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Medicine, healthcare and the environment: from the salutogenic approach towards the salutogenic environments.

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Medicine, healthcare and the environment: from the salutogenic approach towards the salutogenic environments.

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Highlights

Research in contemporary medicine is increasingly calling for coping with the effects of climate change and, more generally, for developing both conceptual and practical tools to face the current health and environmental crisis.

This paper answers this call by analysing the concepts of salutogenesis and salutogenic environments and by proposing them as promising conceptual tools to face the current crises. The paper takes inspiration from Aaron Antonovsky's theory, but it widens and deepens the salutogenic approach to include the environment-health relationship in order to understand the current health scenario.

The paper discusses the potential application of the salutogenic environments to current medical theory and healthcare practice and considers how they can contribute to medical science and healthcare from the epistemological and practical point of view.

In doing so, it provides insights both for philosophy of science, medical theory and medical education.

Declaration of interest: none

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Introduction

Research in contemporary Western medicine is increasingly stressing the need to address and cope with the effects of climate change and, more generally, the environment on health. *The 2022 report of the Lancet Countdown on health and climate change* (Romanello et al. 2022) shows how persistent fossil fuel addiction is increasing the health impact of climate change on vulnerable individuals and communities. Extreme weather events, such as heat waves and droughts, as well as climate change hazards, such as air pollution and infectious diseases, have a devastating impact on both physical and mental health. Furthermore: "climate change threatens the ability of health professionals to prevent disease and to improve health and disrupts health care delivery" (Sullivan et al., 2022: 188; see also Salas, 2020). The need to foster the ecological dimension has also been underlined in medical humanities (Coope, 2021; Lewis, 2021), medical ethics (Zielinsky, 2022) and medical education (Rapport, 2003; Gehle et al., 2010; Young, 2020; Goshua et al., 2021; Sullivan et al., 2022). Theoretical and practical research points out that medicine still follows a concept of health which is often compartmentalised with respect to the ecological contexts (Coope, 2021: 123). Public health and biomedical frameworks have consequently been called to reorient the healthcare processes towards the integration of ecological thinking with healthcare.

Theoretical interdisciplinary analyses of the relationship between health and environment in western medicine are often based on: a) complex system theory - e.g., to

explain the development of the *One Health* approach or the concept of *planetary health* (see Lee & Brumme, 2013; Horton, 2014) and also on b) the evolution-based theories employed to understand the origin and the development of the recent pandemic health crisis via the notion of 'total environment' based on ecological, evolutionary and developmental analyses (Cazzolla Gatti et al., 2021). Philosophy of science has recently started to frame the relationship between the environment and health in a non-externalistic way (Baedke & Buklijas, 2022, see also Arrizabalaga, 2018; Anderson, 2004). It has been recently argued that medicine would benefit from philosophical thinking and conceptual work on the relationship between health and environmental issues and climate change sensitivity (Menatti et al., 2022). On this view, the environment is characterised not just as a source of perturbations and risks for health but rather as a source of opportunities for change achieved by means of organismal adaptive capabilities.

In order to contribute to the development of this theoretical line of research on the relationship between contemporary Western medicine and the environment, I propose here to first reflect on two concepts analysed by Antonovsky (1979): *salutogenesis* and *pathogenesis*. These notions refer respectively to two different frameworks in medicine: salutogenesis is a theory of health and disease focused on promotion of salutary measures, rather than merely preventing diseases or reducing risk factors (see Antonovsky, 1996). Pathogenesis, on the contrary, refers to the process of disease development, as well as factors leading to a morbid condition. I will analyse these two notions and show how they can be applied to the current analysis of health, and then focus on their importance for understanding the relationship between health and the environment.

The concept of salutogenesis was introduced and developed by Antonovsky starting from 1979 (1979; 1987; 1996). The salutogenic model has been adopted, studied, and analysed in medicine and social sciences. The years 2017 and 2022 have witnessed the publication of different editions of the *Handbook of Salutogenesis*, which collect different experiences and applications of the framework to education, medicine, sociology, psychology, etc. (Mittelmark & Bauer, 2017; Mittelmark & Bauer, 2022). A brief search in the medical database PubMed shows that salutogenesis has been mentioned more than 3.000 times in papers related to medicine, with its citations increasing in 2021 and 2022. The salutogenic orientation applied to medicine and healthcare facilities refers to an umbrella of measures that seems to overlap with concepts developed in medical theory, such as the empowerment of patients in decision-making, the so-called patient-centred medicine, integrative care, sustainability measures for

healthcare facilities, community-based medicine etc. (Grover et al., 2021; Gartner et al. 2022, Menatti et al. 2022, 38). The salutogenic model fosters the implementation of these measures and approaches, but, at least in the recent debate, seems to focus more on the application tools such as the scale of sense of coherence (SOC) used to evaluate for instance, the needs of patients and healthcare professionals and manage stressors within healthcare facilities (Pelikan, 2022: 400; see also Dietscher et al., 2022).

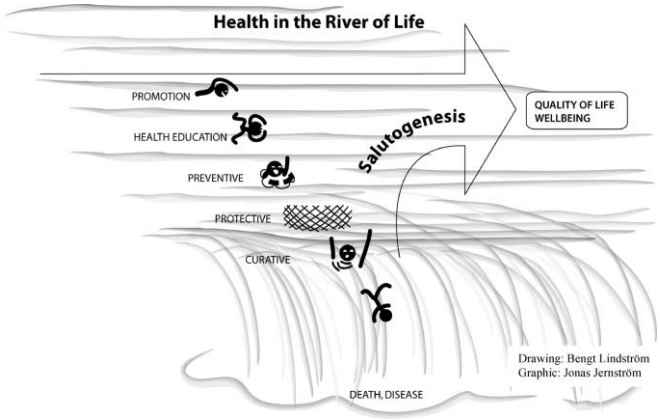

Figure 1. Health in the river of life (Eriksson & Lindström, 2008)

The distinctive feature of the notion of salutogenesis is that it implies a proactive approach to health focused on enabling aspects that can improve people's health and their adaptive capabilities. To illustrate the basic idea of salutogenesis and its relationship to pathogenesis, scholars have proposed the metaphor of the river of life (fig. 1) based on a reflection articulated by Antonovsky (1996: 13), later rendered in figure by subsequent authors. According to this image, it appears not enough to promote health by avoiding stress or, metaphorically, by building bridges across the river of life to prevent people from falling into the river and drowning. Medicine should also help people to swim or teach them (maybe by avoiding any paternalistic approach) how to swim through promotion, health education, and preventive actions, in order to improve and empower people towards health and well-being. In a nutshell, this approach appeals to a wider and more systemic approach to medicine, which includes both preventive and proactive measures contributing to foster health and wellbeing (see Becker et al., 2010).

Adopting the concept of salutogenesis can be especially useful to understand the relationship between health and environment. It may allow us to consider the environment

not only as a source of threats, pathogens, and risks to be avoided or to be eliminated, but also to identify those features of the environment that positively contribute to health by providing better conditions for swimming along the river of life.

Antonovsky and his followers, who were more focused on sociological conditions for health, did not explicitly address the role of the environment in their work. Still today, few papers apply the salutogenic model to understanding the environment and its relationship with contemporary health, both within and outside healthcare facilities.

In this paper, I propose to apply the notion of salutogenesis to the environment-health coupling by introducing and developing the concept of *salutogenic environments*. I define the 'salutogenic environments' as those surroundings that, for different ecological, biological and cultural reasons, provide health and well-being to individuals and communities. I argue that, in order to fill the ecological gap in medicine that medical theory and medical practice are currently denouncing, the analysis of the effects of the environment on health and well-being cannot just be a matter of pathogenesis, but has to be complemented with a salutogenic account. The notion of salutogenic environment will be distinguished from other concepts used in the literature, such as the notion of restorative environments in psychology. A thorough analysis of the salutogenic impact of the environment on health, its complementarity with the pathogenic one, and its possible applications to medicine and medical theory has not been conducted yet. My analysis aims to provide a broader consideration of the role of the environment in medical theory and practice through a salutogenic lens, rather than an exclusively pathogenic one, underling the positive and preventive aspects of the environment as related to health.

The paper is structured as follows: Section 1 explains salutogenesis and its distinctive features, discusses its origin and the historical opposition with the notion of pathogenesis; Section 2 applies the salutogenic approach to the relationship between health and environment in medicine through the concept of salutogenic environments. It discusses why considering salutogenic environments is important for healthcare practice in terms of epistemological as well as practical implications, such as attention to the patients and design and management of healthcare facilities. The section recompiles a few examples of salutogenic environments. The paper concludes by advocating for a new line of research aimed at connecting philosophy and medicine on the positive role of the environment to face the current climate and health crisis.

1. Salutogenesis, its origin and sources

Salutogenesis is a theory of health and disease that focuses on the promotion of salutary measures without addressing exclusively risk factors and disease causation. The term salutogenesis comes from the Latin *salus* (health)[1] and *genesis* (production, generation) and means 'carrier of health'. There is no standard definition of the notion of salutogenesis, as the concept of salutogenesis, the salutogenic account and the related framework have been developed, amended and corrected over many years (see Mittelmark & Bauer, 2016).

The salutogenic account was introduced and developed by Aaron Antonovsky, a medical sociologist whose main field of research was stress - defined as "a stimulus which poses a demand to which no one has ready-made, immediately available and adequate response" (Antonovsky, 1990: 24). He focused on the relationship between physiological and social stress factors (i.e., every kind of problem that can lead to disease or a morbid condition), and on the emergence of disease and health in different social groups, such as menopausal women, Holocaust survivors, minorities, and marginal groups. Through studying how these populations maintained health despite adversity using their individual and social resources, Antonovsky elaborated the concept of generalized resistance resources that allow individuals to cope with physiological and psychological stressors. His work extended to understand the broader social contexts that shape health outcomes across all types of patients subject to stressors.

Antonovsky worked on the implementation and application of the salutogenic framework until he died in 1994. The peak of his research is the books *Health, Stress and Coping* (1979), and *Unravelling the Mystery of Health* (1987).

He was a sociologist of health, yet influenced by research in different disciplines in the humanities and by scholars working in several areas of medical and psychological sciences (see Vinje et al., 2016): endocrinologists working on stress responses and introducing the notion of *heterostasis* (such as Hans Selye, 1950); microbiologists who proposed the integrative approach of disease ecology (such as René Dubos, see also Anderson, 2004); psychiatrists such as such as George Engel who was one of the first to develop a biopsychosocial model of health (Engel, 1977, see also Wade & Halligan, 2017); psychologists working on stress and stress measures, such as Thomas Holmes and Richard Rahe who developed *The social Readjustment rating scale* (1967), and many

[1] It is important to point out that the Latin word 'salus' is highly polysemic and can mean also security, safety, welfare, etc. (see for example Meloni & Vatter, 2023).

other scholars whose contributions converge in Antonovsky's theory in an attempt to relate medicine, psychology and biology to develop a comprehensive and systemic scientific approach to health, disease and illness.

Antonovsky's research can also be contextualised on the basis of the main biological, medical or sociological topics he addresses, and which are closely intertwined in his analysis. From the biological point of view, for instance, the salutogenic approach critically engages with the debate on the homeostatic framework in medicine and biology (Cannon, 1932; see Hagen, 2021 for an extensive analysis on the notion and history of homeostasis). The notion of homeostasis in physiology and medicine is usually associated with stability and the return to normal conditions after a perturbation. In the medical and philosophical literature, the concept of homeostasis has been discussed and put into question after the publication of Cannon's seminal work: notions such as heterostasis and allostasis have revised the idea of homeostasis and explicitly considered the role of change and variability both from the chemical, physiological and medical point of view (see for example, Selye, 1975; see also Hagen, 2021; Bechtel & Bich, 2022; Bich & Menatti, 2025). Antonovsky takes into account the coeval critical contributions to the debate on homeostasis when he considers 'the human organism as prototypically being in the state of heterostatic disequilibrium as the heart of the salutogenic orientation" (Antonovsky, 1987:130). Recent commentators underline how the salutogenic approach was precisely born with the attempt to frame health as a general problem of disequilibrium, and concerning the 'active adaptation to an environment in which stressors are omnipresent and inevitable' (Vinje et al. 2016: 25).

By positioning himself in this debate, Antonovsky considers that salutogenesis opens the way for rehabilitating stressors in human life[2]. He highlights the potentiality of variability and disequilibrium for health by adopting in this context the term 'negative

[2] See the paper 'A somewhat personal odyssey in the studying of the stress process' (Antonovsky, 1990) where A. describes his involvement in stress research as a sociologist of health. He specifies what a stressor is compared to tension for individual and marginal communities. 'Stressor is a stimulus which poses a demand to which no one has no ready-made, immediately available and adequate response' (Antonovsky, 1990: 24). In the context of the debate and the literature on stress in the 1970 he initially considered a stressor as pathogenic. Yet he specifies that when facing a stressor, the individual gets into a tension, which is not necessarily pathogenic. The turning point of his career towards elaborating a salutogenic account of health, is represented by the elaboration of the concept of *generalized resistance resources*, meaning the resources that allow the individual to cope with physiological and psychological stressors during her life and allows her to stay healthy. Individual coping resources are fundamentally generated through environmental and cultural processes. The social context shapes how stressors are distributed, the availability of generalized resistance resources and the development of sense of coherence though life experience.

entropy' or 'negentropy' (Antonovsky 1987: 8-9), meaning that salutogenesis focuses on stressors for health which inevitably are present in the environment. According to Antonovsky, the "mirage of health", an expression recalled from Dubos (1960), or what has been called the mere 'microbe hunting' or again 'the magic bullets' (Anderson, 2004: 40), have to be substituted by a focus on negative entropy, leading to a search for useful inputs into the social system, the physical and organismal environment to counter-act the immanent trend toward entropy. In this sense, in *Unravelling the Mystery of Health* (1987), Antonovsky attempts to merge the biological discussion of the notion of homeostasis with the social criticism of the pathophysiological approach to individual's health.

It is important to point out that when talking about stressors, Antonovsky is not trying to provide a general characterisation of the environment. This limitation will be addressed further in this paper. Antonosky's approach is primarily sociological and focused on the positive role of human context and interactions for health. From the sociological point of view (sociology and sociology of medicine), the analysis carried out by Antonovsky is initially focused on field work on minority groups and marginal situations. In his doctoral research carried out in the mid-fifties, he analyses the cognitive coping responses to social and psychosocial stressors, and then implements his research in discriminated and low-income categories in the United States, by analysing how the lowest social classes showed high rates of morbidity and mortality and by relating poverty and health (see Antonovsky 1967; 1967a; 1968; 1990). In 1961, he also served as the director of the New York State Commission Against Discrimination (Vinje et al., 2016: 27). In 1960, after moving to Israel, the path towards medical sociology became clearer and he started teaching and researching in departments of social medicine (Vinje et al., 2016: 27). Together with healthcare professionals, he worked on surveys within a project about artery disease, multiple sclerosis and menopause. His interest was focused on the role of sociocultural factors and social class in the determination of health, and the role of social and cultural factors in coping with morbidity and disease. From this work, he co-edited the book *Poverty and Health* (Kosa, Antonovsky, & Zola, 1969). During this research he still adopted what he considered the standard pathogenic orientation in medicine, and he delved into the relationship between life stressors and health and how stressors are dealt with, thanks to cultural and social resources.

It is when carrying out psychosocial research on the risk factors in coronary artery disease in immigrants to Israel from North America that he shifted his attention to the

work of Lazarus (Lazarus & Cohen, 1977) and again of Selye (1950) on stress responses. He analysed which mechanisms are related to stressors and which resources are recruited in order to cope with them. He developed the concept of *generalised resistance resources*, which are considered to be available to all individuals regardless of the types of disease and predispositions to develop them. As explained by Vinje (2019), the concept has a clear debt with the notion of *general adaptation syndrome* by Selye (1950).[3] The concept of *generalised resources* refers to the fact that when a physiological stressor occurs, the individual deploys psychological, social and cultural resources to mediate the situation and to cope with tension (Antonovsky, 1979: 99). Interestingly, these resources led Antonovsky to consider what he called 'active adaptation'. He specifically argued that 'Salutogenesis leads us to focus on the overall problem of active adaptation to an inevitably stressor-rich environment" (Antonovsky, 1987: 9). This is a crucial move: considering stressors as something one needs to adapt to rather than to just avoid, eliminate or counteract. In this sense, salutogenesis implies analysing and putting forward the generalised and specific resources that individuals and groups mobilise to face the general stressors of life. When exposed to stressors, individuals face tension that can either lead to breakdown in a pathogenic direction or, if managed, support movement towards health. Antonovsky illustrated this contrast, pointing out that while most research has focused on mechanisms of disease and breakdown, his interest lays in understanding the resources and conditions that help people move toward health (see also Lindström, 2025: 15).

Salutogenesis is thus a theoretical framework for understanding the origins of health through the mobilisation of generalised resistance resources and the development of a strong sense of coherence (that we will explain below as one of the pillars of the

[3] The *general adaptation syndrome* is a concept introduced by Selye. It is based on the assumption that 'all the organisms can respond to stress as such and that the reaction pattern is always the same, irrespective of the agent used to produce stress' (Selye, 1950: 4667). Apart from specific reactions, there is a general adaptation syndrome, which is a process that takes place as a response to every kind of physiological stress. It consists, according to Selye, of three phases: the alarm reaction (A. R.), the stage of resistance and the stage of exhaustion. Most of the characteristics triggered during the first phase (A.R.), such as tissue catabolism and hypoglycemia, are usually reversed during the resistance phase, but reappear in the phase of exhaustion. This means that the adaptive strategies or adaptive energies in an organism are limited and finite. Furthermore, the inherent characteristic of stress is that it continuously triggers damage and defense in the organism through variable adaptive capacities. Interestingly Selye asks: 'Why does exposure to the same stressor produce disease only in certain individuals?' (Selye, 1950: 1388). His answer is that the adaptation syndrome is the normal physiological reaction of every organism to any kind of stress and the exposure to stress can be expected to produce diseases if the defense reaction is inadequate. Antonovsky makes Selye's question one of the foci of his work, and his answer to it is the salutogenic account based on the sense of coherence.

salutogenic framework), shifting the focus from disease causation to the factors that promote and sustain health.

1.1. Explaining salutogenesis: from the criticism of pathogenesis to the elaboration of a new socio-medical account

The concept of salutogenesis and its development cannot be understood without considering its counterpart, that of pathogenesis. This is also necessary to better identify Antonovsky's contribution to the debate about health, as well as to develop the implications of the concept of salutogenesis for current thinking on the relationship between health and environment. The aim of this section is not to establish a strong opposition between the two concepts (as some analyses of salutogenesis do, see for instance Mittelmark et al., 2017), but to show both their differences and their complementarity.

In medicine, pathogenesis generally denotes "The pathologic, physiologic, or biochemical mechanism resulting in the development of a disease or morbid process. [*patho-* disease + *genesis*, production]" (Stedman, 2016). Health has been discussed in medical sciences and humanities in terms of pathology and dysfunction. Disease, pain and well-being are also defined in these terms in philosophy of medicine and humanities (Stegenga, 2018). The discussion about health in contemporary documents of medical education and medical humanities mostly refers to a pathogenic account, meaning that medical practice and theory focus on the aetiology, care and curing of diseases (see Becker et al., 2010). The prevalence of pathogeny and of the pathogenic account in current medicine could be explained historically by referring to germ theory and the scientific dominance of this approach in Western medicine (e.g. Jimenez et al., 2022; Menatti et al., 2022; Kahyesh, 2023, see also Canguilhem, 1966). Historians relate the prevalence of pathogeny also to debates on the relationship between degeneration and regeneration in the 19th and 20th centuries (e.g. Soloway, 1990; Meloni, 2016: 98), by underlining the moral, political, eugenics and racial implications of such dominance in the western history of both medicine and genetics.

Throughout his career Antonovsky criticised the pathogenic account in medicine in several of his essays (e.g. Antonovsky, 1996: 14). According to Antonovsky, the 'pathogenic orientation' is the dominant medical paradigm of contemporaneity (Antonovsky, 1979: vii). Among the main issues, Antonovsky underlined that a

pathogenic account fails to consider the complexity of the definitions of health, to improve the management of healthcare systems, and that it focuses just on a particular disease or a clinical entity: "First attention is given to the pathology, not the human being who has a particular medical problem" (Antonovsky, 1987: 4). In his view, the pathogenic framework pursues an individualistic patient-based approach and formulates health categories in terms of negative characteristics, such as absence or limitation. The pathogenic account implies a dichotomous classification of persons as being either diseased or healthy, and consequently excludes those who are non-diseased (Antonovsky, 1979: 36-39; Antonovsky, 1987: 3; Antonovsky, 1996: 13).

Although this criticism has been maintained mainly among Antonovsky's scholars (Mittelmark et al., 2017; Mittelmark et al., 2022), it has also been taken up by contemporary medical educators and health promoters who have been underlining the limits of adopting a pathogenic model of health, and disease prevention or treatment as the only path to health (Becker et al., 2010; see also Jonas et al., 2014). It has been specified that: "the absence of bad behaviour does not indicate the presence of good behaviour, research consistently has demonstrated that simply decreasing a negative state does not necessarily increase positive states" (Becker et al., 2010: 2). The absence of pathogenesis does not symmetrically imply the presence of salutary factors. This type of criticism has been directed at public health measures, insofar as they are generally more focused on post-factum disease management – that is, when the diseases have already spread – than on disease prevention and health promotion. It has also been underlined how disease prevention and health promotion do not imply the same actions and especially do not receive the same amount of funding, usually receiving less attention in public and population health (Fries, 2020: 20).

The majority of these criticisms does not aim to dismiss the pathogenic approach or underestimate its importance for medicine[4], but rather to complement[5] it in healthcare practice and theory with a different approach, the so-called 'salutogenic' one. As mentioned above, salutogenesis was first introduced by Antonovsky in his book *Health, Stress and Coping* (Antonovsky, 1979). In this book, Antonovsky recompiled how the term was chosen after having designed and carried out studies focused on poverty and

[4] See for instance the case of the epidemiological model (Antonovsky, 1979: 42, 45, 55).
[5] As expressed by Becker et al.: "In theory pathogenesis and salutogenesis are complementary approaches and as America redesign its health care system, salutogenic approaches will be necessary to address the challenges that will emerge" (Becker et al., 2010: 2).

health, minorities and adaptation to diseased situations. He analysed the health of Israeli menopausal women, some of whom survived the WWII concentration camps (Antonovsky, 1979: 6; Becker et al., 2010: 2; Antonovsky & Sagy, 2022: 20). He noted that the crucial variable in a successful adaptation to stressors in this cluster of women was not just a lack of disease[6], but the cultural and socio-psychological stability (Antonovsky, 1979: 7) which allowed women to cope with adversity. He then observed that, considering the pervasiveness and ubiquitousness of pathogens and diseases, it is important to understand why some people get sick and die and why others remain healthy (Antonovsky, 1979: 13-22, 35). Together with the work on stressors, this experience inspired him to develop the salutogenic approach. He considered that the answer to the main question of 'why do people remain healthy?' is to be referred to preventive and health promotion measures in medicine, which the pathogenic approach is not able to fulfil, develop and fully understand.

From this standpoint, he introduced the salutogenic framework to identify and understand the factors leading to health, instead of focusing only on those leading to diseases and sickness. The notion of salutogenesis is then developed based on two main concepts: the idea of health as a *continuum* and the sense of coherence (SOC). The former postulates health as a continuum of multifaceted states or conditions of the human organism. It has been called 'ease/dis-ease continuum' as opposed to a healthy/sick dichotomy (Antonovsky, 1979: 57). The continuum model of health describes health not as an opposition between states of sickness and wellness, but rather as a process along the life of individuals in which they move between two conditions: a state of health (at their birth) and a state of sickness (at their death). In the space in between, there is a continuous movement among different states, which is not the complete absence of one or the other. Physical and psychological stressor events push individuals towards pathogenic or salutogenic ends of the continuum (Antonovsky, 1996). What is defined as normal health is this continuous movement between the always intertwined pathogenic and salutogenic states of life[7].

[6] Antonovsky used the term 'dis-ease' instead of 'disease' to underline the processual and continual characterization of health in order to avoid a dichotomy between different healthy and sick states.

[7] More recently the continuum framework of health has been taken up in preventive medicine by Rose's model (1992; 2008) which analyses how diseases, specifically mental disorders and addictions, have to be understood in their contextual emergence and they have to be treated together with a changing of the society as a whole, thus underlining the collaboration between individual and population health. Rose introduces the notion of 'continuum of risks and severity' (Rose, 1992) by questioning the distinction between normal and pathological. He proposes that preventive medicine has to question the high-risk strategy which focuses

The movement along the continuum is affected by the sense of coherence of individuals and social groups (Antonovsky, 1979: 37).

The sense of coherence is the second (methodological) pillar of Antonovsky's theory. It captures the orientation of the individuals toward the events which surround them, in terms of a) comprehensibility (the ability to understand what is happening, meaning that the challenge is understood); b) manageability (the resources to cope with a situation are available, with respect to individual life and social network) and c) meaningfulness (the ability to find motivation in a situation) (see Antonovsky, 1996: 15).

The sense of coherence is measured through the sense of coherence scale (SOC, via 13 or 29 items, see Eriksson and Contu, 2022), a sociological scale with 11 items measuring comprehensibility, 10 items measuring manageability, and 8 items measuring meaningfulness. The scale is focused on the social and individual coping factors that allow a person to adapt to situations and to develop the resources to deal with changes and challenges in their life, not on the pathogenic factors causing diseases in a specific individual or a group. The scale measures the cultural, social, physiological and psychological elements that allow someone to cope with life's various stressors and manage them in the continuum of health[8].

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just on a small group of people at risk and has to move towards a population strategy. In this sense, population strategy aims to influence or reduce the risk in the population as a whole through public health initiatives. The concept of continuum of health has been similarly used in philosophy of science and population health by Valles (2018), when he affirms that health is best understood as a lifelong phenomenon or according to a "Life course theory" (Valles, 2018: 57). Health should thus be considered as a life trajectory of complete well-being in social contexts. "Individual health develops through dynamic relationships with the healths of their population and their social-environmental context" (Valles, 2018: 59). Taking inspiration from the literature on chronic diseases as illnesses developing over time and as complex social and physiological phenomena, Valles conceptualizes health as imbricated in a continuous temporal model. Health is not based on 'time slices', but as an object on a path which needs individual long-term analysis and understanding of social interactions. In this sense, how the health of the individual develops is understood and managed along with population health (Valles, 2018: 62).

[8] SOC survey is based on 29 questions (or 13 in the reduced version of the scale) with 7-point Likert scale answers. It is organised in three factors of comprehensibility, manageability, and meaningfulness. Examples of these factors are respectively questions such as: 'When you talk to people, do you have a feeling that they don't understand you? (answers from 'never have this feeling' to 'always have this feeling')'; 'When something unpleasant happened in the past your tendency was:' (answers from 'to eat yourself up about it' to 'to say "ok that's that, I have to live with it" and go on'); 'Doing the things you do every day is:' (answers from 'a source of deep pleasure and satisfaction' to 'a source of pain and boredom') (see Eriksson & Contu, 2022: 79). According to systematic reviews (Eriksson & Lindström, 2005, see also Eriksson & Contu, 2022), the scale has been proven to be psychometrically sound. It has been largely used, translated, and validated in several languages and employed in sociological, psychological and medical studies (see Becker et al., 2010; Eriksson & Lindstrom, 2005; Meier Magistretti, 2022; Eriksson & Contu, 2022). The factorial structure of the scale is something problematic (Eriksson & Lindstrom, 2010: 462) as the factorial structure of the three dimensions of the scale is not always clear. Yet its predictive validity is considered quite strong, for instance in discriminating specific at-risk categories in long-term studies (Eriksson & Lindstrom, 2005: 463).

The sense of coherence is considered the core of Antonovsky's theory. Mittelmark & Bauer (2022: 14) point out that: "in his influential 1996 paper in *Health Promotion International*, Antonovsky proposed a research agenda solely of sense of coherence questions", by investigating how the sense of coherence varies along life with respect to age, culture, or the interrelation between SOC and physical or psychological well-being. The sense of coherence is reinforced by the idea of *general resistant resources* (GRR), meaning that a person with a strong sense of coherence usually finds resources in the world and in social relationships to cope with stressors of different kinds. It has been underlined how the GRR are more a: "dispositional orientation rather than a personal trait/type or a coping strategy" (Eriksson & Lindström, 2005: 460).

However, it is important to stress that the salutogenic framework[9] is something more than a measurement in the SOC scale. While relying on the SOC, salutogenesis cannot be reduced to it. The complexity of health, along with adaptive capacities in both sociological and physiological terms, does not seem to be fully captured by the scale, nor is the health-environment relationship. Furthermore, the overall scope of Antonovsky's theory was indeed wider, as it aimed to innovate both medicine and the concept of health "The salutogenic orientation has been proposed as providing a direction and focus, allowing the field to be committed to concern with the entire spectrum of health/disease, to focus on salutary rather than risks factors, and always to see the entire person (or collective) rather than the disease (or disease rate)" (Antonovsky,1996: 18; see also Mittelmark & Bauer, 2022: 10).

On this view, salutogenesis can be characterised an "umbrella concept" (Eriksson & Contu, 2022: 88), aimed at proposing programs in medicine able to move beyond risk factors and at promoting long-term health outcomes. Salutogenesis emphasises the role of prevention as well as the importance of health education in medicine beyond risk factors. As expressed by Antonovsky himself, the salutogenic model "derives from studying the strengths and the weaknesses of promotive, preventive, curative and rehabilitative ideas and practices, it is a theory of the health of that complex system, the

[9] Salutogenesis has not achieved paradigmatic dominance in healthcare. This can be attributed to several historical and structural factors rather than conceptual inadequacy: Antonovsky's death in 1994 disrupted the theory's development; healthcare systems remain institutionally organized around pathogenic models with corresponding financing and training structures; and the theory's complexity hindered empirical implementation (Dietscher et al., 2022)). This paper selectively advocates for specific salutogenic elements, such as the idea of *continuum*, and applies the salutogenic idea to salutogenic environments as valuable complements to existing approaches. Furthermore it is not the aim of this paper to scrutinize why the salutogenic framework has not established itself on a large scale in medicine and medical care.

human being" (Antonovsky, 1996: 13; see also Mittelmark et al., 2017). The salutogenic approach is based on promoting 'salutary factors' (Antonovsky, 1996: 14) and addresses all people, both healthy and sick.

Antonovsky's work is coeval with developments in health promotion of the 70s, 80s and 90s. Health promotion (for a history see Bingenheimer et al., 2003; Raingruber 2012; Tulchinsky & Varavikova, 2015) has been defined as the process of 'enabling people to increase control over their health determinants in order to improve their health and thereby be able to live an active and productive life', as stated in the Ottawa Charter (WHO, 1986). Antonovsky was well aware of the debate on health promotion and preventive medicine, a debate that he participated in, discussing it both from the theoretical and practical point of view throughout the decades of his work, both in the United States and in Israel. His commentators (see Lindröm & Eriksson, 2006) underline that the theoretical framework of salutogenesis is in line with the health promotion theory. Yet, in his last paper (1996), Antonovsky specifies that salutogenesis adds a significant theoretical and practical addition to health promotion, by 1) moving the attention from the individual to population health and to communities which are not necessarily at-risk; 2) moving from risks factors, such as smoking, overnutrition, addiction etc. towards what Antonovsky called "a greater health" for all the persons, meaning that health has to be related to all the aspects of life and should not be focused only on the eradication of risk factors or diseases (Antonovsky, 1996); 3) providing a comprehensive conceptual framework which could finally guide medical actions. Health promotion, according to Antonovsky, "lacks a theoretical foundation" (Antonovsky, 1996: 12). As he specifies: "It is then my goal here to propose such a foundation, in terms of what I call the salutogenic model. It is however, not a theory which focuses on keeping people 'well'. Rather, in that it derives from studying the strength and the weakness of promotive, preventive, curative and rehabilitative ideas and practice, it is a theory of the health of that complex system, the human being" (Antonovsky, 1996: 13).

With respect to both preventive medicine and health promotion, the salutogenic approach seems to put more emphasis on what could be called a 'proactive' line of thinking in promoting health. Whereas prevention (and preventive medicine) and health promotion mainly focus on the reduction of risks and the avoidance of problems and difficulties, proactive salutogenic measures are aimed at creating supportive contexts even if no immediate risk or disease is occurring. According to salutogenesis, the main

focus of medicine should be thus creating states of health which are higher and wider than the ones currently experienced (see Becker et al., 2010; Antonovsky, 1996).

In his last paper, published posthumously, Antonovsky summarizes salutogenesis as the orientation that "sees each of us, at a given point in time, somewhere along a healthy/dis-ease continuum" (Antonovsky, 1996: 14). Consequently, the majority of contemporary scholars identify salutogenesis with the salutogenic orientation or the salutogenic model to be applied to biomedical sciences and health promotion by focusing "attention on the origins of health and assets for (positive) health, contra to the origin of disease and risk factors" (Mittelmark & Bauer, 2022: 11).

2. The salutogenic environments: an innovative tool for contemporary medicine and healthcare

In the previous sections, I addressed the origin of the salutogenic approach, and I analysed its main tenets and its implications for the debate on health. I now move to discuss its possible application to study the relationship between health and environment by introducing the concept of salutogenic environments, an expansion of the framework not explicitly envisaged by Antonovsky and his followers. I consider that, even valuable, Antonovsky's theory needs to be updated with respect to the current health and climate crisis and to do so it is important to introduce an analysis, both conceptual and practical, of the role of the environment.

The role of the environment for health has been acknowledged long before modern times and modern medicine (see Ward Thompson, 2011). Quarantines, landscapes and environmental management, such draining or avoiding marshy areas, constructing public and religious building to avoid pestilences and diseases has been documented along different eras and cultures by historians of medicine and environmental historians (see Meloni, 2021; see also Martini & Lippi, 2021 for the pioneering works in modern medicine of personalities such as I. Semmelweis or F. Nightingale in the XIX century). However, this relationship has not been explicitly theorised. Moreover, when considering the environment, contemporary medicine has been focusing mainly on the pathogenic risks (Menatti et al., 2022; Jimenez et al., 2022; Pontarotti & Merlin, 2023), and it has officially and extensively included risk prevention after the development of germ theory and discoveries by Pasteur and Koch (Snowden, 2020: 205; Bingham et al., 2004; Gaynes, 2019; Gradmann, 2009; Porter, 1998).

Furthermore, the concept of the environment is complex and often ambiguous. Public and population health consider the (mostly physical) environment as all the non-genetic influences on the individual, including social, economic and cultural influences (Riegelman & Kirkwood, 2019: 352). In this sense, the physical environment can be understood as 1) unaltered or natural, 2) altered and 3) the built environment. This distinction is functional to the analysis of environmental diseases and injuries. For instance, the unaltered environment comprises floods and earthquakes, but also more subtly radon and sunlight, elements which are correlated to specific risks for health. The altered environment reflects the impact of chemicals, radiation and biological elements that human beings have been introducing in the environment and which cause risks and harm. Finally, the built environment refers to how buildings and related factors (e.g. food, heating, air pollution) can be sources of risk for health and well-being. This distinction is then related to the various ways in which human beings and the environment interact, to assess risks both for human and ecosystems and to provide public health policies (Riegelman & Kirkwood, 2019: 360).

From an interactionist perspective, human beings are continuously exposed to the environment, to cope with it, and this relationship has implications for health and well-being (see Menatti et al., 2022). While public health is aimed at risk assessment of the environment, medicine and psychology have also focused on the positive potential of different kinds of environment, by focusing on the quality, the diversity and the possibility of use and access and social interaction which could convey restoration, aesthetic appreciation and health and well-being outcomes. The terms used in psychology and humanities to describe the external surroundings reflect this diversity beyond the ecological characterizations of the environment: place, space, surrounding(s), greenery, green space(s), blue space(s), grey spaces, landscape(s), urban landscape(s), natural landscape, wild spaces, wilderness etc. (Bell et al., 2005).

Although Antonovsky and the literature on salutogenesis do not explicitly develop a specific account of the environment, in many of Antonovsky's essays the physical and social surroundings are mentioned a) in creating stressors – e.g. for the fact that individuals are exposed to pathogens and there is a ubiquity of stressors (Antonovsky, 1979: 79) and b) in fostering health and coping with external/internal stressors: "Stability and continuity bring us to the crux of the matter. A strong sense of coherence involves a perception of one's environments, inner and outer, as predictable and comprehensible" (Antonovsky, 1979: 125). Moreover, in the literature on salutogenesis, there is a growing

interest in how "Physical and social environment can enhance well-being and performance" (Mittelmark & Bauer, 2022: 12). In health promotion research, this is referred to as "supportive environments" (Mittelmark & Bauer, 2022: 12; see Dilani, 2008), which may constitute an intra-personal and social application of the salutogenic theory.

In the next section I will argue that the salutogenic approach applied to environments may allow us to better understand the role of the latter in medical sciences and their relation to health. To do so, I will introduce the notion of 'salutogenic environments' and discuss how it allows us to: a) clarify the opposition and the complementarity between the pathogenic and salutogenic aspects of the environment; b) underline the positive and preventive aspects of the environment as related to health and healthcare facilities; c) provide a better understanding of what can be the role of positive and salutogenic environments in healthcare both from a practical and epistemological point of view.

2.1 What are the salutogenic environments

A problem with the study of the role of the environment for health is that most of the work on this relationship implicitly or explicitly relies on a pathogenic perspective. This perspective associates the environment with hazards that need to be prevented, blocked, counteracted, or eliminated in order to maintain a stable state of health, or to return to an initial (normal) state after an environmental perturbation. Such a pathogenic view of the environment tends to overlook the positive or preventive interactions aimed at fostering, rather than just defending or re-establishing health.

In medical documents and medical theory, the environment is mainly framed as a factor which may lead to diseases or a lack of health in general, exemplified, for instance, by climate change sensitivity or the case of endocrine-disrupting chemicals. Climate change sensitivity refers to the effects of climate change on health and well-being. The importance of recognising the role of climate change on health has been growing in the last decades (Costello et al., 2009). As already mentioned, *The 2022 report of the Lancet Countdown on health and climate change* (Romanello et al., 2022) points out the health impact of climate change on vulnerable individuals and communities. Extreme weather events have a devastating impact on both physical and mental health. Official medical and political documents - such as the Millennium Ecosystem Assessment (see Reid et al.,

2005), the *OneHealth* approach (see Hinchliffe, 2015; Mackenzie & Jeggo, 2019) or the most recent *United Nations and the Intergovernmental Panel on Climate Change* (IPCC, 2023) - call for the recognition of the impact of climate change on health and new healthcare policies. The COVID-19 pandemic has exacerbated the health and environmental crisis; the proliferation of new infectious diseases has been recognised as an issue related to the environment and to the effects of climate change (see, for example, Cazzolla Gatti et al., 2021).

Another example is the case of endocrine disruptors: the chemical substances that alter the functioning of the endocrine system of organisms[10]. The evidence of the impact of endocrine-disrupting chemicals (EDCs) is described by many studies (Miller, 2020). Starting from the middle of the 20th century, the use of synthetic chemicals in consumer products has spread rapidly. Concern about the use of these products started in 1950 when the American biologists Burlington and Lindeman (1950) found that DDT, a pesticide for insect control commonly used in the United States at the time, had estrogenic effects on male chicks. In 1962, Rachel Carson shed light on DDT's effects through her book *Silent Spring* (1962), which soon became of paramount importance for the emerging American and global environmental movement. Yet, it was not until 1991 that the research on a large number of these chemicals gained attention both in the scientific and social debate, thanks to the systemisation of the studies developed by Theodora Colborn. She focused on the interference of chemical compounds on the endocrine system, the reproduction and the development of wildlife and humans in the Great Lakes region in the United States (Colborn et al., 1993)[11]. Since then, the amount of research on EDCs has increased, and a large amount of evidence has been provided, mostly for wildlife and especially animals (see Bergman et al., 2013).

The elements above fall into a pathogenic analysis of the environment. They constitute evidence for the harmful effects of climate change and of environmental contamination on the health and well-being of human beings and ecosystems. The pathogenic analysis of the environment is an important tool to understand both the current ecological crisis and what health is at the larger and often underestimated global scale in

[10] https://ec.europa.eu/environment/chemicals/endocrine/definitions/endodis_en.htm

[11] In 1991 T. Colborn organised the first of a series of pioneering meetings at Racine, Wisconsin, later known as Wingspread Meetings, where she gathered experts from ecology, medicine, zoology, and wildlife management, among others, to understand the effect of chemical contamination on human health and ecosystems. On that occasion, the concept of EDCs and the disrupting chemical hypothesis was developed (Krimsy, 2000).

contemporaneity. More importantly, these analyses show how human beings' health is intertwined with the state of the environment and ecosystems. The proliferation of concepts such as 'eco-health' (Parkes et al., 2014), 'socioecological model of health' (Krieger, 2011; Krieger, 2021) or 'socioecological system health' (De Garine-Wichatitsky et al., 2021) goes in this direction, as these concepts underline both the importance of sociological and ecological factors that are often overlooked in public health measures. These concepts have been recently introduced in medical education, and their application in medical practice and theory by healthcare personnel has been urged, especially in public health and health promotion.

Yet, what is almost absent in contemporary biomedical analysis is the other side of the environment: the salutogenic one. The reframing and the application of *salutogenesis* as proposed in this paper can help to complement the pathogenic account in medicine and health theory, and could be applied to the medicine-environment debate through the idea of salutogenic environments.

Broadly speaking, I consider that salutogenic environments are all those parts of the surroundings that, for cultural, biological or ecological reasons, can have a positive effect on the health and well-being of a population, specific clusters of people, or an individual. This is what is missing from a pathogenic characterization of the environment. However, applying the notion of salutogenesis to the environment is more than just acknowledging the positive role of the environment. The application of salutogenesis to the environment conveys a relational view of the role of the environment on health in which the subject plays a proactive role. What is positive and salutogenic emerges in the interaction between people and the environment. I propose in this context to focus on the adaptive capacities of human beings, as elements which need to be understood, developed and applied in specific environments. This is different from a pathogenic approach, which emphasises the negative effects of the environment on the human being and implicitly conveys a partial view of the environment: a source of hazards that need to be blocked, counteracted, or eliminated. Such a pathogenic view of the environment associated with health tends to overlook the positive or preventive interactions aimed at fostering, rather than just re-establishing health.

The difference between pathogenic and salutogenic views of the environment is thus particularly evident in the first distinctive element of a salutogenic approach: the role played by environmental stress. According to salutogenesis, stress is not viewed as something to be avoided or counteracted, based on an idea of health as returning to the

initial state of the system after a perturbation. If we apply this idea to the environment, we can state that, the environment and its stressors can be considered as sources of possibilities. Individuals and groups are not simply subjected to the effect of the environment, but are capable of active adaptation. Active adaptation entails a distinctive strategy, focused on engaging with and taking advantage of variability and change, besides preventing, blocking or eliminating it. Humans do not only respond conservatively to perturbations that threaten their survival or destabilise some of their physiological variables. They interact with their environment and use it as a source of possibilities, tools and resources to modify themselves to maintain viability within the health continuum. On this view, the environment provides a set of changing conditions for swimming in the river of life. However, these are not *a priori* conditions. They depend on the adaptive capabilities of humans and therefore, are relational.

How can these environmental opportunities be captured and exploited for health by human adaptive capabilities? Not just by being there. On this view, an environment is not salutogenic *per se* but in the (behavioural or physiological) interaction with the humans that inhabit it. For this reason, I propose applying Antonovsky's theory of the sense of coherence to highlight that the salutogenic potential of an environment emerges through the relational interplay between individuals and their surroundings: the environment becomes relational when it is perceived and experienced as *comprehensible, manageable, and meaningful* (Antonovsky, 1987). This shifts the focus from intrinsic environmental properties to the dynamic perceptual processes through which environments acquire salutogenic significance for individuals or groups. More specifically, this relational approach suggests that the environment is salutogenic when it exhibits features that satisfy some basic conditions for an individual or group.

The first is that the environment is comprehensible, that is, some of the features that can be employed for adaptation can actually be identified or captured through cognitive or physiological mechanisms. The second is that these features need to be manageable: individuals or groups are able to actively engage with the environment through change by operating in it and modifying their interaction with it to promote health. The third condition is what Antonovsky calls 'meaningfulness', which in this scenario can be interpreted as motivation for action. The presence of some given identifiable features of the environment triggers the adaptive interaction (be it behavioural or physiological) and modifies and possibly expands the range of viability of an individual or a group. This can occur by responding to or taking advantage of the

environmental features through changes in behaviour or physiological regime, or by acting in and modifying the environment to promote one's conditions of existence.

In the next section, I will discuss the antecedents to the concept of salutogenic environments and the studies showing the positive role of the environment in fostering health, developed by research in medicine, psychology, and architecture. These works do not constitute a coherent body of research, and they are not systematised. The notion of salutogenic environments can provide a comprehensive theoretical framework that may help to make sense of or to interpret this huge amount of evidence.

2.2 Examples of positive roles of the environment

The positive role of the environment is not a new topic. However, adopting the notion of salutogenic environment may provide the conceptual tools to develop a more fine-grained conceptualisation of this role and the basis on which to start discussing it more thoroughly. Environmental history, history of medicine, landscape theory and human geography, have underlined a continuity in the attention to the salutogenic role of the environment from ancient times to the contemporaneity: from the ancient Persians, to the Greek Egyptian and Roman cities, to the therapeutic use of landscapes in the English Landscape Garden movement or the urban parks movement in the 18th century (Ward Thompson, 2011; Milligan & Bingley, 2007; Gesler, 1992; Geltner, 2019; Meloni, 2021). And again, before the XX century, healing gardens and therapeutic landscapes were designed with the specific purpose to heal physical and mental health conditions.

From the perspective of history of medicine, Rosenberg (2012) emphasizes the importance of the Hippocratic text on *Airs, Waters, Places* in this regard, as part of "a conceptual tradition that saw the body not only as situated in place, but as a continuously processing entity, always at risk as an aggregate of those elements in the natural world that sustained it" (Rosenberg, 2012: 661; see also Bashford & Tracy, 2012). Rosenberg describes the Hippocratic ecological and sociological understanding of human beings, and the role of the Hippocratic physician who is: "an obligate climatologist, geographer, political scientist, and ethnographer as well as healer, a clinician urging the necessity for understanding peculiarities of place in evaluating and treating patients" (Rosenberg, 2012: 661). In this sense, Rosenberg retraces these characteristics throughout the history of medicine, underlining the importance of geography and meteorological conditions for

aetiology and care (without forgetting the nefarious racist implications of the climate and environmental determinism, see Livingstone, 2012). However, as Rosenberg specifies, "by the mid-twentieth century this accustomed epidemiology of place had become decreasingly central in Western medicine, not so much forgotten as moved from centre stage. It had become a supporting player in a little-questioned narrative of progress toward an increasingly inward and ultimately biochemical and biophysical understanding of the body" (Rosenberg, 2012: 664). The body of the patient became abstracted from the surroundings, and few specialists, mostly in epidemiology, social medicine and tropical medicine, kept working on the relationship between health, disease and environments (Nash, 2006).

In the contemporary literature, the positive role of the environment and its salutogenic potentialities have been partly identified by environmental psychology, cognitive sciences, and also by architecture through evidence-based studies and by pursuing a scientific assessment of the role of the environment on health. These disciplines analyse the beneficial effects of green/blue natural and urban spaces on health and well-being, in terms of cognitive, biophysical, and psychological outcomes.

A large variety of studies encompasses and looks beyond the mere aesthetic pleasure obtained when just looking at landscapes and environments. They pursue a science-based analysis both of ecological preferences and of the outcomes of the environment on health and well-being (Menatti & Casado, 2016; Twohig-Bennett & Jones, 2018). They employ both qualitative and quantitative methods: pre-post studies; observational studies, surveys, studies based on biomarkers, analysis of heart rate measures, and brain activity (see Song et al., 2020). For instance, green playgrounds, parks and urban landscapes are considered capable of improving mental and physical health, as well as cognitive abilities and social engagement (Gascón et al., 2015; Twohig-Bennett & Jones, 2018).

Psychology usually employs the notion of 'restoration' or 'restorative environments', meaning those natural or urban green spaces which have the potential to restore attention and reduce stress. As such, the concept was introduced to study how green spaces could mitigate a pathogenic condition such as stress and attentional fatigue (Labib et al. 2022; Ulrich et al. 1991; 2008, Parson & Hartig et al., 2014). Restoration is usually associated with place attachment, identity, sense of place, bonding, etc, with reference to cultural, biological and evolution-based theoretical explanations (see Kaplan, 1995; Menatti & Casado, 2016; Menatti et al., 2019; Scopelliti et al., 2019). More

recently, environmental psychology has contributed to widen the analysis of how greenery enhances social interaction, equality and cognitive abilities amongst different groups of people[12]. Natural landscapes and environments also play a pivotal role in Indigenous communities' efforts to reclaim their ancestral Lands. Here, deep cultural motivations are intertwined with psychological and ecological considerations (Hatala et al., 2020).

Fewer studies have been carried out inside healthcare facilities on the use of natural environments within the walls of the hospitals or as part of the prevention and treatment of health conditions. Nevertheless, those evidence-based studies that have been conducted are worthy of interest. One of the earliest is a study dated 1984, in which R. Ulrich demonstrated that a view through a window could influence recovery from surgery. The study was pioneering in environmental psychology, as it shows that patients in a suburban Pennsylvania hospital between 1972 and 1981 who were assigned to a room with a window view of a natural setting had shorter postoperative hospital stays; received fewer negative evaluative comments from nurses' notes; took fewer potent analgesics than 23 matched patients in similar rooms with windows facing a brick building wall. Statistically significant differences were found between the tree-view patients and brick wall-view patients regarding patient length of stay, pain medication use, and nurse notes. Even if we can identify a few limitations, such as the separation between natural and urban landscapes and the lack of consideration of cultural preferences in evaluating the restoration of the environment[13], yet this paper was very influential for the implementation of the psychological research on the role of the environment, of landscape and of what is today defined as greenery (in its real presence or just a view) inside healthcare facilities. The literature on this topic in psychology, sciences, and humanities

[12] Recently, a chapter by Lindern et al. (2022) has applied the concept of salutogenesis to explain *a-posteriori* those evidence-based studies developed in psychology about the so-called 'restorative' role of the environment. We find also different papers in psychology which have included the term 'salutogenic' as synonymous with restorative in their vocabulary, yet without clearly referring to Antonovsky's theory (e.g. Ward Thompson et al., 2014).

[13] The limitations were acknowledged by Ulrich himself, for example when he referred to the "built" view in this study (a largely featureless brick wall) he observed that it was a comparatively monotonous one, thus the conclusions of the research could not be extended to other types of built views. The conclusions cannot be extended also to other patient groups, such as long-term patients, who may suffer from low arousal or boredom rather than from the anxiety problems typically associated with surgeries. "Perhaps to a chronically under-stimulated patient, a built view such as a lively city street might be more stimulating and hence more therapeutic than many natural views. These cautions notwithstanding, the results imply that hospital design and siting decisions should take into account the quality of patient window views" (Ulrich, 1984: 2).

has increased since then (e.g., Whitehouse et al, 2001; Devlin et al., 2016; Ulrich et al., 2020).

In medicine, in the last decades, the environment has been used as a tool (as a visual image, art-piece) in the treatment of pathologies and the examination process. Large images of natural environments have been combined with nature soundtracks to reduce stress and agitated behaviour in patients with dementia, including Alzheimer's (Whall et al., 1997) and to alleviate the pain of patients during invasive examinations (the so-called distraction theory (McCaul & Malott, 1984; Miller et al., 1992; see also Malenbaum et al., 2008).

In architecture and landscape architecture, data about the interaction between environments and patients or healthcare professionals are mostly related to the so-called 'evidence-based design' (EBD). Evidence-based design, by following the general paradigm of evidence-based medicine, attempts to measure the physical and psychological effects of the built environment on its users. The EBD studies show that the use of landscapes/greenery or natural environments inside healthcare facilities provides a reduction of infections, implies less stress for medical staff and improves the quality of perceived healing in different categories of patients (see Becker & Jones-Douglas, 2006; Cooper-Marcus & Sachs, 2013; Pedrinolla, 2019).

Many of these studies fall under the so-called restoration literature or restorative psychology. Even if of great value, these studies and the interventions based on them are generally aimed at mitigating a condition (such as stress) or moving back to an initial normal state. Some work on environmental psychology has even employed the term "salutogenesis", but just to generically refer to the positive potential of green spaces for health (Ward Thompson et al., 2014, Lindern et al., 2022).

What these works are missing - and what the salutogenic perspective may provide - is a more comprehensive approach that evaluates not only the pathogenic effects of the environment, but also its preventive effects beyond merely mitigating conditions. A salutogenic account, and more specifically the idea of salutogenic environments, may emphasise the creation of environments which can generally enhance people's health based on their preferences, cultures and settings. Adopting this approach would imply the use of different measures of the effects of the role of spaces on health and the relationship between people and their living spaces, both inside and outside healthcare facilities.

This section has shown that there are many studies on the positive effects of the environment on health. The majority is focused on alleviating, mitigating and reducing a

pathological psychological issue or a condition, or restoring a desirable initial state. Yet, they show the need for a more comprehensive approach, in which the analysis and implementation of the positive elements should complement the negative (pathogenic) ones. As already argued, the absence or reduction of negative effects does not necessarily mean positive outcomes for health and well-being. The literature about the negative effects of the environment on health - e.g. the one about climate change - is growing every day, and rightly so, while attempting to foster ecological awareness in medical education and contribute to sustainability sciences. This literature refers to the pathogenic role of the environment on health, and it conveys a narrative based on the concept of risk and disease. Yet, taking into consideration also the positive effects of the environment could help to fully grasp the role of the environment on health and could have important consequences on the way we design, manage and protect our surroundings (Roe & McCay, 2021).

In conclusion, evidence from medicine, psychology and architecture shows 1) that the environment can be a topic of study in health sciences, both from the salutogenic and pathogenic perspectives; 2) that until now the role of the environment has been mostly analysed as a way to counteract or mitigate a pathogenic condition, such as stress, fatigue, lack of concentration in terms of restoring a condition 3) that the salutogenic environments are not just a way to avoid stress or restore an attention problem, but are the general way to foster health and well-being among people. Further research is needed to understand the epistemological implications of the salutogenic environments, with respect to evidence-based studies to be complemented with a human-centred perspective.

2.3 Importance of considering the salutogenic environments: epistemological and practical implications

Despite the examples provided by the history of medicine and architecture and by contemporary research, the salutogenic role of the environment has been progressively and is still marginalised. Moreover, this body of evidence lacks conceptualisation and theoretical integration. Discussion on the salutogenic role of the environment is missing in philosophy of medicine/philosophy of science and in most of contemporary medical theory. There are many possible reasons for this oblivion. One could be referred to a reductionist approach in modern sciences and medicine, which has been discussed and questioned in philosophy of science and philosophy of medicine (e.g., Ahn et al., 2006;

Beresford, 2010; Valles, 2018: 32). This oblivion led to the lack of a relational framework of health and well-being that accounts for how the environment both supports and promotes health, besides being a source of negative impacts or risks for human beings and organisms in general. Nevertheless, such a relational framework is necessary to understand how the environment can foster health for individuals and communities and how it should be managed and protected as a source of health.

Different reasons support the need to restate the importance of salutogenic environments and develop ideas in this direction:

1) first of all, unhealthy states can develop even in environments that are generally conducive to health, whilst healthy states can be maintained even in environments that pose significant risks - demonstrating that health outcomes depend on the dynamic relationship between individual and environment rather than environmental conditions alone. Furthermore, health and well-being are not merely the absence of disease but refer to the improvement of the general conditions in which the life of an individual or a population takes place. This idea somehow recalls some assumptions of the WHO 1948 definition of health, according to which health is "a state of complete physical, mental and social well-being and *not merely the absence of disease or infirmity*' (WHO, 1946: 2; WHO, 1948; this definition was later reaffirmed in the Alma-Ata WHO Declaration of Health in 1978). In this view, health is not just the absence of a pathogenic element. The presence of a salutogenic environment is a complementary element to be considered in a wider and comprehensive consideration of health.

2) The notion of salutogenic environments can respond to the necessity of understanding what the environment is for the health of the organism and clarify the complexity of this relationship. In the last decades, the analysis of the environment in medicine has been developed mostly with regard to the proximal environment of the organism, or with regard to environmental pathogenic elements affecting the life and development of the organism. Just recently, the role of the environment has been analysed in a non-externalistic way for the organism (see Baedke & Buklijas, 2022). However, we cannot understand what the environment is, as related to health, if we remain exclusively in the realm of a pathogenic account. The notion of salutogenic environments can fill this gap and provide both a more comprehensive framework and specific conceptual tools to address the relationship between health and the environment in medicine and philosophy.

3) Introducing the notion of salutogenic environments can respond to the call for a systemic, relational and ecological understanding of health by medicine in general, and

specifically by medical education, medical humanities and medical theory (Coope, 2021, Lewis, 2021, Zielinsky, 2022, Rapport, 2003; Gehle et al., 2010; Young, 2020; Goshua et al., 2021; Sullivan et al., 2022). The salutogenic environments are a useful tool to analyse the positive value of the environment on health and to foster ecological sensitivity and awareness within healthcare professionals.

4) Healthcare professionals and medical educators could benefit from the research on salutogenic environments as a new set of lenses to observe and consider the different dimensions of the relationship between environment and health, and to apply this know-how to the care of the patients. The salutogenic/pathogenic coupling can shed light on pivotal aspects of the aetiology, treatment, care and cure of the patient's diseases and conditions. More specifically, through the lens of a salutogenic framework and by pursuing the analysis of salutogenic environments, health professionals can understand where the patient comes from in terms of social and environmental surroundings. They can, for instance, evaluate the effects of climate change disruptive events on health, but, at the same time, they can assess the positive effects of the environment on the health and well-being of the patients. The salutogenic framework can provide insights about the places where patients spend their lives, concerning post-treatment, recovery and prevention. The environment of the patient has sometimes been considered in terms of social determinants of health. The environment belongs to the list of Social Determinants of Health (Commission on Social Determinants of Health, 2008; Committee on Educating Health Professionals to Address the Social Determinants of Health, 2016; see also Solar & Irwin, 2010), by referring to "housing, basic amenities and the environment", together with the various conditions which have an impact on health, among them: governance, education, employment, social security, etc. Social determinants are valuable tools in determining health risks and preventing disease in a given population (e.g., Cockerham et al., 2017; Scribner et al., 2017). They are also at the basis of recent accounts of population health (Valles, 2018). However, the reference to the environment within the social determinants of health is often generic and usually pathogenic. The concept of salutogenic environments can be considered an implementation and an amelioration of this aspect of the social determinants of health. Analysing the salutogenic environments for patients' lives could allow us to focus not just on the risk factors, but on all the aspects of the environment enabling health and potential for health, in the different phases of caring for and curing the patients.

5) The salutogenic framework and the notion of salutogenic environments can provide insights into the place of care and healthcare facilities. In this sense, a vast amount of medical, psychological and architectural literature I discussed above, starting from the pioneering work by R. Ulrich (1984), has been demonstrating the role of the environment in fostering health and well-being inside and outside healthcare facilities. This literature provides insights into spaces, landscapes and environments which can contribute to the health and well-being of healthcare professionals, patients and patient's families.

6) More specifically, from the philosophical and theoretical point of view, the notion of salutogenic environments may allow us to shed light differently on the contemporary evidence in medicine, environmental psychology, and architecture (based on qualitative and quantitative methodologies) that illustrates the positive role of the environment in preventing diseases and promoting health. The notion of salutogenic environments addresses the positive role of the environment for health and well-being, which has often been left unexplored in contemporary medicine. With this new perspective, it is possible to discuss, compare, and integrate theories that are used in humanities and cognitive science to justify the positive role of the environment, such as cultural theory, evolutionary biology, or theories of perception. Talking about salutogenic environments responds to a timely call about the importance of the environment in the conceptualisation of health and well-being. It introduces a novel dimension in the debate in biomedical science and the humanities. It may help to analyse the growing amount of evidence proposed by psychology, medical theory, and environmental sciences and to provide a comprehensive, relational and situated account of health.

7) From the epistemological point of view, the discussion of the salutogenic role of the environment and the salutogenic environments has implications with respect to the literacy of medical sciences, and the communication and trustworthiness of scientific research (Douglas, 2022). Relating and analysing the effects of the environment on health should be implemented according to science-based communication and research. However, greenery and environment are often erroneously related to pseudoscience or alternative medicine, which risks undermining the research about ecological issues and impedes a psychologically and biomedically consistent consensus and evidence-based analysis of the relationship between health and the environment. This field of study should not be left to pseudoscience, but approached, instead, with the tools of science and humanities. To avoid reductionism, it would benefit from the contributions of those disciplines at the crossroads of medicine and humanities, such as philosophy of science,

environmental philosophy, philosophy of medicine, medical humanities or environmental humanities. By appealing to evidence-based methodologies and scientific reasonings, the analysis developed from a salutogenic perspective could go in the direction of questioning pseudoscience in medicine (Louhiala, 2010; Mukerji & Ernst, 2022).

3. Conclusion

Research in medicine is increasingly calling for the importance of considering the environment and climate change issues in medical theory, education and healthcare practice. In this paper, I have analysed how the ecological dimension of health in medical sciences can be understood and enhanced through a salutogenic approach, first introduced by Antonovsky (1979; 1987; 1996). I have adapted the salutogenic approach to the current healthcare scenario to provide a better understanding of the relationship between health and the environment. I have first analysed the difference between pathogenesis and salutogenesis in medicine, two concepts that are mostly overlooked in philosophy. I have then reframed the salutogenic framework towards the concept of 'salutogenic environments' in order to shed light on the contemporary environment-health coupling. This paper shows that a salutogenic approach has the potential both in theory and in medical practice as: 1) it underlines the positive and preventive aspects of the environment as related to health; 2) it allows us to clarify and overcome the opposition between the pathogenic and salutogenic aspects of the environment.

This paper is a first step towards introducing the salutogenic framework in the philosophical community and establishing new bridges between medicine and philosophy.

References

Anderson W. (2004). Natural histories of infectious disease: ecological vision in twentieth-century biomedical science. *Osiris*, 19, 39–61. https://doi.org/10.1086/649393

Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion. *Health Promotion International*, *11*(1), 11–18. https://doi.org/10.1093/heapro/11.1.11

Antonovsky, A. (1990). A somewhat personal odyssey in studying the stress process. *Stress Medicine, 6*(2), 71–80.

Antonovsky, A. (1987). *Unraveling the mystery of health. How people manage stress and stay well*. Jossey-Bass.

Antonovsky, A. (1979). *Health, stress and coping*. Jossey-Bass.

Antonovsky, A. (1967). Social class and illness: A reconsideration. *Sociological Inquiry,* 37, 311–322.

Antonovsky, A. (1967a). Social class, life expectancy and overall mortality. *Milbank Memorial Fund Quarterly,* 45, 31–73.

Antonovsky, A. (1968). Social class and the major cardiovascular diseases. *Journal of Chronic Diseases,* 21, 65–106.

Antonovsky, Av., & Sagy, S. (2022). "Aaron Antonovsky (1923–1994): The Personal, Ideological, and Intellectual Genesis of Salutogenesis." *The Handbook of Salutogenesis*, edited by M. B. Mittelmark et. al., 2nd ed., Springer, pp. 19–27. doi:10.1007/978-3-030-79515-3_4

Antonovsky, Av. (2022a). "Salutogenesis and the Mental Health of First Responders." *The Handbook of Salutogenesis*, edited by M. B. Mittelmark et. al., 2nd ed., Springer, pp. 543–551. doi:10.1007/978-3-030-79515-3_50

Arrizabalaga J. (2018). At the intersection of medical geography and disease ecology: Mirko Grmek, Jacques May and the concept of pathocenosis. *History and philosophy of the life sciences*, *40*(4), 71. https://doi.org/10.1007/s40656-018-0236-8

Baedke, J., & Buklijas, T. (2022). Where organisms meet the environment: Introduction to the special issue 'What counts as environment in biology and medicine: Historical, philosophical and sociological perspectives'. *Studies in history and philosophy of science*, S0039-3681(22)00146-7. Advance online publication. https://doi.org/10.1016/j.shpsa.2022.09.008

Bashford, A., & Tracy, S. W. (2012). Introduction: modern airs, waters and places. *Bulletin of the History of Medicine*. 86(4), 494-514.

Bechtel, W. and Bich, L. (2022). Life Out of Balance: Homeostasis and Adaptation in a Darwinian World. Nexus Series. By Joel B. Hagen. Tuscaloosa (Alabama): University of Alabama Press. *The Quarterly Review of Biology*, 97(1), 55-56. DOI:*10.1086/718730*

Becker, D. M. (1988). History of Preventive Medicine. In: Becker, D. M. & Gardner, L.B. (eds). *Prevention in Clinical Practice*. Springer, pp. 13-21. https://doi.org/10.1007/978-1-4684-5356-0_2

Becker, C. M., Glascoff, M., A. & Felts, M. W. (2010). Salutogenesis 30 Years Later: Where Do We Go from here?. *The international electronic journal of health education*. 13: 25-32.

Becker, F. & Jones-Douglas, S. (2006). The ecology of the patient visit.: attractiveness, waiting times, and perceived quality of care. *Healthcare Design*. 6(7):74-79. 10.1097/01.JAC.0000314703.34795.44

Bell, P. A., Thomas C. Greene, Jeffery D. Fisher, and Andrew Baum. (2005). *Environmental psychology*. 5th ed. Fort Worth, TX: Harcourt.

Bergman, Å, J. J. Heindel, S. Jobling, K. A. Kidd, and R. T. Zoeller, (eds.) (2013). The state-of-the-science of endocrine disrupting chemicals— 2012. Geneva, Switzerland: United Nations Environment Programme and World Health Organization.

Bingham, P., Verlander, N. Q., & Cheal, M. J. (2004). John Snow, William Farr and the 1849 outbreak of cholera that affected London: A reworking of the data highlights the importance of the water sup-ply. *Public Health*,118(6), 387–394. https:// doi. org/ 10. 1016/j. puhe. 2004. 05. 007

Bingenheimer, J.B., Repetto, P.B., Zimmerman, M.A., Kelly, J.G. (2003). A Brief History and Analysis of Health Promotion. In: Gullotta, T.P., *et al. Encyclopedia of* Primary Prevention and Health Promotion. Springer, Boston, MA. https://doi.org/10.1007/978-1-4615-0195-4_3

Bircher J. (2005). Towards a dynamic definition of health and disease. *Medicine, health care, and philosophy*, *8*(3), 335–341. https://doi.org/10.1007/s11019-005-0538-y

Britannica, The Editors of Encyclopaedia. (2022). "preventive medicine". *Encyclopedia Britannica*, https://www.britannica.com/science/preventive-medicine.

Canguilhem, G. (1966). *Le Normal et le Pathologique*. Presses Universitaires de France.

Cannon, W. B. (1932). *The Wisdom of the Body*. Norton & Company, Inc.

Carson, R. (1962). *Silent Spring*. Houghton Mifflin Company.

Cazzolla Gatti, R., Menéndez, L. P., Laciny, A., Bobadilla Rodríguez, H., Bravo Morante, G., Carmen, E., Dorninger, C., Fabris, F., Grunstra, N. D. S., Schnorr, S. L., Stuhlträger, J., Villanueva Hernandez, L. A., Jakab, M., Sarto-Jackson, I., & Caniglia, G.

(2021). Diversity lost: COVID-19 as a phenomenon of the total environment. *The Science of the total environment*, *756*, 144014. https://doi.org/10.1016/j.scitotenv.2020.144014

Charon, R.; DasGupta, S.; Hermann, N.; Irvine, C.; Marcus E. R.; Rivera Colsn E.; Spencer, D. &Spiegel, M. (eds) (2017). *The principles and practice of narrative medicine*. Oxford University Press.

Cockerham, W. C., Hamby, B. W., & Oates, G. R. (2017). The social determinants of chronic disease. *American Journal of Preventative Medicine*, *52*(1S1), S5–S12. https://doi.org/10.1016/j.amepre.2016.09.010

Colborn, T., vom Saal, F. S., & Soto, A. M. (1993). Developmental effects of endocrine-disrupting chemicals in wildlife and humans. *Environmental health perspectives*, *101*(5), 378–384. doi:10.1289/ehp.93101378

Commission on Social Determinants of Health [CSDH]. (2008). *Closing the gap in a generation: Health equity through action on the social determinants of health*. World Health Organization.

Committee on Educating Health Professionals to Address the Social Determinants of Health. (2016). *A Framework for Educating Health Professionals to Address the Social Determinants of Health*. National Academies Press.

Cooper-Marcus, C. & Sachs, N. A. (2013). *Therapeutic Landscapes : An Evidence-Based Approach to Designing Healing Gardens and Restorative Outdoor Spaces*. Wiley.

Coope, J. (2021). On the need for an ecologically dimensioned medical humanities. *Medical humanities*, *47*(1), 123–127. https://doi.org/10.1136/medhum-2019-011720

Costello, A., Mustafa, A., Allen, A., Ball, S., Bell, S., Bellamy, R., Friel, S. et al. (2009). Managing the health effects of climate change: Lancet and university College London Institute for global health Commission. *The Lancet* 373, 9676: 1693–733.

De Garine-Wichatitsky, M., Binot, A., Ward, J., Caron, A., Perrotton, A., Ross, H., Tran Quoc, H., Valls-Fox, H., Gordon, I.J., et al. (2021). "Health in" and "Health of" Social-Ecological Systems: A Practical Framework for the Management of Healthy and Resilient Agricultural and Natural Ecosystems. *Frontiers Public Health*. 8:616328. doi: 10.3389/fpubh.2020.616328

Devlin, A. S.; Andrade, C. C., & Carvalho, D. (2016). Qualities of Inpatient Hospital Rooms: Patients' Perspectives. *HERD*, *9*(3), 190–211. https://doi.org/10.1177/1937586715607052

Dilani, A. (2008). Psychosocially supportive design: A salutogenic approach to the design of the physical environment. *Design and Health Scientific Review, 1*(2): 47–55.

Dietscher, C., Winter, U., & Pelikan, J. M. (2022). The Application of Salutogenesis in Hospitals. In M. B. Mittelmark (Eds.) et. al., *The Handbook of Salutogenesis*. (2nd ed., pp. 397–418). Springer.

Douglas, H. (2022). What makes science trustworthy? A guide for the public. *Think Piece. Unesco Inclusive Policy Lab*. 27 dec. 2022. https://en.unesco.org/inclusivepolicylab/analytics/what-makes-science-trustworthy-guide-public

Dubos, R. (1960) *The mirage of health*. Allen & Unwin.

Engel, G. (1977). The need for a new medical model: a challenge for biomedicine. *Science.* 196:129–136.

Eriksson, M. & Lindström, B. (2008). A salutogenic interpretation of the Ottawa Charter. *Health Promotion International,* 23(2):190–199. https://doi.org/10.1093/heapro/dan014

Eriksson, M., & Lindström, B. (2005). Antonovsky's sense of coherence scale and the relation with health: a systematic review. *Journal of epidemiology and community health* vol. 60,5: 376-81. doi:10.1136/jech.2005.041616

Eriksson, M. & Contu, P. (2022). "The Sense of Coherence: Measurement Issues". In *The Handbook of Salutogenesis*, edited by Maurice B Mittelmark, Springer, p. 79-91. https://doi.org/10.1007/978-3-030-79515-3_11

Fries, C. J. (2020). Healing Health Care: From Sick Care Towards Salutogenic Healing Systems. *Social theory & health: STH* vol. 18,1: 16-32. doi:10.1057/s41285-019-00103-2

Gaynes, R. P. (2019). *Germ theory: Medical pioneers in infectious diseases*. Wiley.

Gartner, J. B., Abasse, K. S., Bergeron, F., Landa, P., Lemaire, C., & Côté, A. (2022). Definition and conceptualization of the patient-centered care pathway, a proposed integrative framework for consensus: a Concept analysis and systematic review. *BMC health services research, 22*(1), 558. https://doi.org/10.1186/s12913-022-07960-0

Gascón, M., Mas, M. T., Martínez, D., Dadvand, P., Forns, J., Plasència, A., & Nieuwenhuijsen, M. J. (2015). Mental health benefits of long-term exposure to residential green and blue spaces: A systematic review. *International Journal of Environmental Research and Public Health*, 12(4), 4354–4379. https://doi.org/10.3390/ijerph120404354

Gehle, K. S., Crawford, J. L., & Hatcher, M. T. (2011). Integrating environmental health into medical education. *American journal of preventive medicine*, *41*(4 Suppl 3), S296–S301. https://doi.org/10.1016/j.amepre.2011.06.007

Geltner, G. (2019). *Roads to health: Infrastructure and urban wellbeing in later medieval Italy*. University of Pennsylvania Press.

Gesler, W. M. (1993). Therapeutic landscapes: theory and a case study of Epidauros, Greece. *Environ. Plan.* 11, 171–189. doi: 10.1068/d110171

Gesler, W. M. (1992). Therapeutic landscapes: medical issues in light of the new cultural geography. *Soc. Sci. Med.* 34, 735–746. doi: 10.1016/0277-9536(92)90360-3

Gradmann, C. (2009). *Laboratory disease: Robert Koch's medical bacteriology*. John Hopkins University Press.

Grahn, P.; Tenngart Ivarsson, C.; Stigsdotter, U.; Bengtssson, I.-L. (2010). Using affordances as a health-promoting tool in a therapeutic garden. In Ward Thompson, C. et al. (Eds.). Innovative Approaches to Researching Landscape and Health. NY: Routledge,

Grover, S., Fitzpatrick, A., Azim, F. T., Ariza-Vega, P., Bellwood, P., Burns, J., Burton, E., Fleig, L., Clemson, L., Hoppmann, C. A., Madden, K. M., Price, M., Langford, D., & Ashe, M. C. (2022). Defining and implementing patient-centered care: An umbrella review. *Patient education and counseling*, *105*(7), 1679–1688. https://doi.org/10.1016/j.pec.2021.11.004

Goshua, A., Gomez, J., Erny, B., Burke, M., Luby, S., Sokolow, S., LaBeaud, A. D., Auerbach, P., Gisondi, M. A., & Nadeau, K. (2021). Addressing Climate Change and Its Effects on Human Health: A Call to Action for Medical Schools. *Academic medicine: journal of the Association of American Medical Colleges*, *96*(3), 324–328. https://doi.org/10.1097/ACM.0000000000003861

Hagen, J. B. (2021). *Life out of balance. Homeostasis and adaptation in a Darwinian world*. The University of Alabama Press.

Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and health. *Annual review of public health*, *35*, 207–228. https://doi.org/10.1146/annurev-publhealth-032013-182443

Hatala, A. R., Njeze, C., Morton, D., Pearl, T., & Bird-Naytowhow, K. (2020). Land and nature as sources of health and resilience among Indigenous youth in an urban Canadian context: a photovoice exploration. *BMC public health*, *20*(1), 538. https://doi.org/10.1186/s12889-020-08647-z

Hinchliffe S. (2015). More than one world, more than one health: re-configuring interspecies health. *Social science & medicine (1982)*, *129*, 28–35. https://doi.org/10.1016/j.socscimed.2014.07.007.

Horton, R., Beaglehole, R., Bonita, R., Raeburn, J., McKee, M., & Wall, S. (2014). From public to planetary health: a manifesto. *Lancet (London, England)*, *383*(9920), 847. https://doi.org/10.1016/S0140-6736(14)60409-8

Huber, M.; Knottnerus, J. A.; Green, L.; van der Horst; H., Jadad, A. R.; Kromhout, D.; et al. (2011). How should we define health? *BMJ, 26*, d4163. https://doi.org/10.1136/bmj.d4163

IPCC, 2023: *Climate Change 2023: Synthesis Report*. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647

Jimenez, M. P., DeVille, N. V., Elliott, E. G., Schiff, J. E., Wilt, G. E., Hart, J. E., & James, P. (2021). Associations between Nature Exposure and Health: A Review of the Evidence. *International journal of environmental research and public health*, *18*(9), 4790. https://doi.org/10.3390/ijerph18094790

Jonas, W. B., Chez, R. A., Smith, K., & Sakallaris, B. (2014). Salutogenesis: the defining concept for a new healthcare system. *Global advances in health and medicine*, *3*(3), 82–91. https://doi.org/10.7453/gahmj.2014.005

Jimenez, J. L., Marr, L. C., Randall, K., Ewing, E. T., Tufekci, Z., Greenhalgh, T., Tellier, R., Tang, J. W., Li, Y., Morawska, L., Mesiano-Crookston, J., Fisman, D., Hegarty, O., Dancer, S. J., Bluyssen, P. M., Buonanno, G., Loomans, M. G. L. C., Bahnfleth, W. P., Yao, M., Sekhar, C., … Prather, K. A. (2022). What were the historical reasons for the resistance to recognizing airborne transmission during the COVID-19 pandemic?. *Indoor air*, *32*(8), e13070. https://doi.org/10.1111/ina.13070

Kaplan, S. (1995). The restorative benefits of nature: toward an integrative framework. *J. Environ. Psychol.* 15, 169–182. doi: 10.1016/0272-4944(95)90001-2

Kahyesh S (2023) History of Medical Microbiology. Arch Clinic Microbio, Vol. 14 No. 2: 228.

Kingma, E. (2019). Contemporary accounts of health. In P. Adamson (Ed.), *Health: A history* (pp. 289–318). Oxford University Press.

Kingma, E. (2010). Paracetamol, poison, and polio: Why Boorse's account of function fails to distinguish health and disease. *The British Journal for the Philosophy of Science, 61*(2), 241–264. https://doi.org/10.1093/bjps/axp034

Kosa, J., Antonovsky, A., & Zola, I. K. (1969). *Poverty and health: A sociological analysis*. Harvard University Press.

Krieger, N. (2020). Measures of Racism, Sexism, Heterosexism, and Gender Binarism for Health Equity Research: From Structural Injustice to Embodied Harm-An Ecosocial Analysis. *Annual review of public health* vol. 41: 37-62. doi:10.1146/annurev-publhealth-040119-094017

Krieger, N. (2011). *Epidemiology and the People's Health: Theory and Context*, Oxford University Press. doi:10.1093/acprof:oso/9780195383874.001.0001

Krimsky, S. (2000). *Hormonal Chaos: The Scientific and Social Origins of the Environmental Endocrine Hypothesis*. Johns Hopkins University Press.

Labib, S. M.; Browning, M. H. E. M.; Rigolon, A.; Helbich, M., & James, P. (2022). Nature's contributions in coping with a pandemic in the 21st century: A narrative review of evidence during COVID-19. *The Science of the total environment*, *833*, 155095. https://doi.org/10.1016/j.scitotenv.2022.155095

Lang, T., & Rayner, G. (2012). Ecological public health: the 21st century's big idea? An essay by Tim Lang and Geof Rayner. *BMJ (Clinical research ed.), 345*, e5466. https://doi.org/10.1136/bmj.e5466

Lazarus, R.S. & Cohen, J.B. (1977) *Environmental stress*. Plenum.

Lee, K. & Brumme, Z. L. (2013). Operationalizing the One Health approach: the global governance challenges. *Health Policy and Planning 28*(7):778–785, https://doi.org/10.1093/heapol/czs127

Lewis, B. (2021). Planetary Health Humanities-Responding to COVID Times. The *Journal of medical humanities*, 42(1), 3-16. https://doi.org/10.1007/s10912-020-09670-2

Lindström, B., & Eriksson, M. (2005). Salutogenesis. *Journal of epidemiology and community health*, *59*(6), 440-442. https://doi.org/10.1136/jech.2005.034777

Lindström, B. (2025). A change of perspective. In M. Eriksson (Ed.), *The Hitchhiker's Guide to Salutogenesis* (pp. 13-22). Springer Open.

Louhiala, P. (2010). There is no alternative medicine. *Medical humanities*. 36 (2): 115-7. doi:10.1136/jmh.2010.004358

Mackenzie, J. S., & Jeggo, M. (2019). The one health approach: Why is it so important? *Tropical Medicine and Infectious Disease, 4*(2), 88. https://doi.org/10.3390/tropicalmed4020088

Malenbaum, S., Keefe, F. J., Williams, A. C. C., Ulrich, R., & Somers, T. J. (2008). Pain in its environmental context: implications for designing environments to enhance pain control. *Pain*, *134*(3), 241–244. https://doi.org/10.1016/j.pain.2007.12.002

Martini, M., & Lippi, D. (2021). SARS-CoV-2 (COVID-19) and the Teaching of Ignaz Semmelweis and Florence Nightingale: a Lesson of Public Health from History, after the "Introduction of Handwashing" (1847). *Journal of preventive medicine and hygiene*, *62*(3), E621–E624. https://doi.org/10.15167/2421-4248/jpmh2021.62.3.2161

Meier Magistretti, C. (2022). "The Sense of Coherence in the Life Course". In *The Handbook of Salutogenesis*, edited by M. Mittelmark et al., Springer, p.117-121. https://doi.org/10.1007/978-3-030-79515-3_14

Meloni, M. (2021). The politics of environments before the environment: Biopolitics in the longue durée. *Studies in History and Philosophy of Science*. 88, 334-344.

Meloni, M. (2016). *Political Biology: Science and Social Values in human heredity from eugenics to epigenetics*. Basingstoke: Palgrave Macmillan.

Meloni, M., & Vatter, M. (2023). Biopolitics After COVID: Notes from the Crisis. *Theory & Event* 26(2), 368-392. https://doi.org/10.1353/tae.2023.0019

Bich, L. & Menatti, L. (2025). Homeostasis and Health: from balance to change. *Biological Theory* (forthcoming).

Menatti, L., Bich, L., & Saborido, C. (2022). Health and environment from adaptation to adaptivity: a situated relational account. *History and philosophy of the life sciences*, *44*(3), 38. https://doi.org/10.1007/s40656-022-00515-w

Menatti, L.; Subiza-Pérez, M.; Villalpando-Flores, A.; Vozmediano, L.; San-Juan, C.; Place attachment and indentification as predictors of expected landscape restorativeness. *Journal of Environmental Psychology*, 63: 36–43. DOI: https://doi.org/10.1016/j.jenvp.2019.03.005

Menatti, L. & Casado da Rocha, A. (2016). Landscape and health. Connecting psychology, aesthetics and philosophy through the concept of affordance. *Frontiers in Psychology*. 7: 571. https://doi.org/10.3389/fpsyg.2016.00571

Miles, A. & Mezzich, J.E. (2011). The care of the patient and the soul of the clinic: person-centered medicine as an emergent model of modern clinical practice. International *Journal of Person Centered Medicine* 1 (2) 207-222. http://dx.doi.org/10.5750/ejpch.v2i1.698

Miller, G. W. (2020). *The Exposome. A New Paradigm for the Environment and Health.* London: Academic Press.

Miller, A. C.; Hickman, L. C. & Lemasters, G. K. (1992). A distraction technique for control of burn pain. *The Journal of burn care & rehabilitation*, *13*(5), 576–580. https://doi.org/10.1097/00004630-199209000-00012

Milligan, C.; Gatrell, A.; & Bingley, A. (2004). "Cultivating Health": Therapeutic Landscapes and Older People in Northern England. Social Science and Medicine, 58, 1781-1793. https://doi.org/10.1016/S0277-9536(03)00397-6

Mittelmark, M. B.; Bauer, G. F; Vaandrager, L.; Pelikan, J. M.; Sagy, S.; Eriksson, M.; Lindström, B.; Meier Magistretti, C. (2022). *The Handbook of Salutogenesis – II edition*. Springer, Cham. https://doi.org/10.1007/978-3-030-79515-3_27

Mittelmark, M. B., Sagy, S., Eriksson, M., Bauer, G. F., Pelikan, J. M., Lindström, B., & Espnes, G. A. (Eds.). (2017). *The Handbook of Salutogenesis*. Springer. 10.1007/978-3-319-04600-6

Mittelmark, M. B. & Bauer, G., F. (2022). Salutogenesis as a Theory, as an Orientation and as the Sense of Coherence. In: , *et al.* The Handbook of Salutogenesis. Springer, p. 11-18 https://doi.org/10.1007/978-3-030-79515-3_3.

Mittelmark, M. B & Bauer, G. F. (2016). "The Meanings of Salutogenesis". In *The Handbook of Salutogenesis*, edited by M. Mittelmark et al., 7-15, New York: Springer.

Mukerji, N. & Edzard, E. (2022). Why homoeopathy is pseudoscience. *Synthese* 200, 394. https://doi.org/10.1007/s11229-022-03882-w

Nikku, N. B. & Eriksson, E. (2012). 'Preventive Medicine', in Ruth Chadwick (Ed.) *Encyclopedia of Applied Ethics* (Second Edition), Academic Press, 2012, p. 584-589.

O'Donnell, M. P. (2009). Definition of health promotion 2.0: embracing passion, enhancing motivation, recognizing dynamic balance, and creating opportunities. *American journal of health promotion : AJHP*, *24*(1), iv. https://doi.org/10.4278/ajhp.24.1.iv

Parkes, M., Waltner-Toews, D., Horwitz, P. (2014). Ecohealth. In: Michalos, A.C. (eds) Encyclopedia of Quality of Life and Well-Being Research. Springer. https://doi.org/10.1007/978-94-007-0753-5_4172

Pedrinolla, A., Tamburin, S., Brasioli, A., Sollima, A., Fonte, C., Muti, E., Smania, N., Schena, F., & Venturelli, M. (2019). An Indoor Therapeutic Garden for Behavioral Symptoms in Alzheimer's Disease: A Randomized Controlled Trial. *Journal of Alzheimer's disease : JAD*, *71*(3), 813–823. https://doi.org/10.3233/JAD-190394

Pelikan, J. M. (2022). "Applying Salutogenesis in Healthcare Settings." *The Handbook of Salutogenesis*, edited by M. B. Mittelmark et. al., 2nd ed., Springer, p. 389–395. doi:10.1007/978-3-030-79515-3_36

Pontarotti, G. & Merlin, F. (2023). From Exposome to Pathogenic Niche. Looking for an Operational Account of the Environment in Health Studies. In E. Giroux, F. Merlin, Y Fayet (eds.) Integrative Approaches in Environmental Health and Exposome Research (pp. 173–206). New York: Springer.

Porter, R. (1998). *The greatest benefit to mankind: A medical history of humanity from antiquity to present*. Norton and Company.

Rapport, D. J., Howard, J., Lannigan, R., & McCauley, W. (2003). Linking health and ecology in the medical curriculum. *Environment international*, *29*(2-3), 353–358. https://doi.org/10.1016/S0160-4120(02)00169-1

Raingruber, B. (2012). *Contemporary Health Promotion In Nursing Practice*. Jones & Bartlett Learning.

Reid, W. V., et al. (2005). Millennium ecosystem assessment: Ecosystems and human well-being: synthesis. Island Press.

Riegelman, R. & Kirkwood, B. (2019). *Public Health 101: Improving Community Health*. Jones & Bartlett Learning.

Rocca, E. & Anjum, R. L. (2020). Complexity, Reductionism and the Biomedical Model. In: Anjum, R., Copeland, S., Rocca, E. (eds) Rethinking Causality, Complexity and Evidence for the Unique Patient. Springer, Cham. https://doi.org/10.1007/978-3-030-41239-5_5

Romanello, M., Di Napoli, C., Drummond, P., Green, C., Kennard, H., Lampard, P., Scamman, D., Arnell, N., Ayeb-Karlsson, S., Ford, L. B., Belesova, K., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., van Daalen, K. R., Dalin, C., Dasandi, N., Dasgupta, S., … Costello, A. (2022). The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. *Lancet*

(London, England), *400*(10363), 1619–1654. https://doi.org/10.1016/S0140-6736(22)01540-9

Roe, J. & McCay, L. (2021). *Restorative Cities. Urban Design for Mental Health and Wellbeing*. Bloomsbury.

Rose, G. (1992) *The Strategy of Preventive Medicine*. Oxford University Press.

Rose, G.; Khaw, K.-T.; and Marmot, M. (2008). Rose's Strategy of Preventive Medicine. Oxford. https://doi.org/10.1093/acprof:oso/9780192630971.001.0001.

Rosenberg, C. E. (2012). Epilogue: airs, waters, places. A status report. Bullettin of the History of Medicine, 86(4), 661-670.

Salas, R. N. (2020). The Climate Crisis and Clinical Practice. *The New England journal of medicine*. 382,7 (2020): 589-591. doi:10.1056/NEJMp2000331

Saracci R. (1997). The World Health Organisation needs to reconsider its definition of health. *BMJ (Clinical research ed.)*, *314*(7091), 1409–1410. https://doi.org/10.1136/bmj.314.7091.1409

Scribner, R. A., Simonsen, N. R., & Leonardi, C. (2017). The social determinants of health care: Taking a place-based approach. *American Journal of Preventative Medicine*, *52*(1S1), S13–S19. https://doi.org/10.1016/j.amepre.2016.09.025

Scopelliti, M., Carrus, G., & Bonaiuto, M. (2019). Is it Really Nature That Restores People? A Comparison With Historical Sites With High Restorative Potential. *Frontiers in psychology*, *9*, 2742. https://doi.org/10.3389/fpsyg.2018.02742

Selye, H. (1950). Stress and the general adaptation syndrome. *British medical journal*, *1*(4667), 1383–1392. https://doi.org/10.1136/bmj.1.4667.1383

Snowden, F. M. (2020). *Epidemics and Society. From the black death to the present*. Yale University Press.

Solar, O., & Irwin, A. (2010). *A conceptual framework for action on the social determinants of health: Social determinants of health discussion paper 2*, World Health Organization.

Soloway, R. (1990). Demography and Degeneration: Eugenic and the Declining Birthrate in Twentieth-Century Britain. Chapel Hill, NC: University of North Carolina Press.

Song, C., Ikei, H., Kagawa, T., & Miyazaki, Y. (2020). Effect of Viewing Real Forest Landscapes on Brain Activity. *Sustainability*, *12*(16), 6601. MDPI AG. Retrieved from http://dx.doi.org/10.3390/su12166601

Stedman, T. L. *Stedman's Medical Dictionary.* (2016). Lippincott Williams & Wilkins.

Stegenga, J. (2018). *Care and cure*. University of Chicago Press.

Sullivan, J. K., Lowe, K. E., Gordon, I. O., Colbert, C. Y., Salas, R. N., Bernstein, A., Utech, J., Natowicz, M. R., Mehta, N., & Isaacson, J. H. (2022). Climate Change and Medical Education: An Integrative Model. *Academic medicine : journal of the Association of American Medical Colleges*, *97*(2), 188–192. https://doi.org/10.1097/ACM.0000000000004376

Susser, M. (1974). Ethical Components in the Definition of Health. *International Journal of Health Services*. 1974;4(3):539-548.

Tulchinsky, T. H. & and Varavikova, E. A. (2015*). The New Public Health* (3rd Edition). Elsevier.

Twohig-Bennett, C., & Jones, A. (2018). The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. *Environmental Research* vol. 166: 628-637. doi:10.1016/j.envres.2018.06.030

Ulrich, R. S., Simons, R., Losito, B. D., Fiorito, E., Miles, M. A., and Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *J. Environ. Psychol.* 11, 201–230. doi: 10.1016/S0272-4944(05)80184-7

Ulrich, R. S., Cordoza, M., Gardiner, S. K., Manulik, B. J., Fitzpatrick, P. S., Hazen, T. M., & Perkins, R. S. (2020). ICU Patient Family Stress Recovery During Breaks in a Hospital Garden and Indoor Environments. *HERD*, *13*(2), 83–102. https://doi.org/10.1177/1937586719867157

Ulrich, R., S. (1984). View through a window may influence recovery from surgery." *Science (New York, N.Y.)* 224,4647: 420-1. doi:10.1126/science.6143402

Valles, S. (2018). *A philosophy of population health science: Philosophy for a new public health era*. Routledge.

Vermeulen, R.; Schymanski, E. L.; Barabási, A-L. & Miller, G. W. (2020). The exposome and health: Where chemistry meets biology. *Science*. 367(6476):392-396. doi:10.1126/science.aay3164

Vinje, H. F.; Langeland, E. & Bull, T. (2017). Aaron Antonovsky's Development of Salutogenesis, 1979 to 1994. In M. B. Mittelmark (Eds.) et. al., *The Handbook of Salutogenesis*. (pp. 25–40). Springer.

Zielinski, C. (2022). COP27 climate change conference: urgent action needed for Africa and the world. *Journal of Medical Ethics*. doi: 10.1136/jme-2022-108698

Wade, D. T., & Halligan, P. W. (2017). The biopsychosocial model of illness: a model whose time has come. *Clinical rehabilitation*, *31*(8), 995–1004. https://doi.org/10.1177/0269215517709890

Ward Thompson, C., Aspinall, P., & Bell, S. (Eds.). (2010). Innovative Approaches to Researching Landscape and Health: Open Space: People Space 2 (1st ed.). Routledge. https://doi.org/10.4324/9780203853252

Ward Thompson, C. (2011). Linking landscape and health: the recurring theme. *Landsc. Urban Plan.* 99, 187–195. doi: 10.1016/j.landurbplan.2010.10.006

Ward Thompson, C., Aspinall, P. & Roe, J. (2014). Access to Green Space in Disadvantaged Urban Communities: Evidence of Salutogenic Effects Based on Biomarker and Self-Report Measures of Wellbeing. *Procedia - Social and Behavioral Sciences* 153: 10–22. https://doi.org/10.1016/j.sbspro.2014.10.036

Watts, N., Adger, W. N., Agnolucci, P., Blackstock, J., Byass, P., Cai, W., Chaytor, S., Colbourn, T., Collins, M., Cooper, A., Cox, P. M., Depledge, J., Drummond, P., Ekins, P., Galaz, V., Grace, D., Graham, H., Grubb, M., Haines, A., Hamilton, I., … Costello, A. (2015). Health and climate change: policy responses to protect public health. *Lancet (London, England)*, *386*(10006), 1861–1914. https://doi.org/10.1016/S0140-6736(15)60854-6

Whall, A. L., Black, M. E., Groh, C. J., Yankou, D. J., Kupferschmid, B. J., & Foster, N. L. (1997). The effect of natural environments upon agitation and aggression in late-stage dementia patients. *American Journal of Alzheimer's Disease*, *12*(5), 216–220. https://doi.org/10.1177/153331759701200506

Whitehouse, S.; Varni, J.; Seid, M.; Cooper-Marcus, C.; Ensberg, M. J.; Jacobs, J. R.; Mehlenbeck, R. S. (2001). Evaluating a children's hospital garden environment: utilization and consumer satisfaction. *Journal of Environmental Psychology*, 21 (3): 301-314. https://doi.org/10.1006/jevp.2001.0224.

World Health Organization. (1986). *The Ottawa charter for health promotion.* WHO.

World Health Organization. (1946). *Constitution of the World Health Organization*. Geneva.

World Health Organisation. (1948). Preamble to the Constitution of the World Health Organisation as adopted by the International Health Conference. The World Health Organization.

World Health OrganiSation. Regional Office for Europe. (1984). Health promotion: a discussion document on the concept and principles: summary report of the Working Group on Concept and Principles of Health Promotion, Copenhagen, 9–13 July 1984. WHO Regional Office for Europe. https://apps.who.int/iris/handle/10665/107835

Young, J. D. (2020). Environmental Amnesia: Climate Change and Medical Education. *Academic medicine: journal of the Association of American Medical Colleges* vol. 95,5: 667-668. doi:10.1097/ACM.0000000000003184