preferences, expectations, and personality. The weighting of different aspects also depends on the exact question formulation (Nilsson et al. 2024).

The roles of income

Income is an important variable in many well-being studies (Ed Diener et al. 1995; Easterlin 1974; Easterlin and O'Connor 2020; Kahneman and Deaton 2010; Killingsworth 2021; Killingsworth et al. 2023; Sacks et al. 2012). It can be differentiated into variables located at different places in the framework (see Fig. 3). First of all, there is a differentiation between income at the society level (usually measured as GDP per capita) and at the individual (or household) level. All else staying equal, people in richer countries have higher personal incomes, allowing them to buy more goods and services, which act as need satisfiers. This relationship is moderated by the income distribution and one's position in it, i.e., one's relative income (often measured as an income percentile). Beyond this effect via personal income, living in a richer country can also have a direct effect on accessible need satisfiers, for instance, by better public infrastructure.

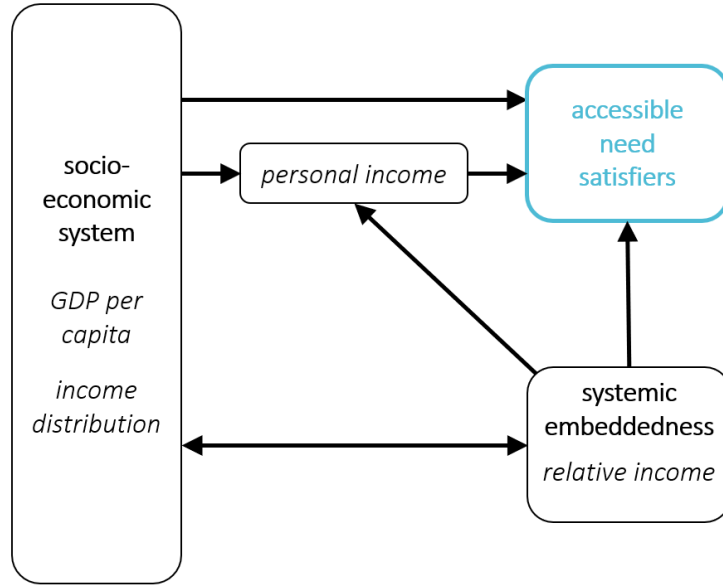


Figure 3: Zoom into the framework to illustrate the position of different income variables

Situating different well-being philosophies

The different well-being philosophies presented in section 2 are interested in different variable categories represented in our framework. Most straightforward is the identification of hedonic well-being as affect.

For eudaimonic well-being in the objective list sense, either need satisfaction (human need theories) or the accessible need satisfiers (capabilities approach) are central. Eudaimonic well-being in the “flourishing” sense (i.e., in the SWB literature) is a bit more complex given the diversity of theories available. Following the classification proposed by Abdallah and Mahoney (2024), they can focus on personal characteristics, need satisfaction, or affect. Preference-based well-being can be understood as the accessible need satisfiers “weighted” by personal preferences (i.e., a subcategory of personal characteristics). As discussed in section 2, it is not clear which philosophical conception of well-being life assessments can be attributed to, or whether they should be seen as their own category.

5 Application examples

In the following, we will present examples of how to reason about causal effects on well-being using our framework. Given the great interest in well-being in sustainability research, after giving some examples of general societal interventions, we will focus on environmental impacts and how to decouple well-being from them (i.e., sustainable well-being).

5.1 General societal interventions to increase human well-being

Societal interventions on well-being, while all stemming from changes in the socio-economic system, can target different determinants of well-being. Our framework helps to understand both the causal pathways that can be used to change these determinants and the potential downstream effects of such interventions. Here, we will discuss three example intervention types (Fig. 4).

First, a straightforward intervention target is the accessible need satisfiers (Fig. 4a). For instance, all else staying equal, increasing the accessibility of healthy food has a positive effect

on need satisfaction (as well as on affect and life assessments further downstream) for an individual whose nutritional needs are not satisfied. This intervention type is not restricted to the production and distribution of goods and services. Changing aspects such as working conditions, decision/making processes, social rules, or information flows at the societal level can all change the quality of need satisfiers available to individuals.

Second, a society can also intervene in the emotional skills of their population, which are part of the category of ‘personal characteristics’ (Fig. 4b). For instance, it can increase the ability of its population to feel gratitude by integrating gratitude exercises in school curricula (implying a change in the need satisfiers accessible to school children). Gratitude interventions have been shown to have a significant positive effect on SWB indicators (Davis et al. 2016; Wood et al. 2010). In our framework, this could be explained by an increased “gratitude sensitivity” leading to a stronger affective reaction to need satisfaction (and possibly a less strong reaction to missing need satisfaction). Although this does not directly improve need satisfaction itself (which would be the relevant outcome for proponents of an objective lists interpretation of eudaimonia), it does improve hedonic well-being and likely also increases overall life assessments (via improved affect, but also via an influence of gratitude on the evaluation of one’s life).

Third, interventions in the socio-economic system can also change the importance of socio-economic position (which is part of systemic embeddedness) for well-being. Increasing the relative socio-economic position of one individual would, on the aggregated level, be cancelled out by the decreased position of others. However, what can be effectively intervened in at the societal level is the level of inequality. Since we know that need satisfaction underlies strong saturation effects, decreasing the span of, for instance, monetary incomes can lift everyone above a necessary threshold, leading to a better aggregate well-being outcome both in eudaimonic and hedonic terms.

So far, the presentation of the examples above, as well as the illustrations, has been restricted to the first-order consequences on well-being, i.e., ignoring the dynamic feedbacks of the system. In principle, the analysis does not have to stop there. For example, it is clear that in the first case, improved satisfaction of nutritional needs can lead to all kinds of improvement of personal characteristics, such as physical skills, but also cognitive ability. In the gratitude exercise example, one can expect a feedback link from affect to personal characteristics. From our framework, it is not clear what the aggregate nature of this feedback will be. For example, improved affective balance (i.e., more positive affect and less negative affect) likely improves all kinds of psychological variables, which then have a positive downstream effect on need satisfaction via objective improvements in one’s life. At the same time, a high level of gratitude could reduce one’s drive to improve their situation individually and/or collectively, with a potential negative effect on need satisfaction compared to a person not gone through the intervention. From this argument, it becomes clear that the framework helps to develop hypotheses over the potential causal effects of an intervention, but not to weigh long-term effect sizes against each other.

5.2 Environmental impacts on well-being

As the system in which our economy and society are embedded, the environment influences human well-being in numerous ways. Given massive human interventions in the environment, such as climate change, it is important to take into account the pathways through which they impact human well-being (Adger et al. 2022). Our framework allows us to differentiate between three major pathways (Fig. 5):

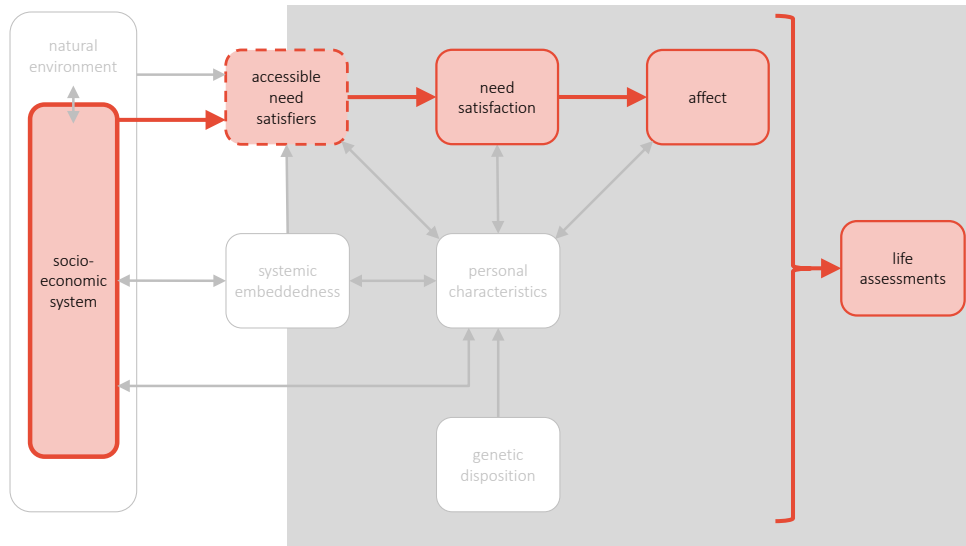
- (a) the direct link between the natural environment and need satisfiers, such as a flood destroying one’s house (potentially interacting with the ability of the society to protect houses

from floods),

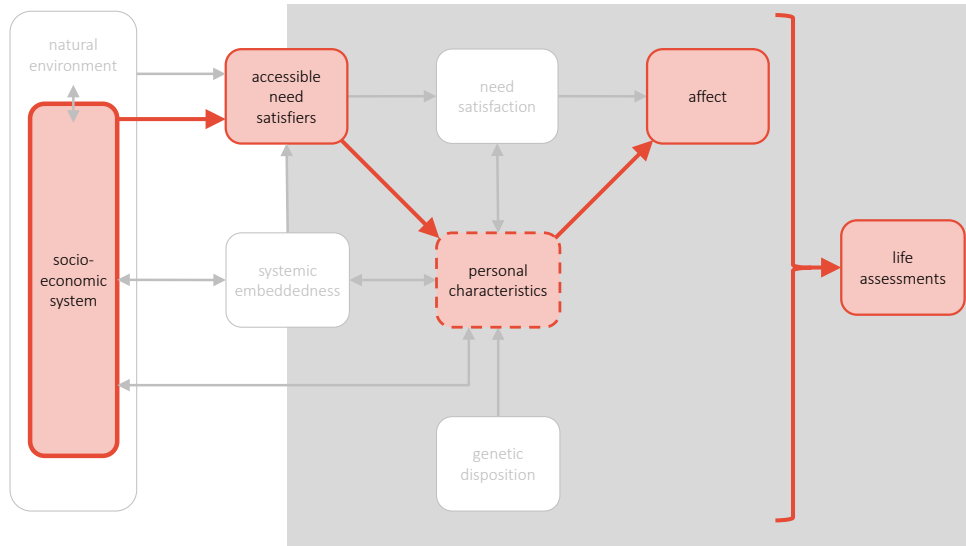
- (b) indirect effects via the socio-economic system, such as the same flood destroying productive capacity and therefore endangering the provisioning of all kinds of need satisfiers, and
- (c) additional feedback effects via changes of personal characteristics due to missing need satisfaction. For instance, an individual traumatised by a flood can contribute less to the societal provisioning of need satisfiers.

As in the case of societal interventions on well-being, feedback effects as in (c) propagate in principle infinitely through the system. For a proper assessment, a dynamic model would be needed.

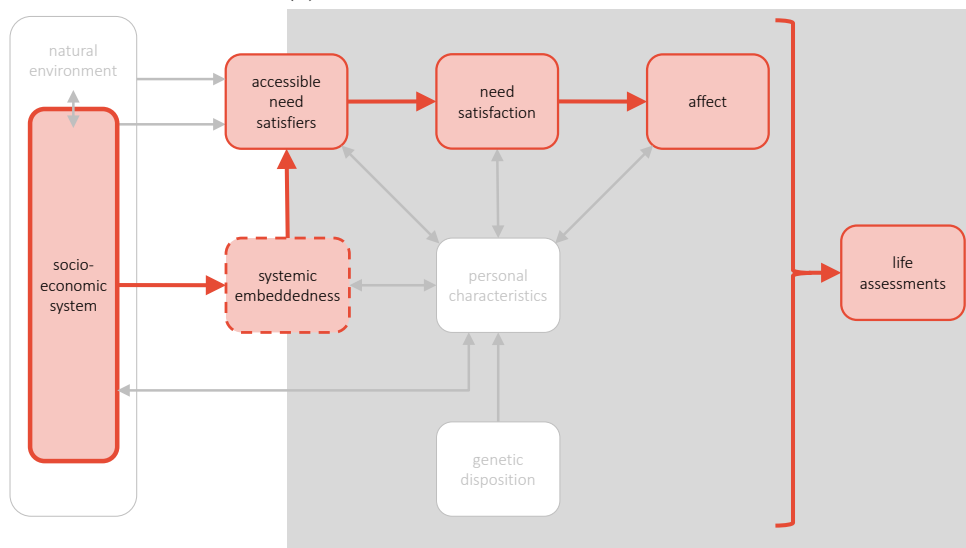
In Fig. 5, the effects of environmental change are considered assuming that initially all other variables remain equal. However, there can be societal interventions in the moderators of these effects. For example, appropriate urban planning can make cities more resilient against heat waves or heavy rain (Dharmarathne et al. 2024; Keith and Meerow 2022).



(a) intervention on satisfiers

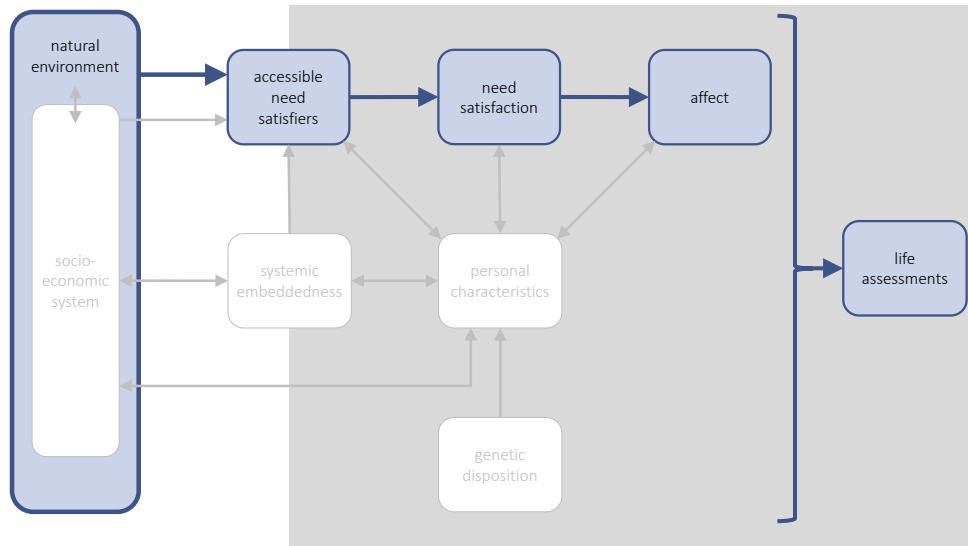


(b) intervention on emotional skills

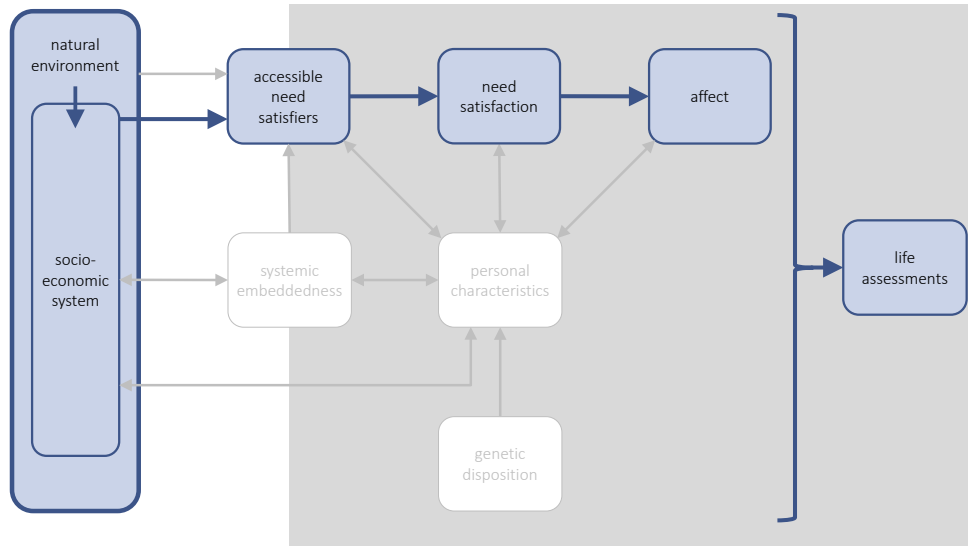


(c) intervention on socio-economic distribution

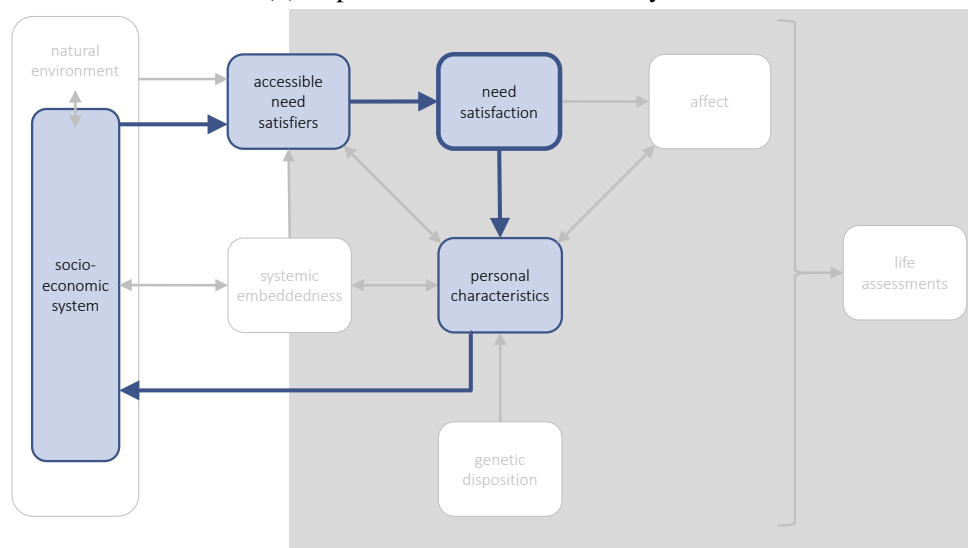
Figure 4: Examples of societal interventions on well-being



(a) direct impacts



(b) impacts via socio-economic system



(c) secondary impacts via personal characteristics

Figure 5: Illustration of climate impact types

5.3 Sustainable well-being

Environmental degradation negatively impacts human well-being in many ways. At the same time, economic activity correlates with ecological impacts. Therefore, a major question in sustainability science is how to ensure high levels of human well-being at low environmental damage. A typical answer in economics is technical efficiency. However, our framework illustrates two other main strategies:

- (a) changing values, preferences, and skills (i.e., personal characteristics), allowing to satisfy human needs with less of the same or different satisfiers following sufficiency principles. This is especially true for social skills, as they directly improve the satisfaction of many needs and help to replace consumption-based satisfiers such as positional consumption. Changing satisfiers to reduce environmental impact often also has synergistic effects on well-being (Creutzig et al. 2022), such as in the case of directly and indirectly improved health due to more active mobility (Creutzig et al. 2012; Steg and Gifford 2005; Woodcock et al. 2009).
- (b) changing the shape of distributions determining socio-economic positions. The more equal the access to need satisfiers, the easier it is to lift everyone above necessary levels.

Following our framework, both arguments are straightforward for need satisfaction and affect. However, as discussed in section 2, it is not exactly clear which aspects individuals take into account when making an overall life assessment. Recent research shows that human need satisfaction explains most of the correlation between income and the Cantril Ladder life evaluation question (Tamberg et al. 2024). Given the strong correlation between income and ecological damage, this implies that a successful decoupling of human need satisfaction from income would also lead to a decoupling of life assessments from ecological damage.

6 Discussion

The framework proposed in this paper can be seen as an attempt to reconcile existing well-being philosophies. While we here take an agnostic stance on the “correct” conceptualisation of well-being, we show how they cover different categories in a causal network, and how variables intrinsic (or “ultimate” (Parfit 1987)) to one well-being conception are only instrumental for another. In addition, the framework addresses the need for a causal structure perspective on the determinants of well-being. The application examples above illustrate how such a perspective helps to identify the well-being effects of societal interventions and environmental changes, as well as to reason about levers for sustainable well-being.

While we discussed the examples mostly qualitatively, the framework can also be used as a basis for the development of quantitative models. For instance, there is a great interest in the Integrated Assessment Models community to extend climate mitigation scenarios to indicators of human well-being (Edwards et al. 2025; Funalot et al. 2025; Low et al. 2025; Wiedenhofer et al. 2024; Zimm et al. 2024).

As discussed in Section 3, taking into account the causal structure of determinants is also important for a meaningful selection of variables in empirical studies, especially for regression models. Often, one wants to avoid controlling for the mediators of an effect (if one wants to estimate the full effect of an intervention, all else not being intervened on). However, some research questions require exactly this (if one wants to estimate the remaining effect of a variable beyond a known pathway, such as in (Haberl et al. 2025; Tamberg et al. 2024)).

Mapping out the causal relationships of a complex system inevitably brings about two limitations. First, it will always lead to a simplification of reality, only depicting what are considered the most important variables and links. For our framework, this is even more the case as it summarises many variables in larger categories, and we focused on those variables that are most prominently discussed in the well-being literature. Therefore, some of the links are conceptually very “thick”. For instance, the links between affect and personal characteristics (I) represent complex phenomena studied in psychology, parts of the link from personal characteristics to the socio-economic system (L) are the area of interest of political science, and sociology researches, among other things, how the socio-economic system shapes the landscape of socio-economic positions (J). As we showed for the case of income (Fig. 3), it is also possible to develop “zoom-ins” into parts of the framework that give a more detailed picture of the variables summarised in different categories. Such extensions of the causal diagrams could be especially useful for the very broad socio-economic system and environment part. For instance, one could integrate the energy service cascade (Kalt et al. 2019) for studies interested in the contribution of different energy services to well-being. A zoom-in that would be useful mostly for psychologists would entail a more explicit mental model of perception, affect, memory, anticipation, and evaluation, allowing a more detailed understanding of how hedonic well-being and life assessments form in the human psyche. This could, in principle, be combined with a more detailed account of time use to take into consideration the momentary nature of hedonic well-being (Han and Kaiser 2024).

Second, and related to that, mapping a system also means making a choice about the boundaries of that system. The focus of our framework is on one individual, for which we take factors such as their genetic disposition as a given. By this, we exclude from the outset the dynamics that determine, for instance, the (epi)genetic dispositions in a population. The framework does include some important feedback links, such as from the personal characteristics of individuals to the socio-economic system⁹. However, it remains silent about the mechanisms translating individual values, opinions, and preferences to the societal level – such as collective organising, power structures, and opinion dynamics. Making these mechanisms more explicit could be a valuable extension of the framework.

Despite these limitations, which are inherent to modelling complex systems, we are convinced that our framework is useful for applications both in well-being and sustainability research, with potential topics ranging from education programs and workplace conditions to climate mitigation and economic redistribution. It can be used to define intervention points, anticipate their effects, and choose appropriate study designs to measure them – independent of the chosen well-being philosophy.

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⁹As discussed in section 3, feedback loops (i.e., cycles) are incompatible with classic causality theory and cannot be modelled with, for instance, regression models. Instead, they require complex system approaches, such as System Dynamics (Meadows 2008). Whether or not this is necessary depends on the research question and the available methods.

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